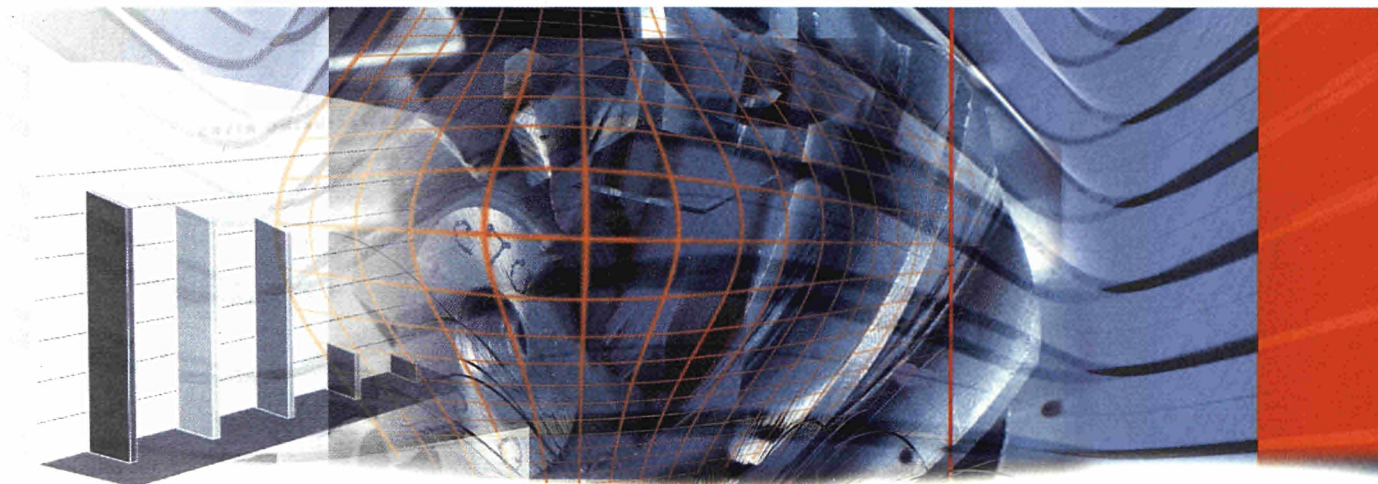


# The competitiveness of European industry



**1999 Report**



EUROPEAN COMMISSION



# **The competitiveness of European industry**

*1999 Report*

*Working document of the services of the  
European Commission*

Preceded by the Commission Communication  
of 6 October 1999 on structural change and  
adjustment in European manufacturing  
COM(1999) 465

This report has been prepared by the Enterprise Directorate-General of the European Commission, with the assistance of a scientific committee, composed of Pierre Buigues, Steve Davies, Pierre Defraigne, Ioannis Ganoulis, Paul Geroski, André Sapir and Leo Sleuwaegen.

Parts of the report draw on background papers prepared for the European Commission by NEI (Nederlands Economisch Instituut) and WIFO (Österreichisches Institut für Wirtschaftsforschung).

A great deal of additional information on the European Union is available on the Internet.  
It can be accessed through the Europa server (<http://europa.eu.int>).

Cataloguing data can be found at the end of this publication.

Luxembourg: Office for Official Publications of the European Communities, 1999.

ISBN 92-828-7647-0

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*Printed in Belgium*

PRINTED ON WHITE CHLORINE-FREE PAPER



# Table of Contents

|  |          |
|--|----------|
| <i>List of abbreviations</i>   | V        |
| <b>Introduction</b>  | <b>1</b> |
| <b><i>PART ONE</i></b>   |          |
| <b><i>ADAPTABILITY AND STRUCTURAL CHANGE IN EUROPEAN MANUFACTURING</i></b>               |          |
| <b>Chapter 1 - Statistical overview by Member State and industrial sector, 1988-1998</b> |          |
| 1. The aggregate picture   | 7        |
| 2. Comparisons across the Member States  | 8        |
| 3. Growth of industrial sectors  | 9        |
| 4. Variability of growth rates between sectors and Member States                         | 10       |
| 5. The theory  | 10       |
| 6. Previous empirical studies  | 11       |
| 7. Defining and measuring specialisation and concentration                               | 12       |
| <b>Chapter 2 - Specialisation of European manufacturing</b>                              |          |
| 1. A weak overall tendency to an increasing production specialisation                    | 15       |
| 2. A weak overall tendency for export specialisation to decrease                         | 16       |
| 3. Individual countries in more detail   | 16       |
| 4. Summary   | 19       |
| <b>Chapter 3 - Geographic concentration of industries</b>                                |          |
| 1. An overall tendency towards de-concentration  | 21       |
| 2. Convergence across industry types   | 23       |
| 3. The core-periphery pattern  | 25       |
| 4. Income, country size and the North-South pattern                                      | 26       |
| 5. Influence of other determinants   | 27       |
| 6. Summary   | 28       |
| <b>Chapter 4 - The impact of structural change on competitiveness</b>                    |          |
| 1. Recalling the advantages and disadvantages of specialisation and concentration        | 31       |
| 2. Speed of change and growth, compared across Member States                             | 32       |
| 3. Is the speed of change increasing?  | 33       |
| 4. Summary   | 33       |
| <b>Chapter 5 - Main findings and policy implications</b>                                 |          |
| 1. Background and results  | 35       |
| 2. Policy implications   | 37       |
| References for Part One  | 37       |

***PART TWO***  
***PRIME FORCES OF STRUCTURAL CHANGE***

|   |    |
|---|----|
| <b>Chapter 1 - Physical investment in Europe</b>  |    |
| 1. Investment trends in the economy and in manufacturing  | 41 |
| 2. Investment in manufacturing: specialisation and concentration                                    | 45 |
| 3. Investment determinants: some empirical results  | 49 |
| 4. Conclusions  | 52 |
| References  | 52 |
| <br>  |    |
| <b>Chapter 2 - Intangible investment and structural patterns of European manufacturing industry</b> |    |
| 1. Performance by industry types  | 56 |
| 2. Intangibles, skills and industry specialisation in the Member States                             | 60 |
| 3. Policy conclusions   | 62 |
| References  | 64 |
| <br>  |    |
| <b>Chapter 3 - Competitiveness, restructuring and firm location flexibility</b>                     |    |
| 1. Industry dynamics and the location of economic activities  | 67 |
| 2. Spatial networks of multinational enterprises  | 68 |
| 3. Relocation in two types of networks  | 70 |
| 4. Operating flexibility  | 71 |
| 5. Further locational implications  | 73 |
| 6. Conclusions  | 74 |
| References  | 75 |

***PART THREE***  
***THE SENSITIVITY OF EUROPEAN INDUSTRY TO EXTERNAL SHOCKS***

|   |    |
|---|----|
| <b>Chapter 1 - The impact of the financial and economic crisis in Southeast Asia on European industries</b> |    |
| 1. Background to the crisis in Emerging Markets   | 83 |
| 2. Impacts of the crisis on global trade and growth   | 84 |
| 3. The composition of EU trade with emerging markets  | 85 |
| 4. The impact of the crisis on aggregate European trade   | 86 |
| 5. The impact of the crisis by manufacturing industry   | 87 |
| 6. The impact of the crisis by Member State   | 95 |
| 7. Conclusions  | 98 |
| References  | 99 |

## List of abbreviations

|        |  |
|--------|--|
| bn     | billion  |
| CEEC   | Central and Eastern European Countries                                       |
| COMEXT | Eurostat, New Cronos (external trade – <i>COMmerce EXTérieur</i> – database) |
| CR3(5) | Concentration Ratio referred to the largest 3(5) industries/countries        |
| DEBA   | Eurostat, New Cronos (Data on European Business Activity)                    |
| EFTA   | European Free Trade Area   |
| EITO   | European Information Technology Organisation                                 |
| EM     | Emerging Market  |
| EOS    | Economies Of Scale   |
| EU     | European Union   |
| FDI    | Foreign Direct Investment  |
| GDP    | Gross Domestic Product   |
| GFCF   | Gross Fixed Capital Formation  |
| GNP    | Gross National Product   |
| ICT    | Information and Communication Technologies                                   |
| IT     | Information Technologies   |
| n.a.   | not available  |
| MES    | Minimum Efficient Scale  |
| mio    | million  |
| MNE    | Multinational Enterprise   |
| p.a.   | per annum  |
| PPP    | Purchasing Power Parity  |
| R&D    | Research and Development   |
| RCA    | Revealed Comparative Advantage   |
| SBS    | Eurostat, New Cronos (Structural Business Statistics database)               |
| SME    | Small- or Medium-sized Enterprise  |
| SR     | Specialisation Rate  |
| STAN   | OECD, DSTI (STAN industrial database), 1998                                  |
| USA    | United States of America   |



# STRUCTURAL CHANGE AND ADJUSTMENT IN EUROPEAN MANUFACTURING

Communication from the Commission to the Council, to the European Parliament,  
to the Committee of the Regions and to the Economic and Social Committee

COM(1999) 465

(Presented by Mr. Erkki LIIKANEN, Member of the Commission)

## Introduction

In its resolution of the 21<sup>st</sup> November 1994 on reinforcing European competitiveness, the Council invited the Commission to report regularly on the competitiveness of European industry.

This Communication summarises the main findings of the 1999 Competitiveness Report<sup>1</sup> and aims to stimulate the debate on the adaptation of European industry to the new conditions resulting from increasing competition both within and outside the European Union.

The 1999 Competitiveness Report is the third one issued after the Council resolution. It deals with structural change in the EU economy, focusing on the presentation and analysis of sectoral data on manufacturing.

The choice of emphasis on manufacturing and the use of country-level, rather than regional, information are imposed by data availability.

## Adaptability: key to competitiveness

The competitiveness of a country is essential for the welfare of its citizens. It means output growth and high rates of employment in a sustainable environment. In a fast-moving world economy, one of the keys to competitiveness is adaptability. An economy is adaptable if it can accumulate and re-deploy resources rapidly in pursuit of new opportunities, while, at the same time, fully exploiting existing competitive strengths. Adaptability is crucial not only for the growth prospects of a country but also for its resilience to economic shocks.

*For an economy to be adaptable to rapid changes of technology and tastes, it should combine macro-stability with micro-mobility.* This year's Competitiveness Report is about mobility, structural change and accumulation in the European manufacturing sector over the last ten years.

The 1999 Competitiveness report is divided in three parts. The *first part* considers the speed and pattern of change in the structure of European manufacturing. It looks at trends in industrial specialisation and in geographic concentration and it relates structural change to growth patterns in Europe.

The *second part* considers in more detail some of the prime forces behind structural change. These include the decisions of firms to invest in tangible and intangible assets and the reorganisation of large multinational enterprises (MNEs) into integrated European-wide organisations operating through networks.

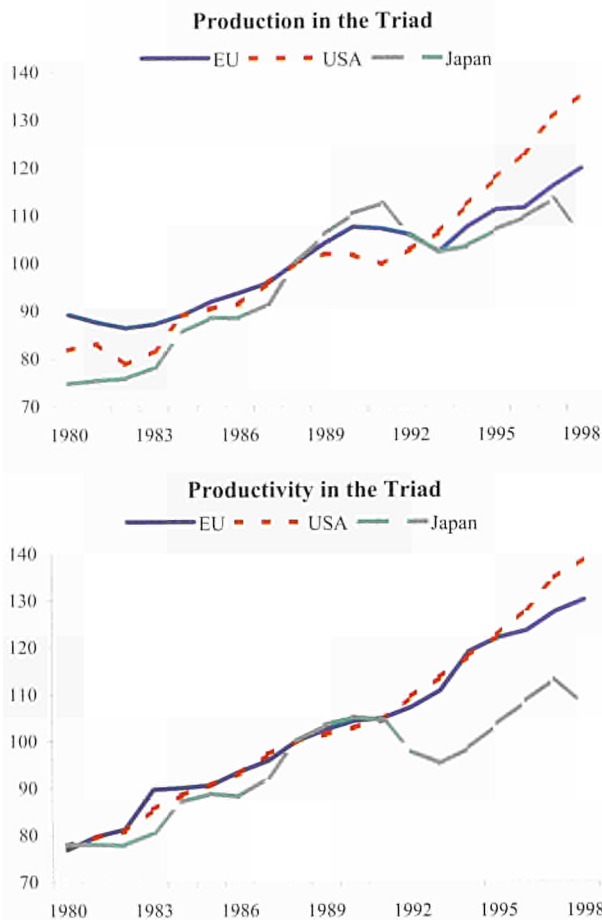
The *third part* provides some indications on the sensitivity of different industries and of different European countries to a world-wide economic shock. It looks, in particular, at the effects on European competitiveness of the recent crisis in Southeast Asia.

## Large potential gains from restructuring

During the period 1988-1998, manufacturing value added in constant prices grew in the EU by 1.8% p.a. and employment in manufacturing fell by 1.4% p.a. on average. Compared to the eighties, this has been a period of slow growth for both Europe and Japan. Growth has accelerated, instead, in the USA (see Figure 1).

<sup>1</sup> European Commission (1999). The competitiveness of European industry: 1999 Report. Luxembourg, SEC(1999) 1555.

**Figure 1: Growth of manufacturing production and productivity in the Triad (1988=100)**



Note: Production in real terms.

Source: WIFO (Österreichisches Institut für Wirtschaftsforschung) calculations using Main Economic Indicators (OECD) and SBS (Eurostat).

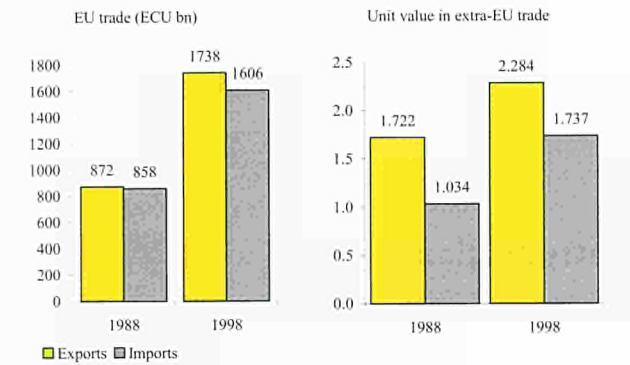
Output and employment performance were weak despite the fact that European manufacturing maintained its market share in the world markets and enjoyed a quality premium in its exports. The trade surplus remained large over most of the period (see Figure 2).

Slow output growth was accompanied by sharp falls in employment in most large EU countries as well as in Finland and in Sweden. Only Ireland and Denmark registered substantial growth in both output and employment in the manufacturing sector (see Table 1).

In part, the poor performance in the last decade may be due to cyclical factors. The case of Finland is different in that this country suffered a devastating loss of export markets in the beginning of the nineties but seems to have, since, turned around the tide. For the most part, however, previous competitiveness reports have attributed the unsatisfactory outcome of the

nineties to structural weaknesses that have prevented EU firms from taking full advantage of new market opportunities. In general, small, open economies appear to have performed better.

**Figure 2: Trade surplus and quality premium in EU trade**



Note: Unit values in the right panel are for EU12.

Source: WIFO calculations using COMEXT (Eurostat).

**Table 1: Annual growth, by Member State**

|                | 1998/1988   | 1997/1988   |              |            |
|----------------|-------------|-------------|--------------|------------|
|                | Value added | Value added | Productivity | Employment |
| EU             | 2.9         | 3.2         | 4.3          | -1.1       |
| Ireland        | 7.9         | 9.9         | 5.7          | 4.2        |
| Austria        | 6.7         | 7.0         | 8.8          | -1.8       |
| Portugal       | 6.7         | 7.2         | 7.6          | -0.4       |
| Belgium        | 4.7         | 5.3         | n.a.         | n.a.       |
| Greece         | 4.4         | 5.6         | 7.3          | -1.7       |
| Netherlands    | 3.9         | 4.2         | 4.2          | 0.0        |
| Denmark        | 3.9         | 4.2         | 2.5          | 1.7        |
| Spain          | 3.6         | 3.1         | 3.9          | -0.8       |
| Germany        | 3.0         | 3.2         | 5.2          | -2.0       |
| France         | 2.4         | 2.8         | 3.7          | -0.9       |
| Italy          | 2.5         | 2.7         | 3.3          | -0.6       |
| United Kingdom | 2.3         | 2.4         | 4.4          | -2.0       |
| Finland        | 1.8         | 1.5         | 1.9          | -0.4       |
| Sweden         | -0.2        | 0.3         | 0.9          | -0.6       |

Notes: Value added in nominal terms.

Source: WIFO calculations using SBS (Eurostat).

Growth in output and employment also varied between different sectors of the economy. Those typified by large investments in intangibles, such as advertising and research intensive industries, grew faster than average. They also shed relatively fewer jobs. Capital and labour intensive industries have done worse on both accounts.

The overall industrial specialisation of EU manufacturing does not appear, however, to be the main factor explaining slow growth. The variation in growth across countries is more pronounced than that across industries. This suggests that *it is the general environment of doing business in each country that needs to be the focus of policy.*



Further, the fact that growth rates vary substantially for the same industry in different countries suggests that *there may still be much scope for restructuring and reallocation of resources within Europe.*

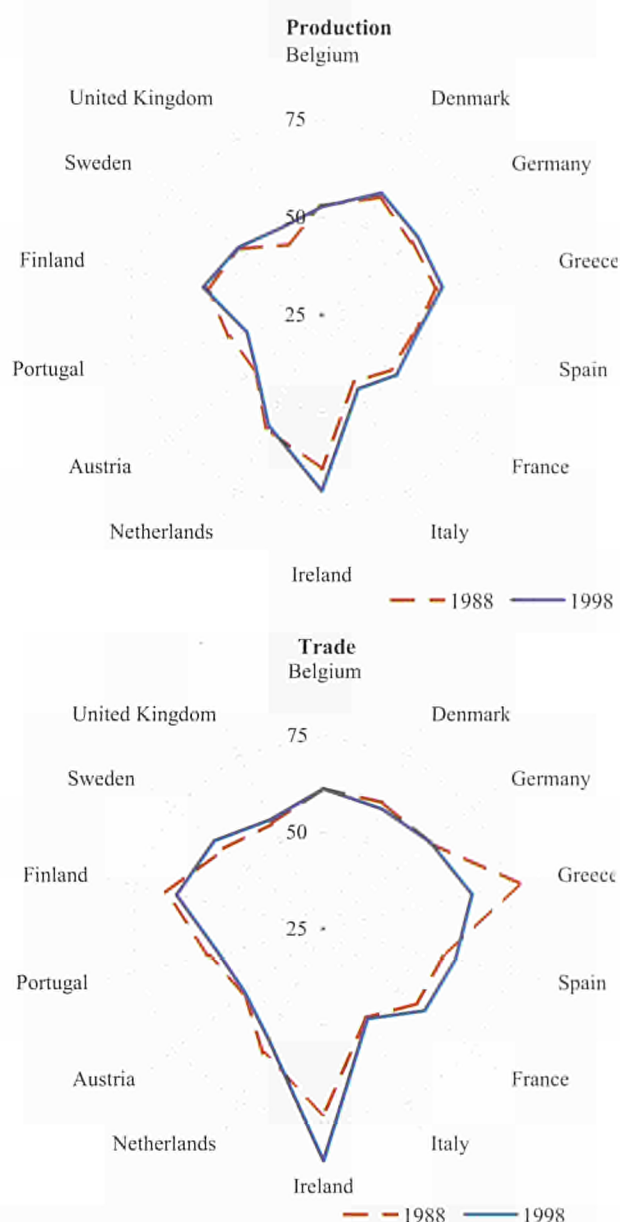
### Little change in Member States' degree of specialisation<sup>2</sup>

High specialisation in few industrial sectors can be a blessing or a curse for a single country. For smaller countries, in particular, it allows a better exploitation of scale economies and of externalities of know-how. The effects, however, of an adverse economic shock may be devastating for a highly specialised country, especially if the mobility and adaptability in the economic system is low.

Over the period under consideration, on average Member States' *degree of specialisation in production has risen only marginally.* The rise is for the most part attributable to increasing specialisation of larger countries in some industries, for example, cars in Germany, machinery in Italy and food in the United Kingdom. Smaller countries did successfully exploit niches but did not experience, in general, a rising specialisation in production.

Further, there are indications that *the degree of specialisation in exports has tended to fall,* albeit slowly. The tendency of de-specialisation in exports is more prominent among smaller EU Member States, with the notable exception of Ireland. De-specialisation in exports should have reduced the exposure of smaller countries to external industry-specific demand shocks (see Figure 3).

**Figure 3: Production and trade specialisation: 1988 to 1998 (share of the largest five sectors)**



Source: WIFO calculations using SBS and COMEXT (Eurostat).

There is no conclusive explanation of the opposite trends between production specialisation and export specialisation. One possible cause would be that MNE headquarter services are more likely to be included in value added statistics rather than in export statistics. Changes in the mix of intra- and inter-industry trade could also explain this phenomenon.

<sup>2</sup> The production structure of a country is “highly specialised” if a small number of industries accounts for a large share of its production. This will be called “production specialisation”. Specialisation can also be measured for exports, or for exports and imports together – “export specialisation” and “trade specialisation” respectively. Needless to say, patterns of specialisation (as well as those of concentration, discussed below) do not necessarily follow the lines of any standard industrial classification scheme, such as NACE used here. Specialisation processes sometimes develop at more disaggregated levels – sub-industries or even firms and they may be regions within countries.

## Geographical concentration<sup>3</sup> of industries declined

High geographical concentration of production or of exports means that a few countries supply a large part of the quantity sold in a given market.

Previous analyses have shown that the EU economy as a whole is less geographically concentrated than that of the USA. This has often led to the prediction that an integrated Europe could become more concentrated. Peripheral and small countries could suffer in the process.

Contrary to such predictions, geographical concentration of both production and exports fell in Europe during the nineties for the great majority of industries. This was primarily due to the fact that *smaller EU Member States have grown faster on average than larger ones*. A number of industries expanded their basis beyond the borders of the more industrially developed EU countries.

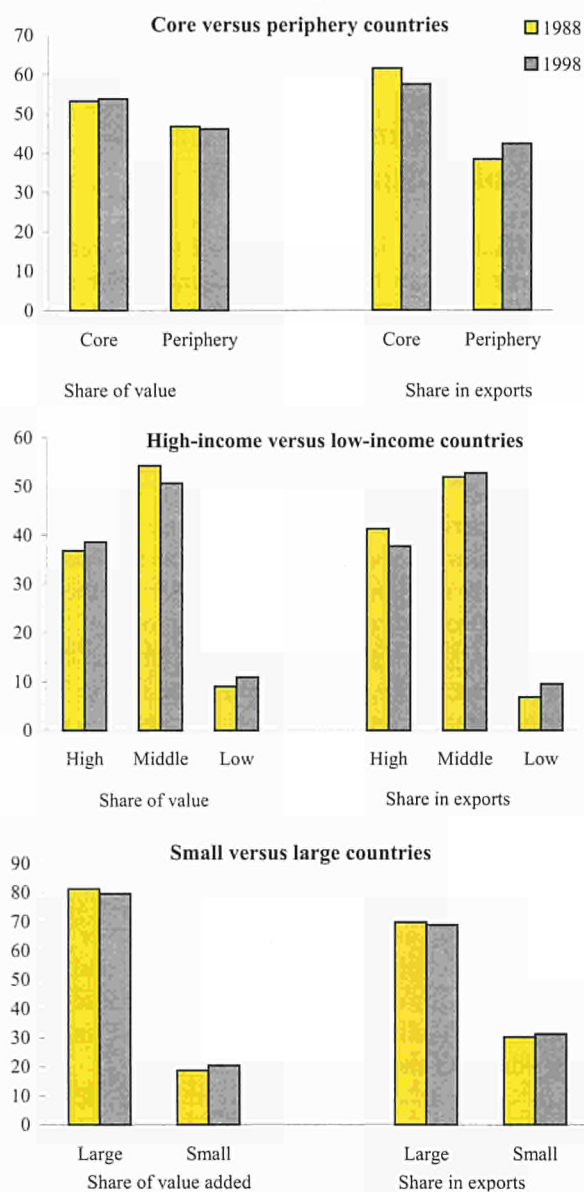
On average, the share of the three largest countries in total EU value added fell by more than one percentage point. In exports, the fall was closer to four percentage points. Moreover, the geographical concentration of research and skill intensive industries declined faster than on average. The smaller EU countries gained shares also in these industries.

Thus, contrary to expressed fears, closer integration in Europe does not seem to have led to a “core-periphery” model at Member State level (see Figure 4).

## Speed of change is important for growth

Structural change is not an end in itself. It is of interest to policy makers in so far as it reveals something about the adaptability and, hence, the competitiveness of the European economic system.

**Figure 4: Geographic concentration of production and exports**



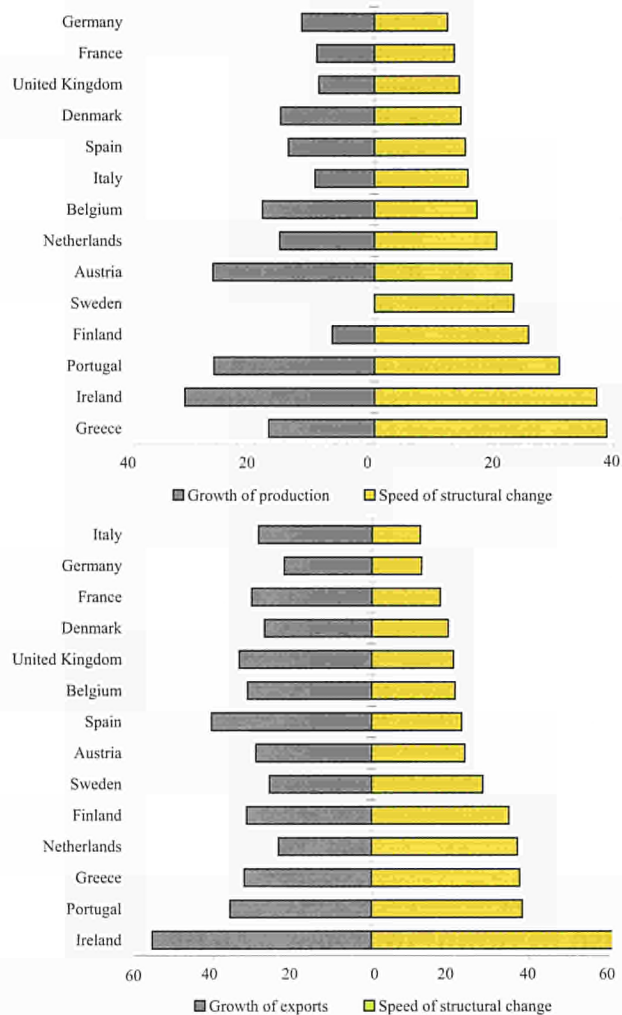
*Note:* The core is defined as composed by Belgium (with Luxembourg), Denmark, Germany, France and the Netherlands. “High-income” countries are Belgium (with Luxembourg), Denmark, Germany and Austria; “middle-income” countries are France, Italy, the Netherlands, Finland, Sweden and the United Kingdom; “low-income” countries are Greece, Spain, Ireland, and Portugal.  
*Source:* WIFO calculations using SBS (Eurostat).

The evidence from industry for the last ten years suggests that *there is a relationship between the “mobility” or “speed of structural change” in Member States and the growth of their production and exports* (see Figure 5).

<sup>3</sup> Geographical concentration is defined as the extent to which EU activity in a given industry is concentrated in just a few Member States. It should be stressed that the report uses aggregate data, not firm data. The term “concentration” is therefore used to indicate the distribution of an industry across the Member States and should not be confused with the notion of “seller concentration” used in industrial economics and in competition policy, which denotes the importance of the largest firms in a market.



**Figure 5: Speed of structural change and growth of production and exports**



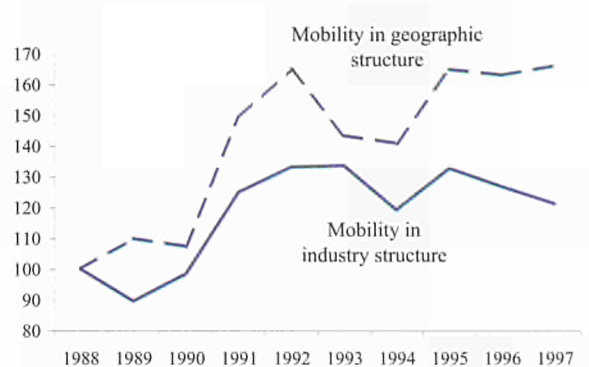
Note: The “speed of structural change” index measures the net effect of structural transformation over a ten-year period. It is computed for each country and separately for value added and exports (total, i.e. extra- and intra-EU) by summing the absolute changes in the sector (i.e. two-digit industry) shares between 1988 and 1998. This index is zero when no industry changes its share and it increases the more industries change their relative positions. This information does not have the same scale as the growth in value added and exports reported on the left-hand side of each figure.

Source: WIFO calculations using SBS and COMEXT (Eurostat).

Looking at the EU as a whole, *mobility is found to have increased since the early nineties*, as economic integration accelerated in line with the Single Market Programme. It declined somewhat over the recession years of 1993-94 (see Figure 6).

On balance, the evidence of the first part of the report suggests that, over the last ten years, the industrial structure of Europe has been changing, albeit relatively slowly. This change has been in line with the objectives of cohesion in Europe: it has not created unfavourable asymmetries between countries and it has tended to favour smaller countries in the periphery of the EU.

**Figure 6: Speed of structural change**



Note: “Mobility” stands for the absolute change of value added shares (sectors, total EU) over the past three years. For instance, 1988 is the difference between 1988 and 1985 (which is taken as reference and set to 100), 1989 is the difference between 1989 and 1986, etc.

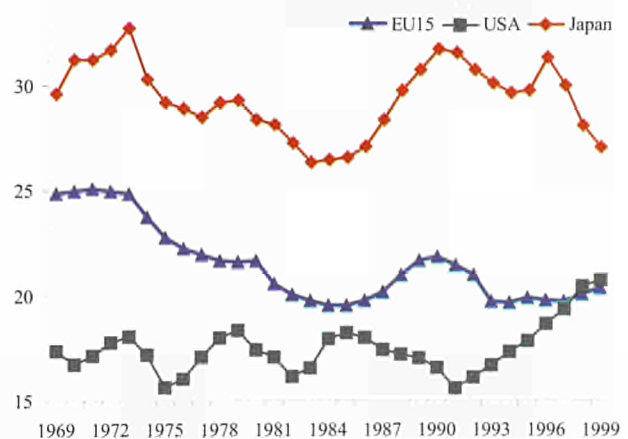
Source: WIFO calculations using SBS (Eurostat).

## Structural change in a period of decelerating investment

The observed industrial change becomes all the more important if one considers that it took place in a decade of weak investment activity in Europe.

In the nineties, the annual growth rate of investment fell sharply to 0.8% p.a. (from 2.5% in the eighties). As a percentage of GDP, gross investment in the EU was close to its post-war minimum (see Figure 7). The deceleration was only partly due to the overall fall in government investment in Europe. Growth of investment in the private sector also fell sharply. The deceleration concerned mainly, but not exclusively, the manufacturing sector.

**Figure 7: Gross fixed capital formation at 1990 prices: total economy (percentage of GDP)**



Source: European Commission.

In contrast, recovery and restructuring in the USA were accompanied by a strong acceleration in investment growth (to 5.4% from 2.4% in the eighties). The acceleration was mainly due to private investment in the manufacturing sector.

Within the EU, France, Italy, Finland and Sweden experienced a fall in gross investment in the nineties. Investment activity in Germany and Belgium grew at or below the EU average. The highest rates of growth were recorded in Denmark, Ireland, Luxembourg and Portugal.

Investment growth and employment creation have been positively related in the long run (see Table 2). This relation seems to have become stronger over time.

**Table 2: Trends in GDP, investment and employment (average annual rate of change)**

|                | GDP     |         |         | GFCF    |         |         | Employment |         |         |
|----------------|---------|---------|---------|---------|---------|---------|------------|---------|---------|
|                | 1970-80 | 1980-90 | 1990-98 | 1970-80 | 1980-90 | 1990-98 | 1970-80    | 1980-90 | 1990-98 |
| Belgium        | 3.4     | 1.9     | 1.7     | 2.3     | 2.3     | 0.9     | 0.2        | 0.2     | 0.2     |
| Denmark        | 2.2     | 2.0     | 2.7     | -0.8    | 1.6     | 4.4     | 0.7        | 0.7     | 0.3     |
| Germany        | 2.7     | 2.2     | 2.0     | 1.2     | 1.6     | 0.9     | 0.1        | 0.6     | -0.5    |
| Greece         | 4.6     | 0.7     | 1.9     | 2.8     | -0.4    | 3.3     | 0.7        | 1.0     | 0.5     |
| Spain          | 3.5     | 3.0     | 2.1     | 1.6     | 5.2     | 1.4     | -0.6       | 0.9     | 0.6     |
| France         | 3.3     | 2.4     | 1.6     | 2.5     | 2.3     | -0.3    | 0.5        | 0.3     | 0.2     |
| Ireland        | 4.7     | 3.6     | 7.7     | 5.7     | 0.5     | 5.6     | 0.9        | -0.2    | 2.9     |
| Italy          | 3.6     | 2.2     | 1.2     | 1.7     | 1.6     | -0.4    | 0.6        | 0.4     | -0.6    |
| Luxembourg     | 2.6     | 4.5     | 5.0     | 2.6     | 3.7     | 5.9     | 1.2        | 1.7     | 3.0     |
| Netherlands    | 3.0     | 2.2     | 2.6     | 0.2     | 1.9     | 2.6     | 0.7        | 1.1     | 1.7     |
| Austria        | 3.6     | 2.3     | 2.1     | 3.7     | 2.5     | 3.1     | 0.3        | 1.1     | 1.1     |
| Portugal       | 4.7     | 3.2     | 2.4     | 4.1     | 3.0     | 4.4     | 0.4        | 1.2     | 0.4     |
| Finland        | 3.4     | 3.1     | 1.5     | 2.1     | 3.4     | -2.5    | 0.9        | 0.6     | -1.3    |
| Sweden         | 2.0     | 2.0     | 1.0     | 0.6     | 3.3     | -2.2    | 0.9        | 0.5     | -1.4    |
| United Kingdom | 1.9     | 2.7     | 2.0     | 0.5     | 4.3     | 2.0     | 0.3        | 0.8     | 0.0     |
| EU-11          | 3.2     | 2.4     | 1.8     | 1.7     | 2.2     | 0.6     | 0.3        | 0.6     | 0.0     |
| EU-15          | 2.9     | 2.4     | 1.8     | 1.5     | 2.5     | 0.8     | 0.3        | 0.6     | 0.0     |
| USA            | 3.2     | 2.9     | 2.7     | 3.6     | 2.4     | 5.4     | 2.4        | 1.8     | 1.3     |
| Japan          | 4.5     | 4.0     | 1.1     | 3.5     | 5.2     | -0.4    | 0.8        | 1.2     | 0.5     |

Note: EU11 = Euro zone.

Source: European Commission.

Low investment is likely to have slowed down structural change, particularly in the recession years of 1993-1994. With the exception of Spain, the “speed of adjustment” of the manufacturing sector in all large European countries (and in Japan) was lower than in the USA. This was in contrast to the eighties when Germany and Japan had the fastest “speed of adjustment” among all large industrialised countries.

## The business environment of individual Member States has an important influence on investment

There is no single set of factors that can explain investment patterns in European manufacturing during 1985-1995. Both macro-economic factors and the life

cycle of products and industries seem to have played an important role.

Investment rates in European industries varied just as much across industries (in the same country) as they varied across countries (for the same industry). Thus, macro-economic policies and national regulatory frameworks may have been as important as industry-specific technological changes and changes in consumer preferences.

Two points are nevertheless worth noting in this respect. First, there is little evidence of a European-wide investment cycle. Variables, such as domestic demand and labour costs, continue to be important determinants of investment at the national level. Thus, despite the process of economic integration, there is still a significant “home-country effect” influencing investment.

Second, this “home country effect” does not seem to be exclusively due to differences in the business cycle of Member States. Differences in investment rates of Member States have persisted over a long period, throughout the business cycle and across sectors. This suggests that *there are important differences in the structural characteristics, as well as in cultural and institutional background of Member States, affecting the investment decisions of firms.*

## Member States’ heterogeneity persists also in intangible investment

Member State’s characteristics seem to matter also for the decisions of firms to invest in intangible and in human capital.

Despite the importance of these types of capital for the competitiveness of the economy, our relevant data sources and our understanding of the investment decisions in this field are inadequate.

Based on a broad industry taxonomy by factor inputs, one can gain a glimpse of the heterogeneity that exists in EU (see Table 3).

Different structural patterns reflect differences in the utilisation of technology and in the skill intensity of production methods, both of which affect labour productivity and export unit values.

The empirical evidence suggests that *investment in intangibles is important for competitiveness irrespective of the industrial specialisation of the country.* It is particularly relevant for the competitiveness of high-R&D and high-skill intensive industries.

**Table 3: Value added shares in total manufacturing in 1997, %**

|                | Mainstream manufact. | Labour-intensive | Capital-intensive | Marketing-driven | Technology-driven |
|----------------|----------------------|------------------|-------------------|------------------|-------------------|
| Belgium        | 22.12                | 15.63            | 22.24             | 21.08            | 18.93             |
| Denmark        | 29.50                | 14.68            | 12.08             | 28.60            | 15.13             |
| Germany        | 28.06                | 14.13            | 15.46             | 16.22            | 26.13             |
| Greece         | 19.61                | 17.71            | 19.26             | 35.36            | 8.06              |
| Spain          | 21.17                | 20.78            | 16.47             | 26.73            | 14.84             |
| France         | 21.94                | 13.57            | 14.69             | 22.10            | 27.69             |
| Ireland        | 12.06                | 6.25             | 12.56             | 31.48            | 37.66             |
| Italy          | 28.88                | 19.84            | 15.90             | 17.65            | 17.73             |
| Netherlands    | 21.50                | 11.75            | 19.23             | 31.20            | 16.32             |
| Austria        | 26.39                | 18.83            | 16.29             | 24.61            | 13.88             |
| Portugal       | 21.92                | 23.65            | 13.94             | 29.77            | 10.72             |
| Finland        | 22.82                | 14.98            | 28.59             | 17.54            | 16.07             |
| Sweden         | 21.95                | 12.07            | 21.25             | 16.16            | 28.57             |
| United Kingdom | 22.85                | 13.21            | 14.33             | 25.52            | 24.08             |
| EU             | 25.41                | 15.31            | 15.55             | 21.28            | 22.46             |
| USA            | 21.26                | 12.22            | 13.51             | 23.17            | 29.84             |
| Japan          | 24.86                | 16.00            | 16.01             | 21.00            | 22.13             |

Source: WIFO calculations based on SBS (Eurostat).

Labour productivity, in particular, is found to be determined, in order of importance, by the skill-intensity of labour, by the invested physical capital, by the research expenditures and by the advertising outlays.

## Multinationals are reorganising into European-wide networks

Industry level data reflect only part of the whole restructuring process and mobility in Europe. A large part of this process takes place within industries, at the micro level. It involves, among other things, the entry and exit of firms, changes in ownership and control of enterprises through mergers and acquisitions, as well as the internal reorganisation of large MNEs.

The strategies and structure of MNEs have changed over time. The establishment of stand-alone affiliates based on a specific territory, operating autonomously and duplicating activities represent old strategies. At present, *an increasing number of MNEs are becoming integrated Europe-wide organisations.* They build, and operate through, production and subcontracting networks that span the whole of Europe (see Table 4).

The progress in information and communication technologies (ICT) has made access to networks easier for all firms. Nevertheless, it remains true that *larger firms have more possibilities to build and participate in such networks throughout Europe.*

The creation of these integrated enterprise networks has far-reaching effects on European restructuring and integration.

**Table 4: Evolution of MNE strategies and structures**

| Form                             | Types of intra-firm linkages                          | Degree of integration      | Environment  |
|----------------------------------|---|----------------------------|--|
| Stand-alone                      | Ownership, technology                                 | Weak                       | Host country accessible to FDI; significant trade barriers; costly communications and transportation |
| Simple integration               | Ownership, technology, markets, finance, other inputs | Partially strong           | Bilaterally open trade and FDI; non-equity arrangements  |
| Complex international production | All functions   | Potentially strong overall | Open trade and FDI; IT; convergence in tastes; increased competition                                 |

Source: World Investment Report 1993 (United Nations).

First, the networking of firms is essential for the cross-border transfer of know-how and of proprietary advantages. Second, firms that belong to such a network have an increased ability to reallocate resources internally in response to adverse economic shocks. This increases the adaptability of the whole economic system. At the same time, it limits the margins within which purely domestic policies can be conducted.

Summarising, the second part of this report argues that the weak investment activity of the nineties has, in all probability, made restructuring in the EU more difficult. Investment decisions in both tangible and intangible assets are still influenced significantly by country specific structures and characteristics. It is easier for larger MNEs to reorganise their operation to take full advantage of the Single Market. Policy needs to focus, therefore, on local impediments to investment and on the difficulties of SMEs to build and participate in European-wide networks.

## Industrial structure is important in facing world-wide shocks

*Adaptability is essential for the resilience of the European economic system to shocks.* The redeployment of resources can mitigate the effects of adverse economic conditions in a specific industry or country.

The recent crisis in Southeast Asia is a good example of how a macro shock abroad may asymmetrically hit industries and countries within Europe, necessitating a rapid structural adjustment.

The aggregate impact of the crisis on European manufacturing during 1996-1998 is estimated to have been between half and one percent of aggregate production. As the impact was not concentrated particularly in sectors of high labour intensity, the loss of employment in manufacturing is likely to have been



of the same order. In the longer run, the effects of the crisis could still prove more significant.

The overall analysis indicates that *the effect of the crisis on EU manufacturing production was rather asymmetric across industries*. Luxury goods industries stand out as having been hit hardest. Engineering industries also appear to have been highly exposed to the crisis. Basic metals industries have both lost exports and faced tougher import competition at home.

*EU countries were also hit asymmetrically, depending on their industrial specialisation (see Table 5).*

**Table 5: EU manufacturing trade with Southeast Asia (actual and adjusted change in exports and imports)<sup>a</sup>**

|                    | Exports<br>% change 1996-1998 |                       | Imports<br>% change 1996-1998 |                       |
|--------------------|-------------------------------|-----------------------|-------------------------------|-----------------------|
|                    | Actual                        | Adjusted <sup>b</sup> | Actual                        | Adjusted <sup>b</sup> |
| France             | 3.5                           | -1.5                  | 37.9                          | 33.8                  |
| Belgium-Luxembourg | -13.5                         | -20.1                 | 33.6                          | 28.1                  |
| Netherlands        | -19.8                         | -14.7                 | 55.1                          | 37.7                  |
| Germany            | -20.1                         | -19.8                 | 14.6                          | 33.6                  |
| Italy              | -38.8                         | -26.8                 | 43.9                          | 36.0                  |
| United Kingdom     | -0.3                          | -14.4                 | 37.0                          | 34.1                  |
| Ireland            | 21.7                          | 3.8                   | 75.4                          | 43.3                  |
| Denmark            | -7.4                          | -16.9                 | 36.7                          | 32.1                  |
| Greece             | -26.7                         | -24.9                 | 15.6                          | 56.3                  |
| Portugal           | -26.5                         | -6.0                  | 16.0                          | 27.3                  |
| Spain              | -40.2                         | -20.4                 | 59.6                          | 37.4                  |
| Sweden             | -23.5                         | -15.6                 | 11.8                          | 28.8                  |
| Finland            | -27.7                         | -15.6                 | 19.0                          | 29.3                  |
| Austria            | -22.1                         | -19.7                 | 9.8                           | 32.1                  |

<sup>a</sup> Calculated on trade values.

<sup>b</sup> Using actual sector shares in total extra-EU imports and exports in 1996 for each Member State but assuming average EU growth rates.

Source: NEI (Nederlands Economisch Instituut) using COMEXT (Eurostat).

Export specialisation was an important contributing factor to aggregated falls in the value of manufacturing exports to Southeast Asia for Germany, Italy, Spain, Sweden, Austria, Belgium-Luxembourg and Portugal.

It is less evident whether Member States' import specialisation prior to the crisis had an important effect on the growth rate of imports from Southeast Asia. In Italy and Spain, an even stronger negative effect came through a poor performance of individual industries relative to the EU as a whole.

## In conclusion

Adaptability and rapid structural change are essential for the competitiveness of the European economy and its resilience to world-wide economic fluctuations. The 1999 Competitiveness Report argues that:

- In a period of low growth and low investment rates, the European manufacturing system nevertheless appears to have taken advantage of European integration, shifting resources between industries and countries.

- This restructuring seems to have taken place in line with the broad objective of closer cohesion. Data at Member State level does not indicate any strengthening of a “core-periphery” model. On the contrary, smaller countries in the periphery of the EU have tended to benefit most.
- A recovery in investment activity in both tangible and intangible assets will be needed to facilitate the desired structural changes.
- Along with industry-specific factors, there is still a large “home-country effect” influencing investment in both tangible and intangible assets. Emphasis on these local conditions and local impediments is essential for building a favourable environment for higher investment in Europe.
- Cross border networking of enterprises is also essential for restructuring and competitiveness. Large MNEs are already reorganising their internal operations to take advantage of positive network effects in the Single Market. Attention is needed on the networking of smaller firms.

The main challenge for policy makers that stems from the above conclusions is how to release the potential for further adjustment of industrial structures.

Future analysis should seek to identify those factors which play a key role in the adjustment process and the best avenues for influencing them. The implementation of the Economic and Monetary Union, the emergence of electronic commerce and, more generally, the information society are examples of recent developments which encourage structural adjustment. The country-specific structural factors, the importance of which was emphasised in the 1999 Competitiveness report, can constitute a suitable area for the application of benchmarking techniques.

Beyond enterprise policy, the Commission will continue to exploit the results of its competitiveness analysis within the wider framework of the Cardiff process, the Broad Economic Policy Guidelines and the European Employment Strategy, particularly in relation to structural reform issues.

Limited availability of statistical information, in particular as concerns services, reduced the scope of the analysis. There is a need to look further into the possibilities of improving the statistical tools for the purposes of competitiveness analysis.

# Introduction

## Responding to fast moving markets

European manufacturing has been and is currently facing dramatic changes in its business environment. The process of European integration has abolished trade barriers, created a single market and now a single currency. New technologies, based in telecom, electronics and biotechnology, are changing production patterns and consumer choices. Globalisation is widening the horizons for production, consumption and competition and is accelerating the diffusion of knowledge, information and technology.

Globalisation also increases the world-wide impact of national and regional economic and political shocks and fluctuations. During the nineties, Asian countries, as well as Russia and South America, have been hit by a crisis and forced to reform their financial and economic institutions. At varying paces, CEEC are slowly catching up and have started the process of negotiating access to the EU. Meanwhile, the USA, the EU's major competitor, retains a robust productivity advantage and is enjoying an unprecedented, long period of economic growth without inflation and fiscal deficit.

In this fast moving world economy, adaptability is a key to the competitiveness of Europe. In order to be competitive, the European economy has to be in a position to rapidly accumulate and re-deploy resources in the pursuit of new opportunities. It also has to exploit in full the existing competitive strengths. Adaptability and rapid structural change are crucial not only for the growth prospects of an economy but also for its resilience to economic shocks.

This report is about adaptability and structural change in European manufacturing over the last decade. The emphasis on manufacturing and the use of country-level, rather than regional, information is imposed by data availability. This restricts the scope of the report when it comes to drawing conclusions relevant for employment creation. Manufacturing has long ceased to be a major source of employment creation for most EU Member States. Also, many important questions on convergence in Europe are best examined with

regional data. On the other hand, country level, manufacturing data may be well adapted for examining the broad patterns of restructuring, as it is at this level of aggregation and for this type of products that the Single Market Programme should have had its major impact over the nineties.

The report is divided in three parts. The first part considers the speed and pattern of change in the structure of European manufacturing and their effect on growth. The second part considers in more detail some of the prime forces behind structural change. These include the decisions of firms to invest in tangible and intangible assets and the reorganisation of large MNEs into integrated European-wide organisations operating through networks. The third part examines in some detail the sensitivity of different industries and of different European countries to the recent shock in Southeast Asia.

## Recalling some key results from the 1998 Competitiveness Report

The main emphasis of this report is on the restructuring of industry within Europe. This is rather different than in last year's report, which was focused on the competitiveness of the EU compared to the USA and Japan. Nevertheless, it is instructive to recall some of last year's findings as a useful starting point.

In the last Competitiveness Report, it was shown that, in comparison to the USA, Europe is at a deficit when it comes to creating income and employment. The productivity of the economy as a whole, and of the manufacturing sector specifically, is still significantly lower in Europe than in the USA. Furthermore, in Europe, the share of the population employed is lower and unemployment higher. Jobless growth is a major problem to be solved in the context of sustainable development.

On the other hand, Europe has enjoyed a large and increasing trade surplus in manufacturing (albeit largely because of deficient home demand), a stable world market share of exports, a quality premium for manufacturing, and a strong position in technological

competence and skills. But these must be balanced against deficits of European manufacturing in fast moving markets, characterised either by technological upturns, as in the case of ICT-related research intensive industries, or by rapidly changing consumer tastes.

The previous report attributed the unsatisfactory performance of Europe in growth and employment to structural weaknesses that have prevented European firms from taking advantage of new market opportunities.

### **The effects of European integration – hopes and fears**

To see why adaptability and structural change are important factors of the future competitiveness of Europe, it is helpful to consider the analogy with the design of a successful business strategy for the individual firm operating in competitive, fast moving markets.

On the one hand, the firm must be ready and able to exploit its specific assets to the full, and this will often require dramatic refocusing over a short period. On the other hand, however, concentrating all of its efforts into too narrow a range of activities – “putting all the eggs in one basket” – runs the risk of being left behind as new opportunities arise.

In just the same way, the future success of Europe’s manufacturing sector depends on its ability to exploit the comparative strengths of its various Member States, whilst also retaining the flexibility to change direction as new challenges and opportunities emerge. This leads to three considerations with policy significance on industrial structure in Europe:

- First, exploitation of scale economies and a deeper division of labour are expected to be the driving forces of Europe’s increased competitiveness flowing from the Single Market Programme. If factor endowments are different across countries, one would expect this to lead to increasing specialisation. In this case, a hypothesis would be that high wage countries might move into high productivity and research intensive industries in order to ensure further growth, whilst low wage countries might specialise in more labour intensive activities.
- Second, there is the concern that an over-specialisation of individual countries in narrow product groups might render them too exposed to demand risks. The possibility is that individual countries and regions might become more

vulnerable to “asymmetric shocks”: disturbances that affect countries differently, and would therefore endanger stability within a common currency area.

- Third, there is the potential concern of a regional nature. Integration may lead to an agglomeration of activities in attractive regions. There might be a danger that a preferred “core” will arise, in which high demand or better market access act as a magnet drawing more and more activity away from the poorer regions, located at the geographical “periphery” or disadvantaged by a lack of endowments, their history, or existing industrial structure.

Certainly, if one compares the regional structure in Europe with that of the USA, one might anticipate the potential for dramatic change in Europe. Regions are far more specialised in the USA, and some economists have forecasted that similar levels of regional concentration will emerge in Europe as a consequence of the creation of a Single European Market.

Thus, the purpose of the first part of the report is to contemplate the evidence of the last decade, and to ask: How fast has been the restructuring process? Has Europe – either as a whole, or within Member States – displayed the ability to restructure quickly? At the same time, we look for evidence that arguably worrying regional over-concentrations have emerged, leaving parts of Europe particularly exposed to asymmetric shocks. A stock-taking of the extent and direction of structural change over the last decade provides another opportunity to assess the impact of integration within the EU.

The report starts (Chapter 1) with a brief overview of recent developments in the European manufacturing sector and a very short summary of the relevant previous literature in this area. Chapter 2 establishes that there has been a tendency towards specialisation, but this is only weak, and is confined to production. For exports, the reverse is true. Chapter 3 finds no evidence that this specialisation has resulted in increased concentration – on the contrary, most industries are slightly more evenly spread across the Member States than was true ten years ago. Chapter 4 turns to the link between specialisation and concentration and competitiveness. Some of the evidence suggests that enhanced competitiveness is indeed more likely where the speed of change is faster. Chapter 5 summarises the main findings of the first part of the report.

## Investment decisions and networking of firms

The process of specialisation and concentration is driven by the decisions of individual firms and investors. The speed of this process depends on economic forces such as economies of scale, spillovers, technology, changing consumer tastes and the mobility of labour. While some of these market forces may be beyond the control of the policy maker, this does not mean that policy, regulations and government actions, in general, do not play a role.

To return to the analogy of the successful corporate strategy, it is important that the firm is able to respond efficiently to signals from the market, and it is top management's task to ensure that inertia in the organisation of the firm does not act as an impediment. Similarly, Europe's firms operate within a framework determined by institutions, regulations, liberalisation programmes and public support, and these are amenable to policy intervention both at the national and at the European level.

Thus, the second part of the report looks in more detail at the investment activity in Europe and at its determinants. The weak investment activity of the nineties in both tangible and intangible assets has, in all probability, made restructuring in Europe more difficult. In large part, the investment performance of each industry has depended on the characteristics and structures of the country where the industry is located. The existence of this "home country effect" suggests that emphasis should be given on policies, regulations and structures at the national level.

Large MNEs are already reorganising their operation to take full advantage of the Single Market. There are developing into integrated European-wide organisations operating through networks. The networking of SMEs is also essential for the competitiveness and adaptability of European economy.

The first chapter of the second part starts with investment in tangibles assets. Chapter 2 focuses on intangible investments and chapter 3 on the process of internal reorganisation of MNEs and the building of enterprise networks in Europe.

The last part of the report examines the impact of the recent crisis in Southeast Asia on the competitiveness of single industries and countries in Europe. The crisis in Southeast Asia is a good example of how a macro shock abroad may hit asymmetrically industries and countries within Europe, necessitating a rapid structural adjustment.

## Main messages of the report

In summary, this report argues that:

- Adaptability and rapid structural change are essential for the competitiveness of the European economy and its resilience to world-wide economic fluctuations
- In a period of low growth and low investment rates, the European manufacturing system nevertheless appears to have taken advantage of European integration, shifting resources between industries and countries.
- This restructuring seems to have worked in line with the broad objective of closer cohesion. There has not been any signs of strengthening of a "core-periphery" model. On the contrary, smaller countries in the periphery of the EU have tended to benefit most.
- The potential for restructuring still appears to be wide. Future restructuring may involve transfer of activities across Europe.
- A recovery in investment activity in both tangible and intangible assets will be needed to carry out the desired structural changes.
- There is still a large "home country effect" on investment in both tangible and intangible assets. Emphasis on these local conditions and local impediments is essential for building a favourable environment for higher investment in Europe.

Cross border networking of enterprises is also essential for restructuring and competitiveness. Large MNEs are already reorganising their internal operations to take advantage of positive network effects in the Single Market. Attention is needed on the networking of smaller firms.





## **Part One**

# **Adaptability and structural change in European manufacturing**



## Statistical overview by Member State and industrial sector, 1988-1998

### 1. The aggregate picture<sup>1</sup>

The production of European manufacturing as a whole increased in the period 1988-1998 by 1.8% p.a. in real terms (2.9% p.a. in nominal terms). Seen from a long-term perspective, this was a period of slow growth – slower than in the USA, but higher than in Japan (Figure 1.1). Employment in manufacturing decreased in Europe by around 8% for the total period whilst it was approximately stable in the USA. Europe was more severely hit than the USA by the currency turbulence of 1993-1994, as well as by the Asian crisis and its repercussions in Eastern Europe (Russia) at the end of the period.

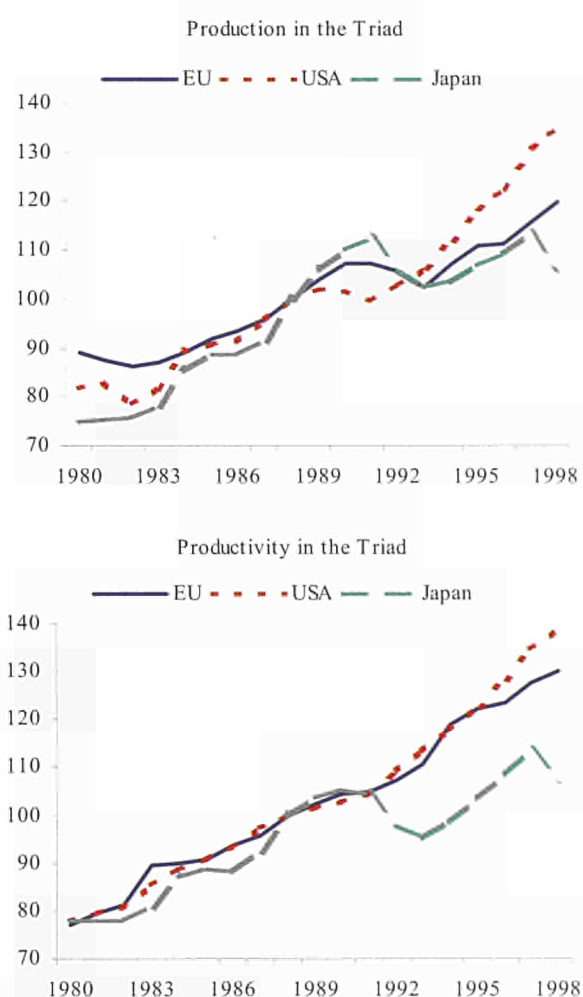
Europe's hope for catching up on productivity versus the USA is therefore not really evident during this period as a whole – indeed the gap has widened in recent years.<sup>2</sup>

The period analysed is 1988 to 1998. Fortunately, the beginning and the end of this period are not particularly extreme points in the business cycle. In the middle of the period, Europe faced a severe recession with devaluations in some Member States. Additional country specific shocks during these years were the unification of Germany, the transition of the CEEC, the loss of the Russian market and the political turmoil in the Balkan region. Each of these shocks affected Member States differently and technically speaking increased the noise in the data set.

Turning to trade, the picture is a little more favourable. Exports (at current prices) have grown faster than imports, so that Europe now has a surplus of 132bn ECU in its trade of manufacturing products (Figure 1.2). Its exports are more higher-valued than its imports, reflecting a positive “quality premium” for its exports to non-members. This premium comes primarily from countries outside the USA and Japan, e.g. from CEEC. Exports as well as imports are rising faster than production, intra-EU exports are increasing

faster than extra-EU exports, reflecting the deepening of integration in Europe (Figure 1.3).

**Figure 1.1: Growth of production and productivity in the Triad (1988=100)**



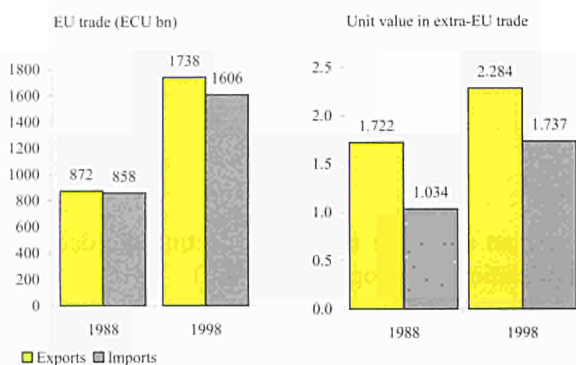
Note: Production in real terms.

Source: WIFO calculations using Main Economic Indicators (OECD) and SBS.

<sup>1</sup> The whole of Part One draws on Aiginger et al. (1999).

<sup>2</sup> Analyses from the US administration suggest that the acceleration of US productivity observed since 1995 is partly attributable to the diffusion and use of ICT in the economy. See US Department of Commerce (1998).

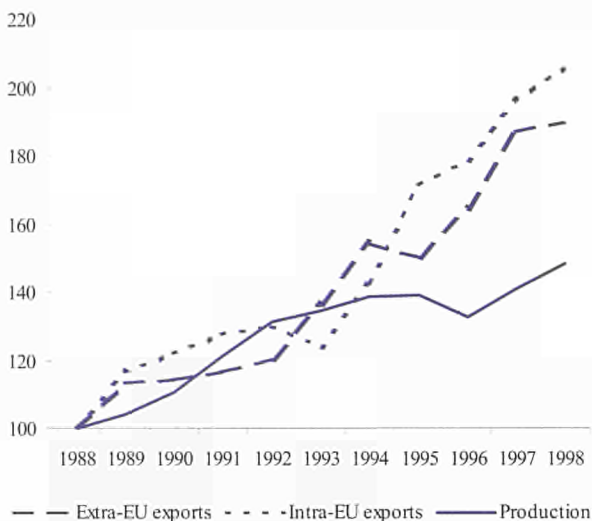
**Figure 1.2: Trade surplus and quality premium in EU trade**



Note: Unit values in the right panel are for EU12.

Source: WIFO calculations using COMEXT.

**Figure 1.3: Exports growing faster than production**



Source: WIFO calculations using COMEXT and SBS.

Let us now turn at looking at individual industries within individual Member States.

## 2. Comparisons across the Member States

Apart from the previous section, in this report, production is defined as nominal value added on grounds that the creation of value added is the final goal of economic activity.<sup>3</sup> Additionally, it is defined as one of the components of competitiveness. Taking

<sup>3</sup> More precisely, we measure production by the value added at factor costs. This is preferred to gross production because it avoids double counting and differences in the degree of vertical integration. This definition is different from that used in many of the publications prepared on SBS data by Eurostat where the variables “turnover” or “production value” are used as equivalent for production.

value added in nominal terms is not ideal for all questions, but problems of price adjustment and holding quality constant for nearly 100 industries in each Member Country are nearly insoluble.

Judged by growth of nominal value added within aggregate manufacturing, the Member States<sup>4</sup> fall into four broad groups (see Table 1.1):

- Three fast growing smaller Member States: **Ireland, Portugal and Austria**. Irish manufacturing industries performed particularly strongly, growing on average by nearly 8% per year, combining a remarkable catching up process with significant specialisation in fast growing industries. With average growth at 6.7%, Portugal is a similar example of a country which has been catching up. Austria also shows an annual growth rate of 6.7%.
- Slightly faster than average growth was also recorded by five other, also mainly small Member States: **Belgium, the Netherlands, Denmark, Greece and Spain**
- **Germany, France, Italy and the United Kingdom** performed rather sluggishly. Germany recorded the highest growth of the four – at just about the overall EU average, but Italy, France and the United Kingdom were all below average.
- At the bottom end of the scale are the two Nordic countries, **Finland and Sweden**. Finland experienced a period of deep recession, induced by problems in the banking sector as well as the large reduction in trade with the former Soviet Union. Both countries were also faced with the devaluation of their currencies during the early nineties.

This country growth pattern is consistent with a catching up process in some of the Member States which had below average per capita income at the start of the nineties. Starting from a position of low average labour productivity in 1988, Ireland and Portugal managed to catch up considerably. However, catch-up was not so pronounced in Greece and Spain.

The ranking of countries by productivity growth is similar, but there are some noteworthy exceptions. In Europe, productivity grew by 1.1% p.a. faster than value added, and this means that employment declined, on average by 1.1%. The countries with particularly strong productivity growth (relative to value added) were Germany and the United Kingdom amongst the

<sup>4</sup> The EU is defined according to its Member States in 1998. The activity of the countries which joined in 1995 is included for the whole period.

larger Member States, and Greece and Austria amongst the faster growing smaller Member States. These were also the four countries suffering the greatest falls in employment. More generally, however, employment has been decreasing in the manufacturing sectors of every Member State, with the exceptions of Ireland and Denmark.

**Table 1.1: Annual growth by Member State**

|                | 1998/1988   | 1997/1988   |              |            |
|----------------|-------------|-------------|--------------|------------|
|                | Value added | Value added | Productivity | Employment |
| EU             | 2.9         | 3.2         | 4.3          | -1.1       |
| Ireland        | 7.9         | 9.9         | 5.7          | +4.2       |
| Austria        | 6.7         | 7.0         | 8.8          | -1.8       |
| Portugal       | 6.7         | 7.2         | 7.6          | -0.4       |
| Belgium        | 4.7         | 5.3         | n.a.         | n.a.       |
| Greece         | 4.4         | 5.6         | 7.3          | -1.7       |
| Netherlands    | 3.9         | 4.2         | 4.2          | 0.0        |
| Denmark        | 3.9         | 4.2         | 2.5          | 1.7        |
| Spain          | 3.6         | 3.1         | 3.9          | -0.8       |
| Germany        | 3.0         | 3.2         | 5.2          | -2.0       |
| France         | 2.4         | 2.8         | 3.7          | -0.9       |
| Italy          | 2.5         | 2.7         | 3.3          | -0.6       |
| United Kingdom | 2.3         | 2.4         | 4.4          | -2.0       |
| Finland        | 1.8         | 1.5         | 1.9          | -0.4       |
| Sweden         | -0.2        | 0.3         | 0.9          | -0.6       |

*Note:* Value added and productivity are in nominal terms. Reliable figures on employment are unavailable for 1998, and so the last three columns show the comparable estimates for value added, productivity and employment for 1988 to 1997. Throughout this report, country aggregates refer to aggregate manufacturing.

*Source:* WIFO calculations using SBS.

### 3. Growth of industrial sectors

Within manufacturing,<sup>5</sup> the average annual growth rate varied quite noticeably. There was negative or zero growth in computers and office machinery, and the textiles and clothing sector, while strong growth – in excess of 4% was observed in tobacco, rubber and plastics, radio, TV and telecommunications equipment, and publishing and printing. Again, in general, productivity growth exceeded that of value added, and the inevitable consequence was generally declining employment. Some of the largest declines in employment were posted by the more traditional sectors of textiles and clothing, and basic metals industries. But office machinery and computers also

reduced employment at a rapid rate – due to the aforementioned negative growth in value added (Table 1.2).

**Table 1.2: Annual growth by industrial sector**

|  | Value added 1998/ 1988 | 1997 / 1988 |              |            |
|--|------------------------|-------------|--------------|------------|
|  |                        | Value added | Productivity | Employment |
| 15 Food products and beverages                         | 3.4                    | 3.8         | 3.8          | 0.0        |
| 16 Tobacco products                                    | 5.9                    | 5.8         | 9.6          | -3.8       |
| 17 Textiles  | 0.9                    | 0.7         | 4.5          | -3.8       |
| 18 Wearing apparel; fur                                | 0.6                    | 0.2         | 3.1          | -2.9       |
| 19 Tanning and dressing of leather                     | -0.1                   | 0.3         | 3.4          | -3.0       |
| 20 Wood, products of wood and cork                     | 3.3                    | 3.2         | 3.7          | -0.5       |
| 21 Pulp, paper and paper products                      | 2.0                    | 2.1         | 3.7          | -1.6       |
| 22 Publishing, printing and reproduction               | 4.4                    | 4.3         | 3.3          | +1.0       |
| 23 Coke, refined petroleum, nuclear fuel               | 2.2                    | 3.1         | 4.4          | -1.3       |
| 24 Chemical and chemical products                      | 2.6                    | 3.3         | 4.5          | -1.2       |
| 25 Rubber and plastic products                         | 4.5                    | 4.5         | 4.1          | +0.4       |
| 26 Other non-metallic mineral products                 | 2.2                    | 2.2         | 3.8          | -1.6       |
| 27 Basic metals  | 0.2                    | 0.8         | 5.1          | -4.3       |
| 28 Fabricated metal products                           | 3.9                    | 4.1         | 4.0          | +0.1       |
| 29 Machinery and equipment n.e.c.                      | 3.6                    | 3.5         | 4.6          | -1.1       |
| 30 Office machinery and computers                      | -2.2                   | -1.1        | 2.1          | -3.2       |
| 31 Electrical machinery/apparatus n.e.c.               | 2.4                    | 2.7         | 4.8          | -2.1       |
| 32 Radio, TV and communication equip.                  | 4.4                    | 5.1         | 5.9          | -0.8       |
| 33 Medical, precision and optical instruments, watches | 3.5                    | 2.9         | 4.9          | -2.0       |
| 34 Motor vehicles, trailers                            | 3.8                    | 3.9         | 4.4          | -0.5       |
| 35 Other transport equipment                           | 2.6                    | 3.7         | 5.9          | -2.2       |
| 36 Furniture; manufacturing n.e.c.                     | 3.7                    | 3.2         | 3.1          | +0.1       |
| Total manufacturing                                    | 2.9                    | 3.2         | 4.3          | -1.1       |

*Note:* Value added and productivity are in nominal terms. Reliable figures on employment are unavailable for some industries for 1998, and so the last three columns show the comparable estimates for value added, productivity and employment for 1988 to 1997.

*Source:* WIFO calculations using SBS.

Another, potentially more illuminating, way to disaggregate manufacturing, is to apply the WIFO taxonomy.<sup>6</sup> This classifies industries according to factor intensities into labour-intensive, capital-intensive, and research- and advertising-intensive sectors. It has as a fifth segment a mainstream sector, which uses the average mix of factors (Table 1.3).

When grouped in this way, it turns out that the growth in productivity is very similar – between 4.5 and 4.7% on average for all sectors, except the capital-intensive group, for which growth was lower than average.

Growth in value added was highest amongst the advertising intensive industries (3.9%), and lowest amongst the labour and capital intensive sectors, at

<sup>5</sup> Manufacturing is defined by Eurostat as NACE sectors 15–36, which amounts to 22 two-digit sectors and roughly 100 three-digit industries therein. The main data sources are Eurostat, European Commission, United Nations and WIFO.

<sup>6</sup> First applied in European Commission (1998), Part Two. For the methodology, see Peneder (1999) as well as Part Two (Chapter 2) of this report.

2.7% and 1.6%, respectively. It was also these sectors which showed the fastest loss of employment.

**Table 1.3: Annual growth by type of industry (WIFO taxonomy): 1988 to 1998**

|                       | Value added | Productivity | Employment |
|-----------------------|-------------|--------------|------------|
| Mainstream            | 3.4         | 4.6          | -1.2       |
| Labour intensive      | 2.7         | 4.7          | -2.0       |
| Capital intensive     | 1.6         | 4.2          | -2.5       |
| Advertising intensive | 3.9         | 4.7          | -0.8       |
| Research intensive    | 3.2         | 4.6          | -1.3       |
| Total manufacturing   | 2.9         | 4.5          | -1.4       |

*Note:* Value added and productivity are in nominal terms. Estimates were computed for those industries for which employment data in 1998 were missing.

*Source:* WIFO calculations using SBS.

Although these differences are not very pronounced, they are consistent with weak demand growth in labour and capital industries. They seem to support two hypotheses: labour intensive industries lose ground in European manufacturing due to the forces of the intensified globalisation process, which lead to de-location of labour intensive production to low wage countries outside. Capital intensive industries seem to substitute labour more intensively through stronger rationalisation. The former hypothesis is supported by the fact (not shown in the table) that highly globalised industries, which are to a large extent labour intensive, expanded at a slightly below average rate of 1.8%. The latter hypothesis is confirmed by the below average growth (1.7%) of mainly capital-intensive high-wage industries, which reduced employment the most.

#### 4. Variability of growth rates between sectors and Member States

Having disaggregated EU manufacturing in two directions – by Member State and then by sector – one preliminary step is to assess in which direction the variability is greater. This information is potentially helpful in highlighting whether country- or industry-level determinants are likely to be the more important.

The average rate of nominal growth in a typical three-digit industry amounted to 2.1% during the nine-year period 1989-1997. The standard deviation of 6.3 percentage points reveals the high variation between EU Member States and between industries, a picture confirmed by the very high extremes in the distribution and by the analysis of variance in Table 1.4.

**Table 1.4: Country and industry effects on growth**

| Analysis of variance of industry growth (1989 to 1997) |            |     |       |    |
|--|------------|-----|-------|----|
| Source   | Partial SS | df  | F     |    |
| Model  | 18370.3    | 214 | 3.3   | ** |
| Intercept  | 3124.1     | 1   | 118.9 | ** |
| Country  | 5705.3     | 11  | 19.7  | ** |
| Industry effect  | 2527.9     | 17  | 5.7   | ** |
| Country x industry effect                              | 8796.5     | 186 | 1.8   | ** |
| Residual   | 20574.6    | 783 |       |    |
| Total  | 38944.9    | 997 |       |    |
| N  | 998        |     |       |    |
| R <sup>2</sup>   | 0.47       |     |       |    |

*Note:* SS = Explained and unexplained variance; df = degrees of freedom.; F = Test of the significance of the model/coefficients (\*\* = significant at 5%).

*Source:* WIFO calculations using SBS.

Forty-seven percent of the variation can be explained by country, industry and combined industry and country effects. The variation across countries is more pronounced than the industry effects, indicating that the country specific environment, economic policy and macroeconomic development have a significant impact on industry growth. This picture is consistent with the view that European manufacturing is not yet fully integrated. Most of the variation in average growth rates comes from combined country and industry effects, suggesting that country specific environments combined with industry specific determinants common throughout the entire EU – such as demand growth – are the ingredients of long run performance.

Given these results, there are obviously a large number of country- and industry-specific factors at work, and therefore it is not surprising that we shall find below that broad-based general trends in both specialisation and concentration are fairly weak.

#### 5. The theory

Three strands in economic theory have some bearing on how specialisation and concentration might develop with increasing integration.<sup>7</sup>

For given endowment differences across Member States, **traditional trade theory** suggests that intensified integration will tend to increase specialisation. Countries with higher incomes will tend to specialise in capital intensive, skill intensive and research intensive industries. On the other hand, if endowments converge – as they should eventually in a single market with factor mobility – and industries

<sup>7</sup> See Wolfmayr-Schnitzer (1999) for a more extensive survey.



have constant returns to scale, then specialisation should decrease.

According to the **new trade theory**, high-income countries will tend to concentrate on industries with high levels of innovation, driven by forces on the demand side (new products and greater variety are demanded) and supply side (innovation rents and the capacity to make use of technological opportunities). In industries where product differentiation is important, countries will specialise in products on the upper quality segment. Countries with similar incomes will engage in *intra*-industry trade, and there is no certainty that increased specialisation will emerge.

**Economic geography**, on the other hand, highlights the possibility that regions/countries with privileged market access (defined by size, income level, and centrality) may profit first and more strongly from integration. Industries characterised by increasing returns to scale should locate near the largest market; spillovers should enforce the advantages of large markets, as will forward and backward linkages. On the other hand, the periphery will specialise in low wage industries, in industries with less product differentiation and limited spillovers. Eventually, however, this process will reverse if wages rise faster in the centre, if diseconomies of agglomeration emerge and if lower transport costs make a given cost difference between the core and periphery more decisive. International migration, as well as labour mobility within a country and between industries, will also reinforce this offsetting effect. The mobility of firms, as well as the upgrading of skills and productivity in the periphery, will also diminish the danger of uneven development.

Overall, then, the predictions from theory suggest that specialisation and concentration might go either way, especially in the longer run.

## 6. Previous empirical studies

For the sake of brevity, we merely itemise the key findings:<sup>8</sup>

- **The USA has higher, albeit declining, regional concentration**

Krugman (1991) showed that manufacturing is more regionally concentrated in the USA than in Europe by comparing four regions in the USA with four large countries in the EU. However, the most highly concentrated industries were not “cutting edge”, high

technology sectors – in fact, textiles were the most concentrated. Higher concentration in the USA was subsequently confirmed in later studies, and this led to a widespread expectation that concentration in Europe would converge on US levels once the Single Market took effect. However, Karsten (1996) cautioned that Europe was not fully comparable with the USA, insofar as skills were more dispersed, and the Single Market in Europe was evolving from an initially more fragmented structure. In the USA, on the other hand, the fundamental locational decisions were made at the start of the industrial revolution, in a market that was already integrated. In fact, concentration declined in the USA between 1947 and 1985. This, combined with the additional evidence of Kim (1995, 1997), led to the conclusion that regional concentration has been declining in the USA with the “high water mark of manufacturing location ... reached probably in the 1920’s” (Krugman, 1991, p. 80).

- **Conflicting evidence for Europe**

In an investigation of eight countries (including the USA), Dollar and Wolff (1993) found that an equal number of industries were concentrating and de-concentrating between 1970 and 1986, although their main focus was on catching up and not on concentration. Bruehlhart (1995) reported that 14 out of 18 industries were concentrating in Europe between 1980 and 1990. Labour intensive industries exhibited the highest dispersion, but they also showed significant potential for future concentration, while industries with high returns to scale were already concentrated. Aniti (1998) found that concentration increased in the majority of industries between 1976 and 1989, and that specialisation rose in six out of ten European countries. However, Dalum et al. (1998) and Laursen (1998) reported the contrary for exports.

- **Technology, multinationality and quality ranges**

In another strand of literature, Archibugi and Pianta (1992, 1994) found evidence of convergence in aggregate indicators of scientific and technological activity (e.g. R&D, and patent intensity). However, at the sector level, they found increasing technological specialisation. Similar results by Cantwell (1989) and Laursen (1998) raise the possibility that technological and sector specialisation might be moving in opposite directions. More generally, in a background study for this report,<sup>9</sup> it was found that factor endowments have become more similar over the past fifteen years. This seems to be driven by a catch-up of countries like Spain, Ireland, Finland and Denmark (by accumulating

<sup>8</sup> See Aiginger (1999) for a more extensive survey.

<sup>9</sup> See section 2.3 of Aiginger et al. (1999).

R&D capital) and, to some extent, also of Portugal and Greece (by investing in physical capital). The implication is that any increase in specialisation arising from integration will be dampened by the decreasing differences in endowments between Member States.

Davies et al. (1998) report that geographic concentration did not change in Europe between 1987 and 1993. In terms of the location of production, it appears that the leading firms have dispersed their operations across more, rather than fewer, Member States. That is, multinationality had increased. Trade increased fastest in industries seen as sensitive to the Single Market Programme (catching up from low values). Multinationality did not increase specifically in sensitive sectors (it had been high here before), but rather grew fastest where it had been low: in advertising intensive industries and in industries with low trade intensity.

- **Concentration of trade?**

The European Commission (1997) distinguished *inter*-industry (one-way) trade from *intra*-industry (two-way) trade and further disaggregated the latter into horizontal and vertical components. Overall, it found that intra-industry trade is increasing, although the most recent data indicates that the increase has flattened out. Portugal and Greece have the highest shares of one-way trade. Denmark is an exception, as a high-income country with a one-way trade share of 60%. France, Germany and Belgium have the lowest shares of one-way trade, but the largest shares in both categories of two-way trade. The two-way differentiated category can be split again into the markets in which exports are more highly valued (upper quality segment) and in which they are lower valued. Some countries are specialised in certain industries over the entire price/quality spectrum (Denmark in agriculture, Greece in textiles). Most countries are specialised in different quality segments, with Germany being the outlier, supplying all its important industries in the higher quality segment. The conclusion is that countries may not be specialised in industries, but rather in quality ranges within the same industry. This hints at the importance of productivity differences and/or of skills, and possibly indicates that specialisation according to factor intensities may not be all-important.

## 7. Defining and measuring specialisation and concentration

**Specialisation** is defined as the extent to which a given country specialises its activities in a small number of industries or sectors. Thus, the production structure of a country is “highly specialised” if a small number of industries accounts for a large share of its production. A traditional example would be the Nordic countries, highly specialised in timber, pulp and paper. This will be called “production specialisation”. Specialisation can also be measured for exports, or for exports and imports together – “export specialisation” and “trade specialisation” respectively.

Geographic **concentration** is defined as the extent to which EU activity in a given industry is concentrated in just a few Member States. Motor vehicles would be a good example (it is concentrated in a few countries) and similarly electrical machinery.

It should be stressed that the report uses aggregate data, not firm data. The term “concentration” is used to indicate the distribution of an industry across the Member States and should not be confused with the notion of seller concentration used in industrial economics and in competition policy which denotes the importance of the largest firms in a market.

Both concepts are to be investigated at the sector level (22 NACE two-digit sectors) and at the industry level (95 NACE three-digit industries). Data are available for 14 Member States (Belgium and Luxembourg are consolidated). Needless to say, patterns of specialisation and concentration do not necessarily follow the lines of any standard industrial classification scheme, such as NACE: specialisation processes sometimes develop at more disaggregated levels – sub-industries or even firms and they may be regions within countries. Again, data unavailability prevents such further disaggregation.

There are many standard statistical indexes of dispersion which might be employed to measure these two concepts. Each has different properties and none is ideal for all purposes. Since our preference is for robust findings, most of the results reported below will be based upon the general picture provided by the seven different indicators shown in Box 1.1. However, some tables and figures will refer directly to one particular measure, e.g. the concentration ratio.



**Box 1.1: Indicators of specialisation and concentration: an overview**

**Concentration ratios (CR3 and CR5)**

This is the share of the largest  $n$  units in the total, e.g. CR3 is the share of the largest three industries/countries. Here, we calculate two alternatives, taking  $n$  to be either three or five for geographical concentration and specialisation at the sectoral level, and five or ten, for specialisation at the industry level.

**Herfindahl**

This is the sum of the squared shares of each sector/industry in total manufacturing. Although this measure formally makes use of all information, its value is heavily influenced by the largest (market, export, country) shares.

**Standard deviation of the shares**

This is a measure of dispersion across industries with respect to an average industry.

**Specialisation rates (SR)**

For country specialisation, this is the sum of the country's shares in each industry relative to each industry's share of total manufacturing; for geographic concentration of an industry, it is the sum of the industry's share in each country relative to that country's share in total manufacturing. In trade analysis, this is called the RCA or Balassa index, and in geography it is sometimes called the locational coefficient. Since the measure is not symmetric (it is between 1 and infinity for positive specialisation and between zero and one for negative specialisation), it is conventional to transform it into an SRA index, defined as  $(SR-1) / (SR+1)$ . This transformation is specifically useful in econometric work; its standard deviation is known as sd-SRA.

**Dissimilarity index (the sum of absolute differences)**

For specialisation, this is the sum of the absolute differences between the country's share in each industry and the industry's overall share in EU manufacturing. For concentration, it is the sum of the absolute differences between the industry's share in each country and the country's overall share in EU manufacturing.

**Gini coefficient**

This summarises differences in the specialisation rates by cumulating the differences in the shares of a country and the shares of the EU, after ranking the industries according to their specialisation ratios. The first four measures do not compare an industry/country against a norm and are therefore called absolute indicators. The specialisation rate, dissimilarity index and Gini relate industries/countries to such norms and are termed relative. Absolute indicators implicitly focus attention on large countries; relative indicators implicitly give more weight to the role of small countries.



## Specialisation of European manufacturing

### 1. A weak overall tendency to an increasing production specialisation

Table 2.1 and Figure 2.1 provide an overall picture of which Member States are the most specialised, and the magnitudes of the changes 1988-98.

- **The prevailing tendency is for specialisation to increase**, albeit marginally, in most Member States. This is quantified in the table. Remembering that there are seven measures (Box 1.1), fourteen countries and two levels of aggregation (sector and industry), in total, there are 196 comparisons between 1998 and 1988. Of these, 133 (68%) indicate an increase – a proportion which is statistically significantly greater than half at the 99% level. Visual confirmation is provided by the cob-web diagrams of Figure 2.1, based on the five-country concentration ratio (CR5) – the 1998 line tends to lie marginally outside the line for 1988.
- **Portugal and the Netherlands are exceptions** to this general trend – in these countries de-specialisation has occurred.

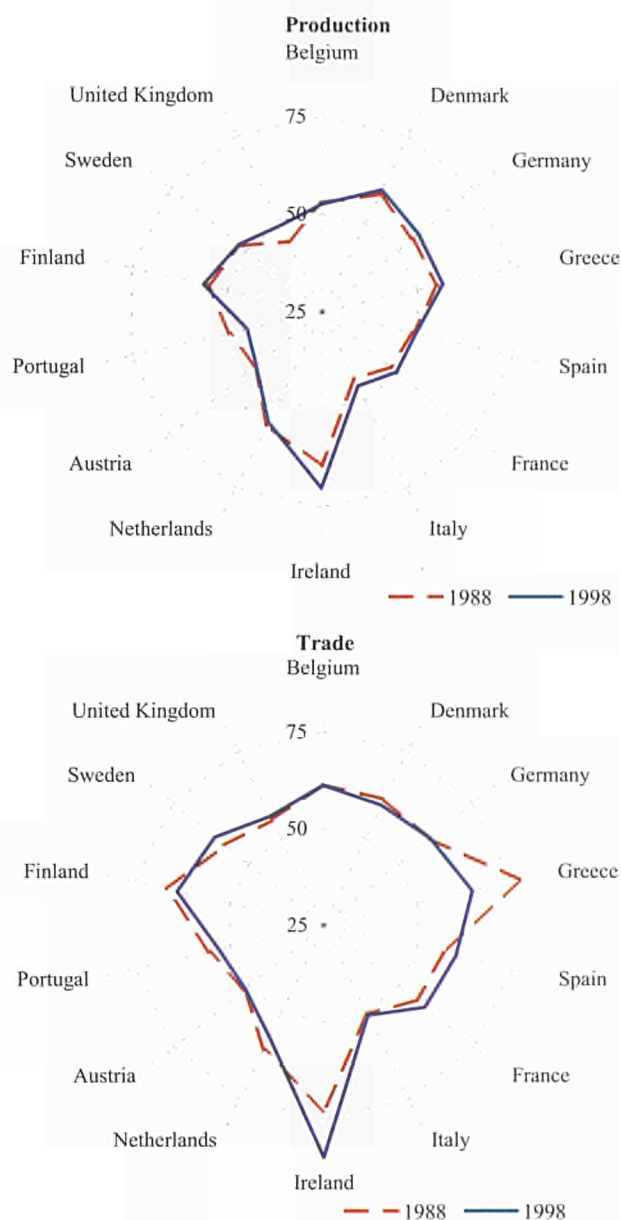
**Table 2.1: Production specialisation increases, but export specialisation decreases: 1988 to 1998**

|                | Production indicators<br>increasing/decreasing |    |          |    |       |    | Trade indicators<br>increasing/decreasing |    |          |    |       |     |
|----------------|--|----|----------|----|-------|----|---|----|----------|----|-------|-----|
|                | Sector   |    | Industry |    | Total |    | Sector                                    |    | Industry |    | Total |     |
|                | +  | -  | +        | -  | +     | -  | +   | -  | +        | -  | +     | -   |
| Belgium        | 2  | 5  | 3        | 4  | 5     | 9  | 2   | 6  | 0        | 8  | 2     | 14  |
| Denmark        | 3  | 4  | 7        | 0  | 10    | 4  | 0   | 8  | 1        | 7  | 1     | 15  |
| Germany        | 7  | 0  | 6        | 1  | 13    | 1  | 6   | 2  | 5        | 3  | 11    | 5   |
| Greece         | 6  | 1  | 4        | 3  | 10    | 4  | 0   | 8  | 0        | 8  | 0     | 16  |
| Spain          | 4  | 3  | 2        | 5  | 6     | 8  | 6   | 2  | 5        | 3  | 11    | 5   |
| France         | 6  | 1  | 1        | 6  | 7     | 7  | 6   | 2  | 4        | 4  | 10    | 6   |
| Italy          | 7  | 0  | 3        | 4  | 10    | 4  | 7   | 1  | 3        | 5  | 10    | 6   |
| Ireland        | 7  | 0  | 7        | 0  | 14    | 0  | 8   | 0  | 7        | 1  | 15    | 1   |
| Netherlands    | 0  | 7  | 1        | 6  | 1     | 13 | 2   | 6  | 7        | 1  | 9     | 7   |
| Austria        | 5  | 2  | 6        | 1  | 11    | 3  | 3   | 5  | 4        | 4  | 7     | 9   |
| Portugal       | 0  | 7  | 4        | 3  | 4     | 10 | 0   | 8  | 0        | 8  | 0     | 16  |
| Finland        | 7  | 0  | 7        | 0  | 14    | 0  | 1   | 7  | 1        | 7  | 2     | 14  |
| Sweden         | 7  | 0  | 7        | 0  | 14    | 0  | 4   | 4  | 2        | 6  | 6     | 10  |
| United Kingdom | 7  | 0  | 7        | 0  | 14    | 0  | 1   | 7  | 4        | 4  | 5     | 11  |
| Sum of signs   | 68   | 30 | 65       | 33 | 133   | 63 | 46  | 66 | 43       | 69 | 89    | 135 |

Note: Number of positive and negative changes between 1988 and 1998 (for the indicators, see Box 1.1).

Source: WIFO calculations using SBS and COMEXT.

**Figure 2.1: Production and trade specialisation: 1988 to 1998 (share of the largest five sectors)**



Source: WIFO calculations using SBS and COMEXT.

- **In most cases, the magnitude of the change is marginal.** This is illustrated graphically by the very fine difference in the lines for 1988 and 1998 in Figure 2.1. Numerically, the weighted average five-sector concentration ratio rises only slightly from 24.8 in 1988 to 25.5 in 1998.

- If we look at the development over time, we see that **specialisation tended to decrease from 1985 to the beginning of the nineties, but to increase since then**. The time paths for the average of the seven indicators are shown for each country in Figure 2.2.

## 2. A weak overall tendency for export specialisation to decrease

Switching to **exports**, we find:

- There is a tendency of decreasing specialisation. In only five countries the majority of indicators exhibit increasing specialisation in exports: Germany, Ireland, Italy, France and Spain – all except Ireland are large countries. In the remaining nine countries, export specialisation has declined. If we again count signs, we see that only 89 of the total 224 indicators (40%)<sup>1</sup> increase – a proportion which is significantly less than half at the 99% level.
- In five countries, this de-specialisation of exports has occurred alongside increasing specialisation in production: the United Kingdom, Sweden, Finland and to some extent Greece.

## 3. Individual countries in more detail

We now turn to some of the individual Member States, in order to illustrate some of the underlying forces at work.

### Both production and export specialisation rise

#### Germany

Starting from a moderately low initial value, production specialisation in Germany decreased up until 1990-1991, but has shown a rising trend ever since.<sup>2</sup> Its largest sectors are those which are large in the EU total – the skill intensive mainstream sectors of machinery, motor vehicles and chemicals, with electrical machinery and metal products following. As

<sup>1</sup> The indicator for which this downward trend is most pronounced is the RCA value, which provides information on net trade. It declines in twelve countries on the sectoral level and in thirteen on the industry level. The average decline is rather strong. This is the indicator traditionally used in empirical work testing the Heckscher-Ohlin theory, namely on the relative specialisation of exports and imports.

<sup>2</sup> The data now includes the Neue Länder. These new regions did not decrease the degree of specialisation but rather complemented the old structure.

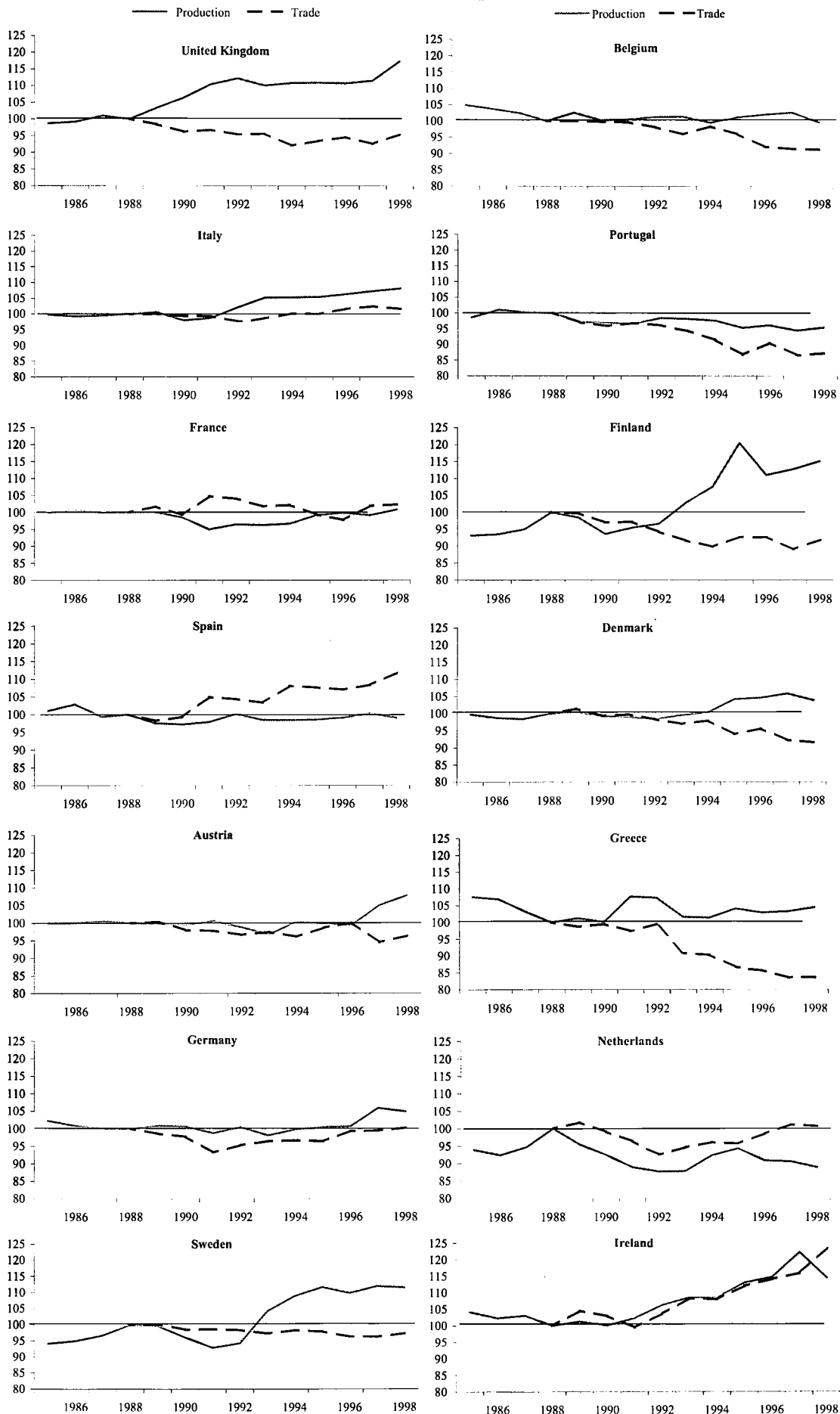
a group, the share of these leading sectors has increased slightly over this period.

The picture on trade is more mixed: while 11 of the 16 indicators of *export* specialisation have risen, if we measure *trade* specialisation by the standard deviation of net exports (exports minus imports, i.e. net RCA), specialisation has tended to decline for sectors and industries. There are two reasons, and both also apply more generally for other countries:

- An increase in intra-industry trade in a stronghold. For instance, the share of the motor vehicle industry in German total exports increased from an already high level of 17.4% to 18.9%. But imports also surged from 8.4% to 12.1%, and the relative trade specialisation (RCA minus the industry's export surplus relative to that for total manufacturing) declined from 0.67 in 1988 to 0.55 in 1998.
- Weak demand in resource intensive industries with traditional trade deficits. Examples are petrol products and pulp and paper, whose large negative RCA values in 1988 declined up to 1998. However, while the low exports kept up with the general growth of total exports, the absolutely higher imports did not keep up with total import growth. The explanation lies with the low income elasticity of these industries, the ability of downstream industries to economise on inputs, and the success in upholding exports in niches.

#### Italy

Italy started from the lowest level of all the Member States, but the specialisation of both production and exports increased over this period. The driving force is the persistent rise in the machinery industry, which presently accounts for 14% of production and 21% of exports. On the other hand, a stronghold which has been lost is office machinery. The shares of the textile industries have been decreasing slightly, but less so than in other countries. This has led to increasing market shares for Italy in this sector, and more generally to its share in labour intensive industries. It has also increased the dissimilarity in Italy's production structure compared to the EU average. However, Italy is focusing on the quality segment of the textile industries, and the unit value of its exports is significantly higher than the European average.

**Figure 2.2: Specialisation trends in production and exports**

*Note:* The indicators (see Box 1.1 for definitions) were preliminarily transformed into comparable indexes and then averaged on an unweighted basis to obtain the composite indicator represented here. Countries are ranked from low to high specialisation in the reference year (1988).

*Source:* WIFO calculations using SBS and COMEXT.



### **Ireland**

Ireland maintained its position as the most specialised country – during the decade, it continued to intensify its specialisation. The top three sectors produce 56% of total industrial output, the largest being chemicals (basic chemicals and pharmaceuticals), with a production share rising from 16.4% to 27.2%. Large increases also took place in office machinery and printing and publishing (reproduction of recorded media). Ireland also has the highest degree of structural change (mobility of structure): the food industry, which was a former stronghold, lost 7 percentage points; and textile and wood related industries, which were never strong, continued to lose share.

Ireland now has the largest share in manufacturing of research intensive industries, although these are mainly subsidiaries of MNEs with headquarters outside of the country. Ireland's share of labour intensive industries is the lowest in Europe. Ireland is positively specialised in high growth, highly globalised industries, in the high productivity sector, and has reinforced all of these strengths during the last decade. The structural funds, a tax policy favourable for businesses, the upgrading of its educational system and the return of skilled workers have together created a successful policy mix which attracts and upgrades firms in dynamic industries.

### **Increased specialisation in production but not in exports**

#### **United Kingdom**

Statistically, the mix of increasing specialisation of production but decreasing specialisation of exports can be explained by specific developments in certain sectors: in food, domestic production seems to have substituted for imports; in printing, export shares are generally static; in basic metals, production declined less steeply than exports.

Relative to the EU as a whole, specialisation is strongest, as well as increasing, in other transport, publishing and office machinery (the share of which is falling, but less sharply than in other countries).

#### **Finland**

Finland has a moderate position in specialisation, and also combines increasing production specialisation with decreasing export specialisation. Finnish production is dominated by pulp and paper, machinery and telecommunications – the latter two growing sharply over the period. The food industry and the

textile industries are losing shares; wood and wood related industries are rather stable.

Export specialisation is decreasing according to most indicators. The main reason is that the export share of paper dropped from 32% to 23%. This is in contrast to the rising production of the pulp and paper industry. One reason for this divergence could be that the headquarter function of Finnish firms is strengthening the basis for creating value added. A wood and paper cluster provides services which increase value added, but some of these services are not reflected in exports or, at least, are not reported as exports of manufactured goods.

#### **Sweden**

Sweden, too, has a moderate position in specialisation, with the same diverging trends in production and exports. The largest four sectors in production are paper and cars (both increasing their shares), food and machinery (both losing shares). The greatest jump occurred in telecom equipment, which increased its share in production by nearly 6%, and it is now the largest exporter.

Paper's share in production is rather stable, and its share in exports is falling. For machinery, production shares are increasing, while export shares are on the decline. In neither case can imports account for the difference, possibly hinting again at the effect of MNEs increasing headquarter services, but shifting part of their exports to foreign production, and thus contributing to the divergence of production and export trends.

#### **Greece**

In Greece, specialisation in production is increasing specifically in food, petroleum products and chemicals, and in construction related industries. This was once the country with the highest export specialisation, but this has lessened due to losses in the textile and apparel sector. The food sector is now the largest export sector. The share of intra-industry trade is lower than in all other EU Member States.

### **A robust decrease in specialisation**

#### **Portugal**

Portugal is the exception, insofar as specialisation is decreasing strongly and robustly in both production and trade. This declining specialisation reflects the shrinking share of the textile industry, which once accounted for 13.4% of production, but dropped to 9.4% in 1998. Food production and wood related industries also lost ground.

On the other hand, other sectors have made considerable progress, notably the motor industry and to a lesser extent electrical machinery. On the industry level, motor vehicles are the largest item, accounting for 13% of exports, thereby surpassing the apparel industry as the largest exporter.

Portugal also managed to narrow its deficits in advertising intensive industries (tobacco, shoes) and in research intensive industries (agro-chemicals, electronic valves, telecom apparatus and motor vehicles).

#### 4. Summary

There is undoubtedly some evidence of increasing specialisation in production. Some large industries in large countries play a key role here; for example, cars in Germany, machinery in Italy, and food in the United Kingdom. This should be quite consistent with theories stressing the importance of clusters, with path dependency of strategic advantages and knowledge spillovers within regions.<sup>3</sup> However, in the smaller countries, there is no clear tendency towards increasing production specialisation, with the notable exception of Ireland. Ireland is continuing to specialise, specifically in research- and skill-intensive industries and it now has the lowest share of labour-intensive industries.

On the other hand, the other small countries are successfully exploiting new opportunities for niche producers offered by the Single Market. They are partly extending former strongholds via exports, and partly going multinational and producing abroad. They are also losing some of their former strongholds in resource-intensive or labour intensive segments.

Overall, the evidence does not suggest that the trend towards specialisation has been either pervasive or quantitatively striking. But this is not to deny that, within individual countries, there has been noticeable structural change. Portugal and Ireland are prime examples where, for different reasons, this is reflected in quite different changes in our summary statistics. In other cases, there has been a turmoil which is not reflected at all by these summary statistics. (We return to this later, in Chapter 4.)

Perhaps the most interesting finding from this chapter is the contrast between typically marginally increasing production specialisation and typically marginally declining export specialisation. To some extent, one

might expect a convergence of export and production specialisation, if production specialisation is catching up, because production for domestic consumption has been reduced. However, this cannot explain why export specialisation is *decreasing* and why, for several countries, decreasing export specialisation occurs alongside increasing production specialisation.

Some specific developments in specific countries/sectors are illustrative examples. The pulp and paper industry increases or maintains its production share in Finland and Sweden, but lowers its large share in exports. Food, chemicals, and publishing and printing increase their shares of production in the United Kingdom, but decrease export shares. Production shares are rather stable for the steel industry in the United Kingdom, but the share of steel in exports has been on the decline.

We have no conclusive explanation of these opposing trends, but there are various possibilities about the general underlying forces:

- There might be a systematic role for the headquarters and services of large MNEs. If these firms provide additional services to their core manufacturing activity, these tend to be reported in value added, since production statistics are classified according to main activities. It is less probable that the services are included in the export statistics. More generally, this may not simply be a statistical artefact. The theory of MNEs tells us that headquarters are providing knowledge and services to all of their subsidiaries. If the number of MNEs rises, and if they at least partly substitute domestic production with foreign production, production and export trends could move in different directions. Certainly, many of the industry/country combinations for which the opposite trends are apparent are characterised by large shares of MNEs.
- Declining **export/trade** specialisation may often reflect the combination of two effects: (i) static world demand for exports of resource-based industries in which some countries have a traditional comparative advantage, and (ii) an all-round growth in demand for other differentiated product industries due to the growth in intra-industry trade. However, this combination need not necessarily imply decreasing **production** specialisation, especially if the resource-based exporting industry is relatively small so far as domestic consumption is concerned, and the other sectors, enjoying a growth in demand from intra-industry exports are large in terms of domestic consumption.

<sup>3</sup> Nevertheless, it should be recalled that the analysis is based on data at national level. This limits the inferences which can be made on regional developments.

- Not inconsistent with the previous hypothesis is the straightforward possibility that there has been a particularly pronounced trend towards specialisation in production for domestic consumption – sufficient to offset reduced specialisation in exports.

This subject merits future investigation, but it does seem to be tied up with the changing mix in intra- and inter-industry trade on the one hand, and the increase in MNEs' activity on the other hand. Certainly, decreasing net trade balances are exhibited by all countries except Ireland (and the Netherlands at industry level only), due to two movements. Firstly, large net imports in resource intensive industries decreased due to the slow growth in demand for raw materials and semi-finished products. Secondly, large export surpluses decreased in strongholds, since imports – albeit still relatively small – increased faster. The first tendency shows that resource-based, inter-industry trade, though still important to some industries, lost relative importance. The second shows that division of labour and intra-industry trade became even more important in the strongholds. This is consistent with the picture that comparative advantages as well as disadvantages are a declining force in Europe.



## Geographic concentration of industries

### 1. An overall tendency towards de-concentration

In this chapter we turn to industry concentration, asking, specifically, whether the share of the leading countries in individual industries is rising or falling. High concentration of production or of exports means that a few countries supply a large part of a given sector (industry). Low concentration or dispersion means that a sector or an industry is evenly spread across the Member States.

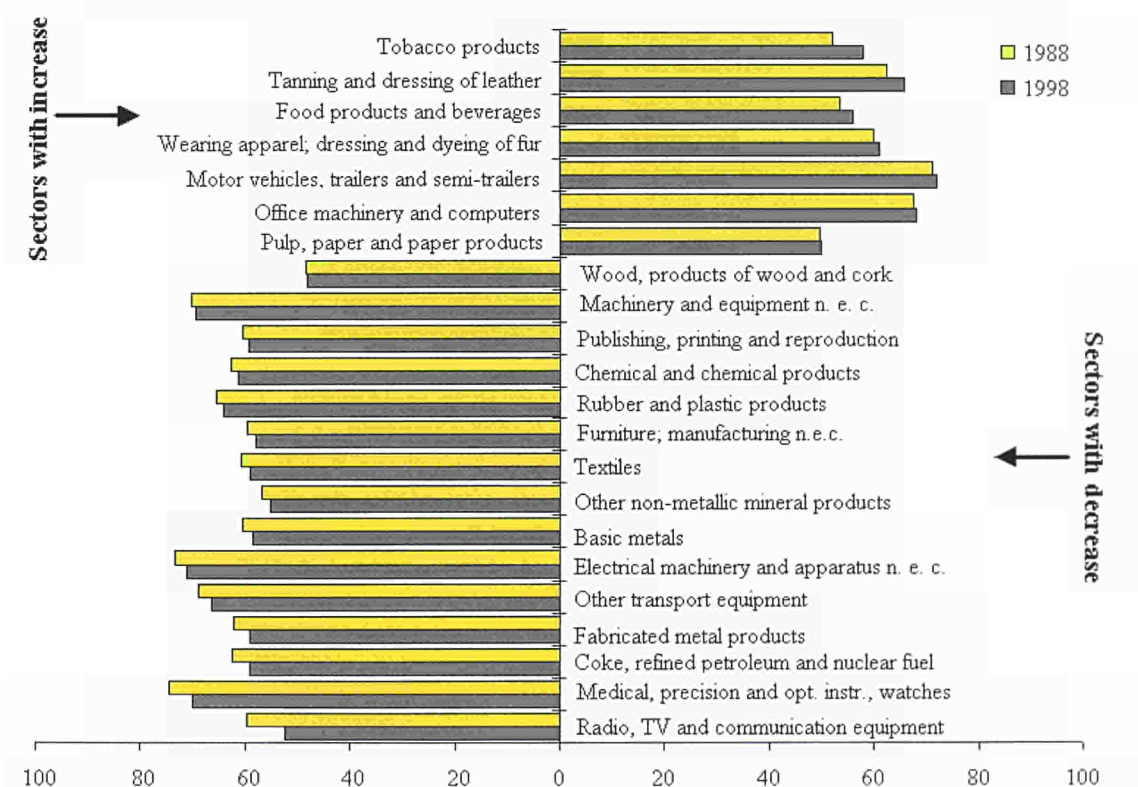
#### Concentration of production

Motor vehicles, electrical machinery and machinery

are the most concentrated sectors. In these sectors 70% of European value added is generated in three countries. Germany supplies the largest production share in each sector, with France, the United Kingdom or Italy alternatively making up the top three. Office machinery and other transport equipment are also heavily concentrated. In all these sectors the leading five countries together produce about 85% of the total EU output. However, amongst these heavily concentrated sectors only motor vehicles has increased its geographical concentration in the past decade.

The least concentrated sectors are wood and pulp and paper, food, mineral products and telecom equipment, here about 50% are produced in three countries and about 70-75% in five countries. Concentration has decreased in most of these industries, strongly in

Figure 3.1: Geographic concentration of production (sectors), 1988 and 1998



Note: Geographic concentration is measured by CR3 (the share of the largest three producer countries).

Source: WIFO calculations using SBS.

telecom equipment, where Germany and Spain lost while Sweden and Finland increased their shares. In the food sector, concentration has increased, due largely to increased market shares of Germany and the United Kingdom.

Overall, geographic concentration of production, as measured by CR5, increased in only four out of 22 sectors: tobacco, food, plastics, and other transport. If confined to the share of the largest three producing countries (CR3), it increased in seven sectors (see Figure 3.1).

The unweighted average of the concentration rate over all sectors declined by 0.9% for the top three countries and 1.6% for the top five countries.

At the more disaggregated three-digit level (not shown in the table), we see a lot of mobility, but the pattern is similar. Concentration rates decline in two thirds of the industries, the weighted average decline being about 1.2% (for top three and top five). The largest increases occurred in reproduction of media, which concentrates in Ireland and in Austria. Other increases are reported in a small basic steel sub-industry “other first

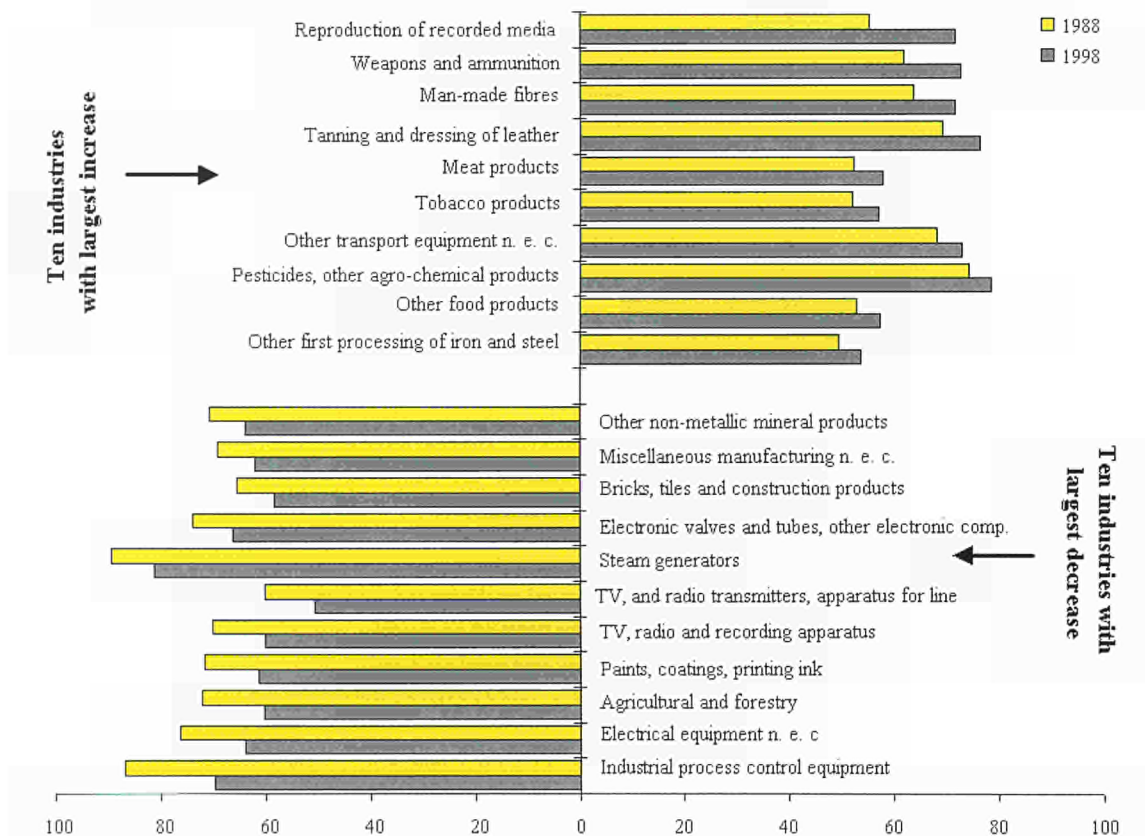
processing of iron”, which concentrates in Italy and France, and in the weapons and ammunition industry (United Kingdom, France). Games and toys is geographically concentrated in Germany, Denmark and the United Kingdom, three textile industries in Italy and partly Spain.

In three industries the increase in concentration (CR5) was larger than five points but none of these belong to the top ten most concentrated industries, even after this increase. On the other side concentration decreased in 13 industries by more than 5%. Some of them are high tech industries such as telecom, medical equipment and process control.

**Concentration of exports**

Concentration decreases robustly for exports and trade imbalances across countries shrink. The shares of the largest three countries in a typical sector decreased by 3.2% and by 4.0% in the typical industry. Absolute export concentration increased in just two sectors: office machinery due to the inroads of Ireland and the Netherlands, and other transport due to the gains of

**Figure 3.2: Geographic concentration of exports (industries), 1988 and 1998**



Note: Geographic concentration is measured by CR3 (the share of the largest three producer countries).  
Source: WIFO calculations using COMEXT.

France, Italy and the United Kingdom. At the industry level the highest export concentration rates are to be seen in processing of nuclear fuel, and aircraft and spacecraft, in two leather industries and some resource related industries (bricks, tobacco, jewellery). (See Figure 3.2)

On the other hand, increases in concentration are reported in one quarter of the industries, the largest being in leather, wood containers and bricks, as well as in pesticides, ships and boats and air and spacecraft. For the majority of industries even the relative indicators show declining concentration, underlining the picture drawn by absolute indicators. The highest export concentration rates are reported in pulp and paper, wood, leather, apparel and office machinery, the largest increases in chemical industry, publishing and printing and in tobacco. The regional imbalances of exports and imports of countries in specific industries (as measured by the RCA value) decline.

## 2. Convergence across industry types

In this section we investigate whether extra insights are provided by grouping together industries into the broad types identified in the WIFO taxonomy (see Table 1.3 above).

The level of concentration has been historically higher in research-intensive and in skill-intensive sectors. This is exactly in line with modern theory, which stresses spillovers and pooled labour markets in dynamic industries. In both groups, however, geographic concentration has been declining over this period (see Table 3.1).

In the typical research-intensive industry, the largest three countries produced 71.6% of total EU output in 1988; but this share has now fallen to 68.8%. This decrease is more rapid than the average in the other sectors.

Concentration has been declining specifically in: process control equipment, where France, Italy and Finland have made gains; in audio, video and telecom industries, where Finland, Sweden and, in part, Austria and Belgium have increased their shares; and in the pharmaceutical industry, where Ireland has made some inroads. The main losses in these sectors occurred in Germany (in the first two) and the United Kingdom.

**Table 3.1: Geographic concentration of production in research intensive industries**

|  | CR3  |      | CR3 change (a) | SD SRA (b) |      | Dissimilarity index (c) |      | Largest share in 1998 (d) |        |         | Largest gain from 1988 to 1998 (e) |         |         |
|--|------|------|----------------|------------|------|-------------------------|------|---------------------------|--------|---------|------------------------------------|---------|---------|
|  | 1988 | 1998 |                | 1988       | 1998 | 1988                    | 1998 | I                         | II     | III     | I                                  | II      | III     |
| Pesticides, other agro-chemical products                 | 74.1 | 78.5 | -4.4           | 0.48       | 0.48 | 81.9                    | 66.7 | UK 34%                    | F 28%  | D 17%   | P -18%                             |         |         |
| Other chemical products                                  | 58.4 | 62.5 | -4.1           | 0.36       | 0.36 | 28.5                    | 26.6 | D 29%                     | UK 19% | F 15%   | UK +4%                             | IRL +4% |         |
| Office machinery and computers                           | 67.5 | 69.8 | -2.3           | 0.49       | 0.57 | 38.0                    | 53.7 | D 32%                     | F 25%  | IRL 14% | IRL +9%                            | NL +6%  | D +6%   |
| Motor vehicles   | 71.3 | 73.2 | -1.9           | 0.44       | 0.43 | 33.5                    | 34.3 | D 46%                     | F 14%  | UK 13%  | D +5%                              | UK +1%  | B +1%   |
| Electricity distribution and control apparatus           | 84.9 | 85.5 | -0.6           | 0.30       | 0.26 | 76.3                    | 77.6 | D 69%                     | F 11%  |         | F +1%                              | D +1%   |         |
| Optical instruments and photographic equipment           | 73.5 | 73.6 | -0.1           | 0.38       | 0.41 | 27.6                    | 33.7 | D 33%                     | I 24%  | UK 17%  | I +13%                             | IRL -1% | P +1%   |
| Instruments for measuring, checking, testing, navigating | 78.6 | 77.6 | -0.9           | 0.37       | 0.38 | 40.6                    | 40.7 | D 31%                     | F 28%  | UK 19%  | D +3%                              | S +2%   |         |
| Aircraft and spacecraft                                  | 78.7 | 77.4 | -1.3           | 0.41       | 0.43 | 55.4                    | 52.4 | UK 32%                    | F 23%  | D 22%   | D +2%                              | S +1%   | P +1%   |
| Pharmaceuticals  | 58.9 | 56.7 | -2.2           | 0.18       | 0.26 | 24.2                    | 26.0 | F 20%                     | D 17%  | UK 16%  | IRL +3%                            | E +1%   |         |
| Medical equipment  | 66.4 | 61.3 | -5.0           | 0.40       | 0.42 | 37.8                    | 33.0 | D 38%                     | F 13%  | UK 11%  | F +2%                              | IRL +3% | FIN +2% |
| Electronic valves and tubes, other electronic comp.      | 73.7 | 65.9 | -7.7           | 0.40       | 0.40 | 50.6                    | 36.3 | D 24%                     | UK 22% | F 20%   | D +6%                              | I -6%   | IRL +2% |
| TV, and radio transmitters, apparatus for line telephony | 60.0 | 50.6 | -9.3           | 0.21       | 0.39 | 21.1                    | 53.2 | F 19%                     | UK 17% | D 15%   | FIN +8%                            | S +6%   |         |
| TV, radio and recording apparatus                        | 69.9 | 60.0 | -9.9           | 0.48       | 0.49 | 61.5                    | 72.9 | D 21%                     | UK 13% |         | B +4%                              | A +4%   |         |
| Industrial process control equipment                     | 86.9 | 69.9 | -17.0          | 0.42       | 0.47 | 57.7                    | 35.3 | D 28%                     | F 23%  | I 19%   | UK +11%                            | F +8%   | I +5%   |

<sup>a</sup> Industries are ranked according to the change in CR3.

<sup>b</sup> "SD SRA" stands for standard deviation of (adjusted) localisation coefficients (see Box 1.1).

<sup>c</sup> The "Dissimilarity index" is computed as the sum of absolute differences of country shares for industry from that of manufacturing.

<sup>d</sup> Missing values mean that the third place either very small or shared or or very near to fourth and fifth ones.

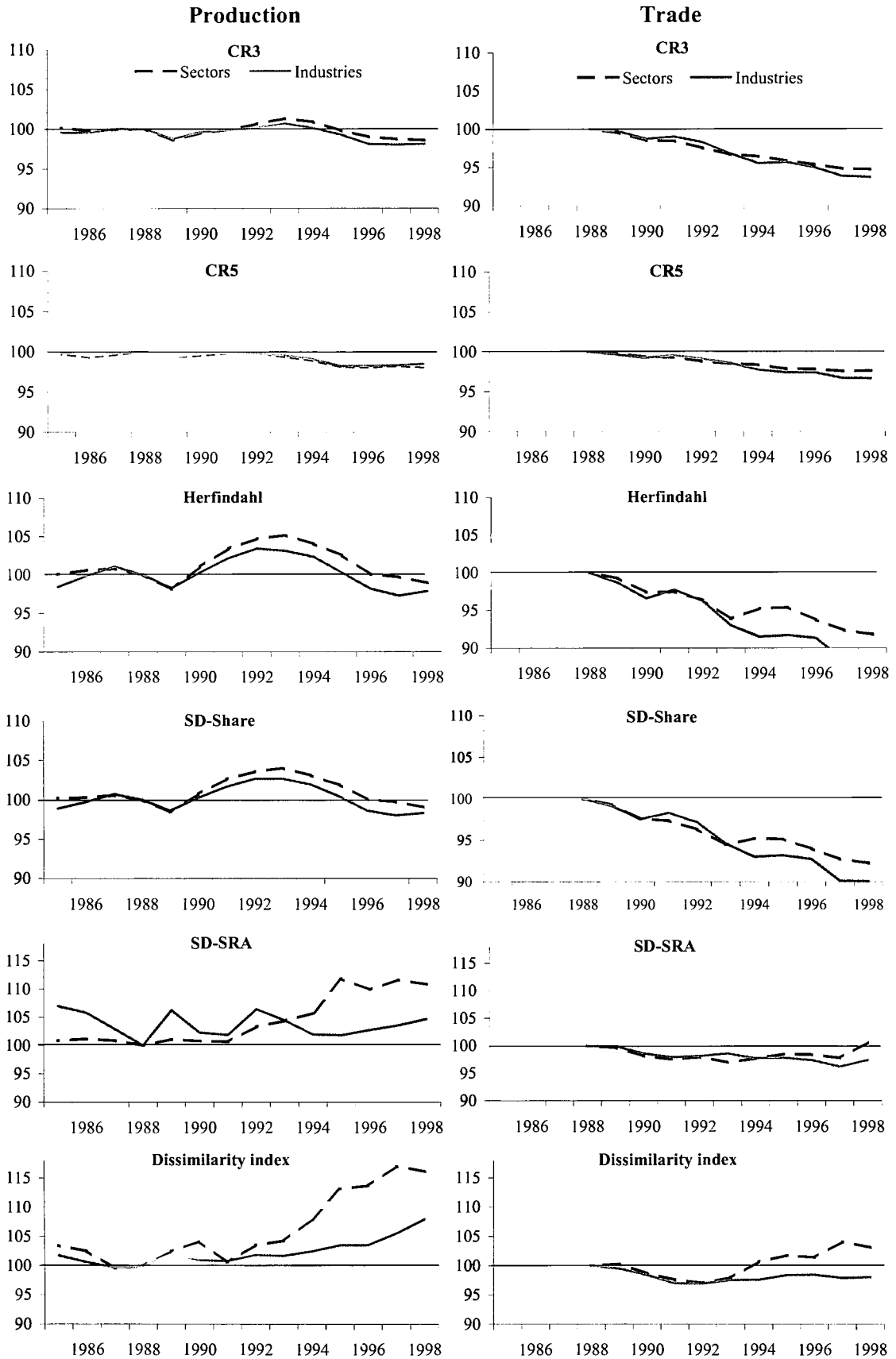
<sup>e</sup> Missing values mean either that there is no sector with a significant gain or that the gain is lower than 1%.

Source: WIFO calculations using SBS.

Significant increases in concentration are evident for two chemical industries (agro-chemicals and other chemicals, where Germany and the United Kingdom have both increased shares; in electronic components (Germany and Italy), and in office machinery (Ireland and the Netherlands).

Least concentrated is the advertising-intensive segment. Concentration increased here slightly, but the typical top three share is still only 62.1%. The largest increases occurred in some food industries, as well as in publishing, the reproduction of recorded media (Ireland, Austria), sports goods (United Kingdom) and games and toys industry (Denmark).

**Figure 3.3: Concentration trends in production and trade**



*Note:* The indicators (see Box 1.1 for definitions) were preliminarily transformed into comparable indexes and then averaged on an unweighted basis to obtain the composite indicator represented here.  
*Source:* WIFO calculations using SBS and COMEXT.



In the labour-intensive segment, concentration lies below the average and the trend varies across industries. The shares of the largest countries are increasing in many textile industries, but decreasing in construction and transport-related industries and in electrical equipment. In the textile industries, the rising shares of Italy and of Portugal translate into high absolute and relative concentration, and an increase in the dissimilarity index. In four textile industries, Italy's shares account for about one third of Europe's value added (starting from about 20% in 1988). Portugal increased its share to 5%. The large increases in these countries' shares reflect the declining production in other countries, since Italy and Portugal's shares of manufacturing for the apparel industry are roughly constant.

If we divide industries according to skill classes, we see the same convergence. Concentration is higher, but declining in the highest skill class. It is low in the low skill industries, in which absolute concentration is approximately constant.

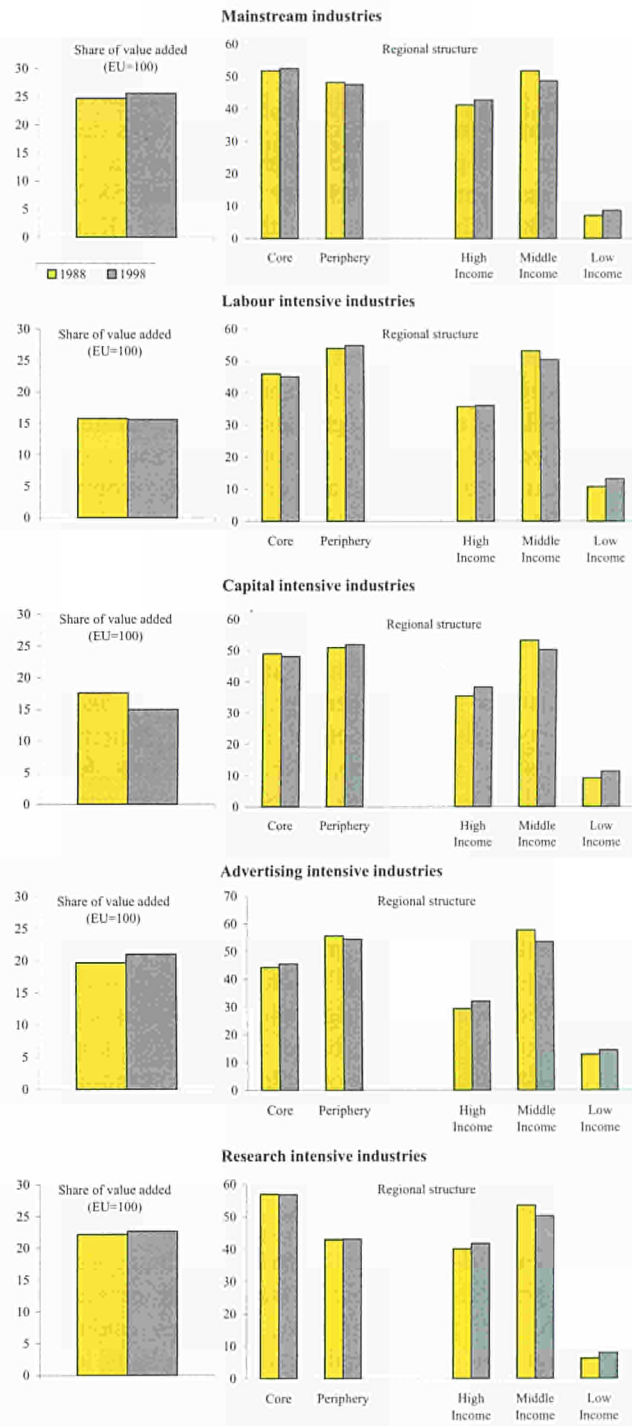
### 3. The core-periphery pattern

Economic geography stresses the importance of a core region, in which dynamic economies of scale can be exploited, while the fate of the periphery depends on trade costs, factor costs, mobility and trade barriers (see Chapter 2). The importance of market access, market size, income levels and sometimes a North-South split are also discussed in this literature.

In order to test for a core-periphery split, we have chosen a classification of countries that defines about one half of manufacturing as coming from core countries and one half as periphery.<sup>1</sup> We find (see Figure 3.4):

<sup>1</sup> Dividing the EU Member States into core and periphery countries is not an easy task, since some countries comprise core as well as periphery areas (Italy, United Kingdom). Probably, the right measure of the European core should encompass higher-than-average industrialised regions, such as Northern Italy and parts of the United Kingdom. For present purposes, however, we define the core as composed by Belgium, Denmark, Germany, France and the Netherlands. In fact, the main results remain unchanged if we also switch Italy and the United Kingdom from the periphery to the core. However, the details of the results depend slightly on the indicators used. The share of the core is stable if we take the weighted average (or absolute value added). If we take unweighted averages of the market shares, the core loses and the periphery wins (since the periphery has higher market shares in smaller industries and small industries are growing at high rates in small countries).

**Figure 3.4: Industry types and geographic structure**



Source: WIFO calculations using SBS.

- Stable shares of production over time: roughly 50% of total manufacturing was produced in the core and 50% in the periphery in both 1988 and 1998. Some of the peripheral countries like

Ireland, Portugal and Greece have increased their shares of value added, but others (Sweden and Finland) have lost shares, following a rather difficult period of restructuring during the ten years on which the analysis is focusing.

- The core has its largest market shares in the **research-intensive** sectors, although this declined over the period: the core share in a typical research-intensive industry fell from 58.2% to 57.0%. The shares of the United Kingdom decreased and those of Ireland and Finland increased. The core made its largest gains in electric components (where Italy and Germany won shares) and pesticides (which shifted from Austria, Spain and Finland to Germany). The periphery made its greatest inroads in telecom equipment, control equipment and optical instruments, as well as considerable progress in audio and video, and aircraft and spacecraft.
- The core produced less than half of value added of a typical **advertising-intensive** industry. Industries with an increased share for the core were publishing, games and toys, some food industries and beverages. Germany and the Netherlands, in particular, increased their market shares in this group, while the losses for the periphery occurred in the Scandinavian countries and Italy.
- In the **labour-intensive** industries, the typical market share of the core was low, and it decreased slightly to 45.7% in 1998. From a country perspective, Germany's share dropped, while the shares of Spain, Portugal and Italy in this segment increased. Spain increased its shares in transport and construction related industries; Italy in textiles and machine tools; Portugal in wood, apparel and some engineering industries. In all these cases, the peripheral countries gained not only in narrowly defined low cost industries.
- In **capital-intensive** industries, the core and periphery have stable shares, partly at variance with the prediction that, in such industries, integration would lead upsizing of plants located in the centre. The core increased its shares in basic metals, cement and textile fibres, but lost larger shares in basic chemicals, pulp and paper, and tiles and flags. From the country perspective, France and the Netherlands decreased their shares in capital-intensive industries, and Ireland had the greatest increase (e.g. basic chemicals).

- In **exports**, the core lost market shares, with no difference between *extra-* and *intra-*EU exports.<sup>2</sup> The industries that contributed to this trend were capital-intensive industries (coke, nuclear fuel, and basic chemicals), as well as textile industries, audio and video and telecom equipment. The core is losing exports in research-intensive industries, but to a lesser extent than for total exports. From the country perspective, the loss of the core is due to the decreasing market shares of Germany and to a slighter degree of the Netherlands; the gains for the periphery come from Ireland, Spain and the United Kingdom.

#### 4. Income, country size and the North-South pattern

The core-periphery dichotomy is based on geographical criteria. In this section, we investigate three alternative criteria.

First, dividing the Member States according to **per capita GNP** (at PPP)<sup>3</sup> creates a pattern in which middle-income countries are losing shares, high-income countries are making small advances, and low-income countries are gaining strength. This split is particularly distinct in advertising-intensive countries, in which middle-income countries had an over-proportionate share and have now regressed to the average. For the labour-intensive segment, the same loss has been witnessed in the middle-income countries, while the share of the low-income countries has increased. The rising shares of the high-income countries in the labour-intensive segment are nevertheless a surprise. While high-income countries lost shares in the apparel industry, as expected, some high-income countries, such as Germany, increased their production of construction materials. In the research-intensive segment, the shares of the high-income countries are, as expected, over proportionate, but not by a large margin. The low-income countries have caught up by 2% and now have 8% of the value added generated by industries in this group. Measured according to exports, the high-income group has lost at the expense of the other two groups.

<sup>2</sup> The share of the core is now 57.6% of total exports, 55.7% for extra-EU and 58.8% for intra-EU (weighted data).

<sup>3</sup> The countries are classified as "high income" (Belgium, Denmark, Germany and Austria), "middle income" (France, Italy, the Netherlands, Finland, Sweden and the United Kingdom) and "low income" (Greece, Spain, Ireland, and Portugal).



Alternatively, a **North versus South** divide in many theoretical studies, primarily from the USA, implying that the South is specialised in labour-intensive industries, while the North is innovative, specialised in research driven industries and those with significant product differentiation.

In Europe, the North<sup>4</sup> produced 19.4% of the output in typical labour-intensive industries in 1998, having reduced its share by 4.0%. The South produced 32.8%, having increased its share by 3.5 percentage points during the last ten years. A considerable amount of production in the research-intensive industries can be attributed to the North, although its share increased only marginally. The South increased its share in typical research-intensive industries by 0.9%.

Finally, we compare **large and small** countries (see Figure 3.5). The large countries (Germany, Spain, France, Italy and the United Kingdom) produced 79.6% of EU value added in 1998, representing a decline of 1.7 percentage points compared to 1988.

This is due to the lower shares of Italy and the United Kingdom, while the shares of Belgium, Austria and Ireland increased. The share of large countries in research-intensive and in skill-intensive industries is over proportionate, but declined typically by 3.0 percentage points. The same tendencies hold for exports. The share of large countries in capital-intensive industries is below average.

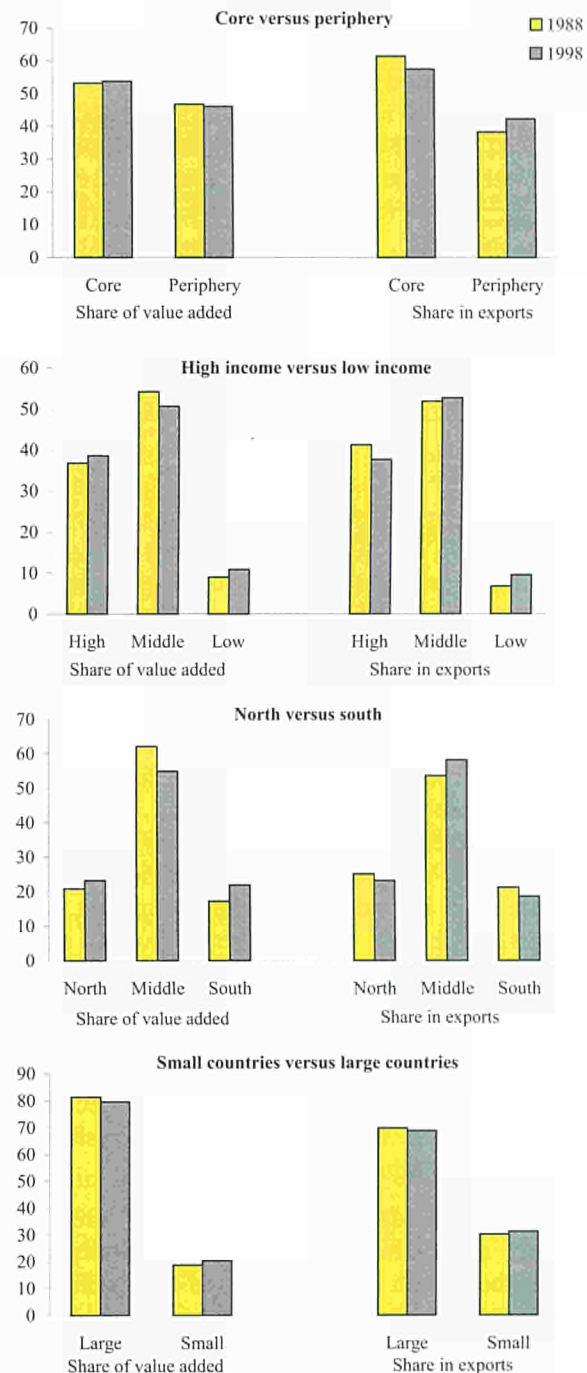
## 5. Influence of other determinants

In this section, we turn briefly to three industry characteristics, to see whether they are discriminators between industries with increasing and decreasing concentration. Table 3.2 reports concentration trends for the different industry characteristics.

We find that concentration is greater in industries with high multinationality, although it decreased in these industries between 1988 and 1998 by two percentage points. There are only three industries with high degrees of **multinationality**<sup>5</sup> in which concentration rose: reproduction of recorded media, other chemicals and other food. Large decreases were recorded in

control equipment, audio and video, telecom equipment, electronic components, electrical equipment and ships and boats. This suggests a generally de-concentrating effect for MNEs over this period.

**Figure 3.5: Geographic concentration of production and exports**



Source: WIFO calculations using SBS.

<sup>4</sup> We have defined the “North” to include Denmark, Ireland, Finland, Sweden and the United Kingdom; the “Middle” as Belgium, Germany, France and the Netherlands; the “South” as Greece, Spain, Italy and Portugal.

<sup>5</sup> Here, we have used the Davies and Lyons (1996) classification of industries according to the multinationality of their leading firms – the indicators roughly reflect the number of countries in which the firms produce. WIFO has reclassified their indicators from old to new NACE.

**Table 3.2: Industry characteristics and concentration trends**

|                                    | CR3   |       |        | CR5   |       |        |
|------------------------------------|-------|-------|--------|-------|-------|--------|
|                                    | 1988  | 1998  | change | 1988  | 1998  | change |
| High market growth                 | 64.05 | 62.34 | -1.72  | 82.46 | 81.55 | -0.91  |
| Medium market growth               | 64.70 | 63.33 | -1.37  | 83.23 | 81.55 | -1.68  |
| Low market growth                  | 65.91 | 65.31 | -0.60  | 83.64 | 82.44 | -1.20  |
| High degree of globalisation       | 67.37 | 66.35 | -1.02  | 85.23 | 83.86 | -1.37  |
| Medium degree of globalisation     | 66.01 | 64.44 | -1.58  | 84.50 | 82.82 | -1.68  |
| Low degree of globalisation        | 61.28 | 60.19 | -1.09  | 79.59 | 78.85 | -0.74  |
| High multinationality              | 66.47 | 64.49 | -1.97  | 83.54 | 82.22 | -1.32  |
| Medium multinationality            | 65.17 | 63.66 | -1.51  | 83.06 | 81.66 | -1.39  |
| Low multinationality               | 63.02 | 62.82 | -0.20  | 82.73 | 81.64 | -1.09  |
| High minimum efficient scale       | 63.53 | 62.94 | -0.58  | 82.09 | 81.32 | -0.77  |
| Medium minimum efficient scale     | 65.10 | 63.82 | -1.28  | 83.29 | 81.60 | -1.69  |
| Low minimum efficient scale        | 66.03 | 64.21 | -1.82  | 83.94 | 82.61 | -1.33  |
| High economies of scale            | 64.90 | 64.51 | -0.39  | 83.32 | 82.92 | -0.40  |
| Medium economies of scale          | 66.10 | 63.50 | -2.60  | 83.05 | 81.16 | -1.89  |
| Low economies of scale             | 63.66 | 62.97 | -0.69  | 82.95 | 81.45 | -1.51  |
| High product differentiation       | 68.67 | 66.50 | -2.17  | 85.64 | 83.85 | -1.79  |
| Medium product differentiation     | 65.48 | 64.88 | -0.60  | 84.23 | 83.77 | -0.46  |
| Low product differentiation        | 60.51 | 59.60 | -0.91  | 79.46 | 77.91 | -1.55  |
| High productivity                  | 63.34 | 63.19 | -0.15  | 81.68 | 80.87 | -0.81  |
| Medium productivity                | 67.54 | 64.72 | -2.82  | 84.36 | 82.95 | -1.41  |
| Low productivity                   | 63.78 | 63.07 | -0.71  | 83.28 | 81.71 | -1.57  |
| High wage level                    | 68.08 | 67.69 | -0.39  | 84.84 | 84.32 | -0.52  |
| Medium wage level                  | 65.42 | 62.94 | -2.48  | 82.98 | 80.98 | -2.01  |
| Low wage level                     | 61.16 | 60.35 | -0.81  | 81.50 | 80.23 | -1.27  |
| Low skill industries               | 55.87 | 54.79 | -1.08  | 79.67 | 78.30 | -1.37  |
| Medium skills/blue collar workers  | 64.18 | 62.46 | -1.71  | 83.35 | 82.35 | -1.00  |
| Medium skills/white collar workers | 63.25 | 61.34 | -1.91  | 79.67 | 77.54 | -2.13  |
| High skill industries              | 66.51 | 63.72 | -2.79  | 85.08 | 82.19 | -2.89  |

Source: WIFO calculations using SBS.

It is to be expected that integration will enable a stronger exploitation of **economies of scale**. We have tested this expectation using two statistical indicators: one for economies of scale (EOS) and the other for minimum efficient scale (MES).<sup>6</sup> The data indicate that industries with larger EOS are, indeed, geographically more highly concentrated, but the difference from average concentration is very small. For both indicators the results are not statistically significant. However, they suggest that concentration declines somewhat less in industries with prominent scale economies. Among the industries with strong economies of scale, we find increasing concentration in other transport, other chemicals, other food and agro-chemicals; but there are also other industries with increasing returns, like electrical equipment, basic iron, and paints, in which concentration is declining. Overall, then, there is little evidence of a systematic effect related to production scale economies.

Industries with **high market growth** are less regionally concentrated, average concentration is 64.3% in those with high growth and 65.9% in those with low growth. Regional concentration declined in

both groups between 1988 and 1998. Concentration is six percentage points higher in the group of **highly globalised industries**, but there is no difference in the rate of decrease between 1988 and 1998 between highly and lowly globalised industries.

Finally, we find that **high wage** industries are significantly more concentrated, although they did not reduce their concentration over the last ten years. Within the high-wage group, there are some capital-intensive industries (like agro-chemicals and steam generators), as well as some engineering industries (like machine tools, office computer, production of recorded media). Exactly half of them increased, and half of them reduced concentration. Within the low-wage industries, most textile industries increased concentration; in industries producing semi-finished or less processed goods, concentration decreased. Industries with high product differentiation<sup>7</sup> started from high levels of concentration, which tended to decline over the last ten years.

## 6. Summary

The evidence does not support fears that the Single Market would lead to increased concentration – either in terms of production or trade. If anything, concentration has tended to decline, albeit marginally, in the typical industry (see Figure 3.3 above). This is in spite of the slight trends towards specialisation noted in the previous chapter, which have been more than compensated for by the relatively faster growth of the smaller Member States over the last decade. (See Box 3.1)

This has a number of implications, either direct or indirect. Not least of these is that there are no signs of a strengthening of the core at the expense of the periphery. The share of total manufacturing in the periphery is stable, and some indicators look even brighter for the periphery; for example, in research-intensive industries the difference in favour of the core has become smaller. Theoretical models suggested that lower trading costs flowing from integration might first favour the centre and in a later stage, perhaps, the periphery. This hypothesis has been likened to a U-shaped curve. Certainly, the data reviewed here are insufficient enough to answer the question of on which part of the U-curve European manufacturing is currently producing. However, if anything, the signs are most consistent with the possibility that Europe is

<sup>6</sup> As indicators for economies of scale, we use data from Davies and Lyons (1996) on Minimum Efficient Scale (in relation to industry size, MES) and Pratten's (1988) classification into EOS classes according to a set of indicators.

<sup>7</sup> The standard deviation of export-unit values is used as an indicator of product differentiation. See Aiginger (1997).

eventually reaching the second side of the U. The periphery is catching up in several indicators (exports, research-intensive industries) and the low-income countries are making inroads in skill- and research-intensive sectors.

Nevertheless, we should take into account that the study period is short, and that these results for countries should be complemented by further analysis at the regional level.

### Box 3.1 Rising specialisation, but declining concentration: no paradox

At first sight, it seems strange that countries can become more specialised, whilst industries become less concentrated. After all, increased specialisation implies that a country is concentrating more of its activity in those industries in which it is comparatively larger, and less in those in which it is comparatively smaller. In a world where all countries were of the same size, and likewise all industries, increased specialisation must mean that industries will also become more concentrated (because the larger players would become larger, and the smaller players smaller.)

To put the same point statistically, specialisation and concentration are two perspectives to be derived from a matrix with the columns referring to 14 countries, and the rows to 22 sectors (95 industries). Specialisation is observed by reading down each column, whilst concentration is observed by reading along each row. One might expect that if “inequalities” tend to increase down the columns, so they should also increase along the rows.

In fact, there is no paradox in our results, and the two opposing trends can be reconciled precisely because the Member States are *not all equal sized*, nor are the industries.

Formally, this can be shown most elegantly using the well-known statistical “Entropy index”. This index is similar conceptually to the Herfindahl index described in Box 1.1 (the entropy is the summed product of share and log share, as opposed to the Herfindahl, which is the summed squared shares). In its numbers equivalent (antilogged) form, this converts each country’s (industry’s) actual distribution of industry (country shares) into an hypothetical equivalent number of equal sized industries (countries). So a very specialised country will record a low number equivalent industries, whilst a very diversified country will record a value nearer to 22 (in terms of sectors). Similarly, a geographically concentrated industry records a low value, whilst a dispersed one records a value near to the upper limit of 14.

When the entropies are calculated for specialisation and concentration in 1988 and 1998 (based on production), we confirm the main message of the last two chapters:

- average specialisation (across countries) increased slightly: the numbers equivalent decline from 16.6 to 15.9
- average concentration (across sectors) declined slightly: the numbers equivalent rise from 7.5 to 7.7.

Moreover, it is easy to show, algebraically, that the two concepts are related as follows:

Average specialisation of countries = Average concentration of industries x Specialisation of industries in the EU as a single entity / Concentration of total manufacturing as a single entity.

For example, in 1998:  $15.9 = 7.7 * (17.1 / 8.3)$ ; and in 1988:  $16.6 = 7.5 * (17.6 / 8.0)$ .

This shows that average specialisation and concentration moved in opposite directions, because aggregate specialisation of the EU as a whole and concentration of manufacturing as a whole also moved in opposite directions.

In other words, although most countries were specialising more in what they do best, this did not lead to increased concentration of industries *because the smaller countries (which tend to account for the smaller shares in any particular industry) have grown more rapidly than the larger countries*: in 1988, it was as if EU manufacturing in aggregate was produced by 8.0 equal sized Member States, but by 1998, this had risen to 8.3.

Putting this story into more specific terms, the five largest sectors – chemicals, machinery, food, motor vehicle, metal products – increased their share of European production by 2.2%, and this trend influenced measured specialisation rates in most countries. For geographic concentration, what is important is that the share of the large countries declined, and so the concentration of those industries where the large countries have the highest shares tended to decline. High growth in small countries increased dispersion (decreased concentration).



# The impact of structural change on competitiveness

Having established the main trends for specialisation and concentration, we now need to ask “what do these tell us so far about the concerns raised in the introductory section?” The answer is “more about some than others”, and, in particular that we need a little more information before we can tackle what is perhaps the key issue: competitiveness. This chapter attempts to provide that extra information. But, first, we take stock of the story so far.

### 1. Recalling the advantages and disadvantages of specialisation and concentration

We argued in the introduction that the process of specialisation and concentration is driven by the decisions of individual firms and investors in a rapidly changing environment. The speed and direction of the process depend, on the one hand, on economic forces such as economies of scale, spillovers, technology, the price elasticity of demand and the mobility of labour, and, on the other hand, on the underlying economic, social and political framework. Institutions, regulations, liberalisation and public support can all influence the course of the process.

In general there are advantages as well as disadvantages of specialisation. These can be grouped into two broad effects:

- **The efficiency effect.** At the individual firm level, by specialising the firm may be able to exploit economies of scale, to reap learning effects, to use specialised inputs etc. If so, efficiency increases.
- **The risk effect.** On the other hand, risks can increase for less diversified firms and specialisation can be particularly disadvantageous, if the firm is locked into a mature, declining industry.

Both these effects have equivalent counterparts at the regional and national levels. Countries with higher specialised industries can enjoy higher productivity if specialisation occurs in dynamic markets, and if they have specific endowments and scale economies which

can be exploited. Moreover, geographic concentration of industries may also enhance competitiveness if significant spillovers or vertical linkages exist.

However, there are also other angles, not so easily explained by the analogy to the individual firm. In particular, the risk effect at the macro level has become a major policy issue as Europe becomes a currency union. This is discussed in the literature about the optimal regional extension of areas with a common currency.<sup>1</sup>

If member countries of a currency union are too much specialised in narrow product markets, then external shocks will lead to asymmetries in demand, which can no longer be dampened by changes in the external value of currencies. In this case, the flexibility of capital, product and labour markets have to be increased to prevent persistent differences in demand.

Against this backcloth, the previous chapters have helped provide a partial assessment of how real these hopes and fears have been. In particular, the two previous chapters have shown that, although there has been a trend towards increased specialisation, this has not been pronounced or pervasive. Nevertheless, in principle, this might have led to increased concentration. In practice, however, this has not been the case since geographical concentration has tended to decline, largely because of the relatively stronger growth performance of the smaller Member States.

However, what they have not shown directly is how this has *affected* competitiveness. Indeed, a moment's reflection will confirm that there can be no simple and obvious causal link between specialisation and concentration and the competitiveness of Member States and the EU as a whole. While it is true that indexes of specialisation and concentration may *reveal* something about the extent of change<sup>2</sup>, they can not

<sup>1</sup> See Mundell (1961) and De Grauwe, (1996).

<sup>2</sup> It should be noted that our indices capture the net effect of structural forces operating on industries. To the extent that there are offsetting forces at work: a specific small increase in specialisation may be the net effect of two countervailing forces, one increasing specialisation and a second smaller one working against.



establish directly that this has an *effect* on competitiveness. Ultimately, it is the underlying “speed of change” which would be expected to have an impact on competitiveness and growth.

The purpose, then, of this chapter is to provide the missing link: evidence that change enhances competitiveness.

## 2. Speed of change and growth, compared across Member States

For this purpose, we have constructed an index of the “speed of change” for each country by summing the absolute changes in the sector (i.e. two-digit industry) shares between 1988 and 1998.<sup>3</sup> This index would be zero if no industry changed its share of total value added, and it increases the more industries change their relative positions.

Countries have been ranked by this index, as well as by their growth in value added and exports (total, *extra-* and *intra-*EU). This has been conducted at the levels of both industries and sectors, and so we have eight comparisons of growth and speed of change (Table 4.1).

**Table 4.1: Growth of production, employment and exports and the speed of change**

|            | Rank correlation coefficient between speed of change and growth |                |
|------------|---|----------------|
|            | Sector level  | Industry level |
| Production | 0.42 *  | 0.38 *         |
| Employment | 0.18  | 0.23           |
| Exports:   |   |                |
| Total      | 0.48 *  | 0.47 *         |
| Extra-EU   | 0.43 *  | 0.51 *         |
| Intra-EU   | 0.09  | 0.13           |

*Note:* Speed of change (dissimilarity) = sum of absolute differences of shares in a specific country in 1998 as compared to 1988. \* = Significant at 90% level.

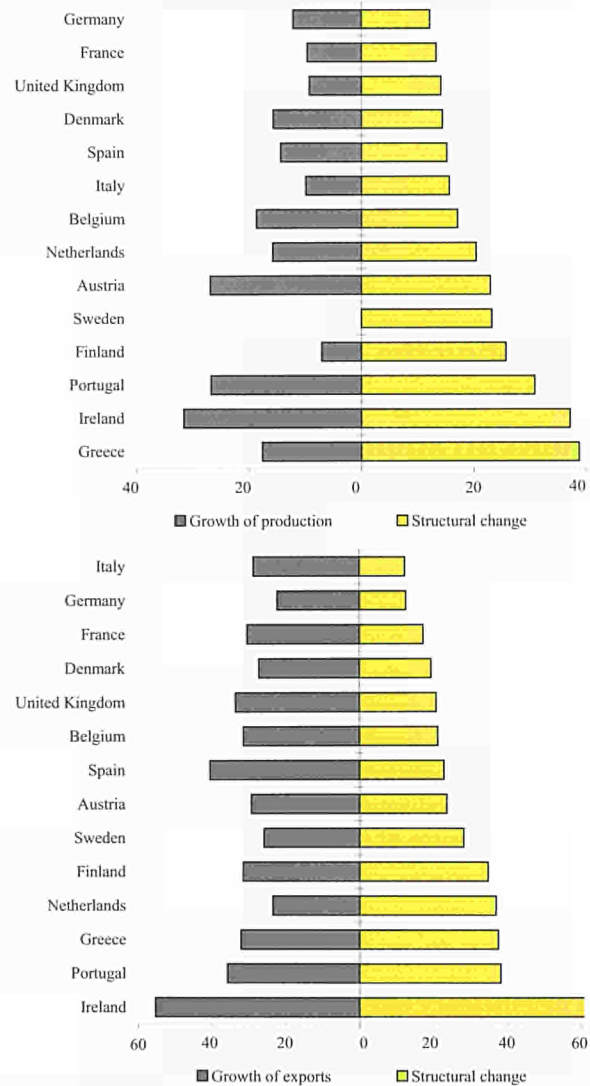
*Source:* WIFO calculations using SBS and COMEXT.

<sup>3</sup> The index calculates the sum of the absolute differences between the shares of production in 1988 and 1998. This process is repeated for each country, and separately for value added, total exports, extra-exports and intra-exports. This is again a dissimilarity index of the type used in previous chapters. But this time it is between structures for the same country at two points in time (for specialisation, the same calculation was made to compare a country with the EU; for concentration to compare an industry with total manufacturing; in both cases for the same year).

All eight correlations are positive, six of them significantly so at the 90% level.<sup>4</sup>

Amongst the Member States, the index was highest (structural change fastest) in production in Ireland, followed by Portugal: these two countries assumed the same positions in terms of growth in value added (see Figure 4.1).

**Figure 4.1: Speed of change and growth of production and exports**



*Note:* The scale on the right and the left side of the figure is not in the same dimension.

*Source:* WIFO calculations using SBS and COMEXT.

Table 4.2 shows which sectors gained shares and which lost most heavily in the two countries. Having said this, the correlation is by no means perfect. For

<sup>4</sup> The lower correlation between speed of change and employment suggests that the underlying relation is quite complex. For some industries structural change might determine an employment reduction in the short term but a positive effect is likely to follow in the long run.



instance, Germany, Austria and Belgium all grew relatively rapidly, while their structural change was slow. Contrarily, there was substantial structural change in Sweden and Finland, but their growth was relatively slow.

Needless to say, there will be important country-specific effects (e.g. for the Nordic countries, devaluation and the loss of the Russian market). However, these correlations, especially for change in production and extra-EU imports, are sufficiently high to be suggestive of an underlying positive relationship between change and growth in value added, exports and competitiveness. Of course, correlation does not prove causality. This would require at least a longer timer series and controlling for intervening economic and political variables.

**Table 4.2: Growth of production in Ireland and Portugal and the speed of change**

| Ireland                       |   | 1988  | 1998  |
|-------------------------------|---|-------|-------|
| Sectors with largest increase | Chemical and chemical products                      | 16.39 | 27.18 |
|                               | Publishing, printing and reproduction               | 4.94  | 8.73  |
|                               | Medical, precision and optical instruments, watches | 3.72  | 5.13  |
|                               | Electrical machinery and apparatus n. e. c.         | 2.76  | 4.17  |
|                               | Radio, TV and communication equipment               | 2.12  | 3.09  |
| Sectors with largest decrease | Machinery and equipment n. e. c.                    | 4.72  | 3.44  |
|                               | Office machinery and computers                      | 10.34 | 8.89  |
|                               | Basic metals  | 2.54  | 0.57  |
|                               | Tobacco products                                    | 3.19  | 1.15  |
|                               | Food products and beverages                         | 27.88 | 20.07 |
| Portugal                      |   | 1988  | 1998  |
| Sectors with largest increase | Motor vehicles, trailers and semi-trailers          | 3.01  | 7.67  |
|                               | Other non-metallic mineral products                 | 7.10  | 8.91  |
|                               | Electrical machinery and apparatus n. e. c.         | 2.62  | 4.34  |
|                               | Furniture; manufacturing n. e. c.                   | 1.44  | 3.04  |
|                               | Publishing, printing and reproduction               | 3.48  | 4.89  |
| Sectors with largest decrease | Machinery and equipment n. e. c.                    | 3.82  | 2.91  |
|                               | Office machinery and computers                      | 2.42  | 1.39  |
|                               | Basic metals  | 5.01  | 2.38  |
|                               | Tobacco products                                    | 13.43 | 9.36  |
|                               | Food products and beverages                         | 10.50 | 5.26  |

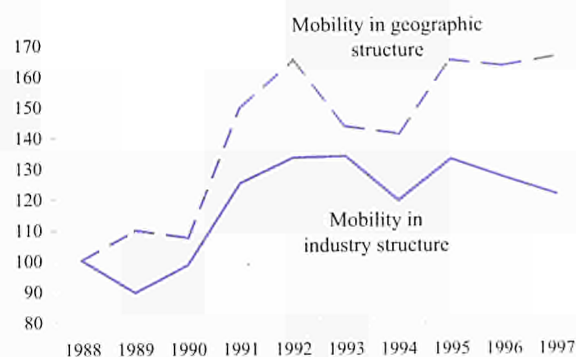
Source: WIFO calculations using SBS.

### 3. Is the speed of change increasing?

We have also investigated whether the speed of change has been increasing over this period by recomputing it for each year, based on absolute changes in shares compared to three years previously.<sup>5</sup> Again this can be computed either by looking at changing industry structure of countries or by looking at country structure of industries. We have done both, and the results are shown in Figure 4.2. It appears that the

speed of change has accelerated, being faster through the nineties than it was at the end of the eighties. Although we can not rule out external influences (globalisation), this finding is consistent with the Single Market Programme having led to an increased the speed of adjustment and, possibly, enhanced competitiveness of European Industry. However, if we recall the size of the remaining productivity difference versus the USA and the temporary halt to the catching up process, this effect may not have been sufficient from the efficiency point of view.

**Figure 4.2: Speed of structural change**



Note: "Mobility" stands for the absolute change of value added shares (sectors, total EU) over the past three years. For instance, 1988 is the difference between 1988 and 1985, 1989 is the difference between 1989 and 1986, etc.

Source: WIFO calculations using SBS.

## 4. Summary

This chapter has delved beneath the aggregate indices of specialisation and concentration of the previous chapters to extract an indicator of the underlying speed of change. Some, admittedly basic, statistical tests suggest that:

- Those Member States exhibiting the most dynamic industrial structures have tended to enjoy faster growth;
- The speed of change appears to have increased as the effects of the Single Market have begun to work through.

Both results will require deeper analysis in the future before we can attribute an element of causality, but, on the face of things, both are consistent with a link between structural change and competitiveness.

<sup>5</sup> That is, the equivalent of the index in the previous section, but instead of just comparing the end points, here we investigate three-year changes on a rolling basis.



# Main findings and policy implications

## 1. Background and results

### Motivation

In a fast-changing world economy, one of the keys to competitiveness is adaptability. Amongst other things, this means the ability to push extra resources into exploiting existing comparative strengths, whilst keeping open the capability to pursue opportunities in new areas as and when they arise. This is just as true for the EU as a whole as for any individual firm searching for an optimal corporate strategy.

One purpose of this report is to assess how far the EU displays this desired adaptability. In principle, there are a number of ways of assessing this question. Here we have chosen to examine the data on two key statistical indicators – the extent to which the Member States have specialised (or not) their activity into a small number of industries; and the extent to which industries within the EU are concentrated (or not) in just a few Member States.

Coincidentally, these two indicators also offer valuable insights into the effects of the single European market. They allow us to evaluate whether European integration has led to the specialisation which is, to some extent, implied by the removal of market imperfections within Europe. Similarly, they allow us to test whether this has been at the expense of an over-concentration in geographical terms, in which certain disadvantaged countries lose out to the larger, more geographically core countries.

### Main findings

The main results in a nutshell are as follows. First, the evidence on specialisation is mixed. On balance, most, but not all, countries have tended to become slightly more specialised in terms of their production. This is more pronounced in the last five years than the previous five years, and is consistent with the effects of the Single Market beginning to bite. On the other hand, there has been no such tendency for exports – if anything, the reverse is true. Second, fears that

geographical concentration would rise have not materialised. Here, the evidence is robust and clear cut – in the typical industry, production is now more geographically dispersed across the Member States than it was ten years ago. These are, of course, generalisations and we should not ignore the considerable diversity that the data reveal. For example, two of the fastest growing economies, in manufacturing terms, are Ireland and Portugal. Whilst the former has become even more specialised over the decade by pursuing newly found strengths, the latter has become considerably more diversified as it establishes footholds in what, for it, are new industries. On the other hand, in some of the larger Member States, structural change has been less pronounced. We must not be extravagant in our claims to have unearthed a strong causal positive relationship between the extent of structural change and the rate of growth. But, with caution, we do suggest that some of our findings (especially in the previous chapter) are consistent with such a relationship.

### The findings in more detail

In slightly more detail, our main findings are as follows:

1. There has been a slight strengthening of certain clusters, specifically of large industries in large countries (e.g. the manufacturing of cars in Germany, machinery in Italy, chemicals in France, and food in the United Kingdom). This movement is contributing to a rise in the specialisation indicators for production in a majority of countries. The tendency is however quite weak, and its strength varies between countries. Portugal, for example, is broadening its production structure and its exports, while Ireland is enjoying high and increasing specialisation.
2. If anything, there has been a slight de-specialisation of manufacturing exports. In most countries export specialisation in 1998 is lower than in 1988. This result merits further analysis, but is consistent with a broad-based growth in intra-industry trade, contrasted to little growth in inter-industry trade in resource-based and certain

other industries. In some countries, increasing production specialisation has coincided with decreasing export specialisation. The Finnish pulp and paper, Swedish machinery, and the United Kingdom chemical industries are examples of industries which were affected by this trend. Another interesting case is the German car industry, which increased both its exports and its overall market share over this period. However, since imports expanded relatively faster (from a much lower level), this increase in intra-industry trade actually eroded the magnitude of Germany's trade balance relative to that of the rest of the EU.

3. Geographic concentration, measured as the share of the top three or five countries in industries, has declined. This holds on average, as well as for the majority of industries for production and, even stronger, for exports. In terms of production, only four out of 22 sectors (food, tobacco, plastics and other transport) had increasing absolute concentration rates, in exports only two. At the industry level, absolute concentration decreased in two thirds of the industries.
4. Geographic concentration is higher in research and skill intensive industries. But in both groups, it has been declining faster than the average. Specific examples are control equipment, the audio and video sector, telecom equipment and pharmaceuticals. Geographic concentration is higher in industries with strong economies of scale, and in industries with high globalisation, with high product differentiation and high wages. All of these results are consistent with the theory. However none of them really help to *explain* the changes in concentration we have observed between 1988 and 1998 (although there is some evidence that a strong presence of MNEs has contributed to de-concentration). This indicates that strategies of individual firms may play an important role in explaining changes in concentration in specific industries. Perhaps the period studied here was too short and too strongly influenced by shocks, but the net effect is that we have not unearthed a complete quantitative *explanation* of the sources of change.
5. The combination of generally increased specialisation and generally decreasing concentration may appear superficially surprising. However, it can be explained by the fact that the smaller Member States have tended to grow faster in aggregate, than the larger Member States. As a consequence, increased specialisation within individual large countries does not mean that the

EU is more dependent on that country for that particular industry. Rather, concentration does not increase because the "market" shares of the smaller countries have increased simultaneously. In many ways, this is a happy coincidence of events – the presumed benefits of specialisation have not coincided with the tensions of increased concentration.

6. Contrary to the fears of some, the industrial shares of the more centrally located countries have not risen over the past ten years. For the sake of brevity, we shall call this group "core" and the non-centrally located Member States "periphery", although these concepts are more appropriate for regions than countries. This result is robust to changes in the classification of countries. As for exports, the core is losing market shares. As might be expected, it has an over-proportionally large share of research intensive industries, but even this has declined marginally (more strongly for exports). The periphery has made inroads in telecom equipment, control instruments as well as aircraft and spacecraft. In advertising intensive industries, the core has traditionally had lower shares, but, conversely, this has been increasing during the last ten years. Sport goods, music, games and some food industries are responsible for this trend. Thus, there are some signs of convergence – if anything, the Member States' industrial structures are becoming more similar, at least in broad terms.
7. As already mentioned, the smaller countries have been growing faster over the past ten years than larger countries. In Ireland and in Portugal, this is partly a result of the catching up process. In the former this has been effected by increasing its already high specialisation, whilst the latter has spread its manufacturing over a wider range of industries by expanding into (for it) new areas. Relatively, fast growth has also emerged in Austria and Denmark, which were already members of the high-income group. If classified according to income per capita, the medium income group has been losing output share, the high income group has been winning slightly and the low income countries have been gaining fastest. The high-income countries are losing some of their lead in research intensive industries, while low-income countries are catching up in endowment structure and in industry structure. However, these trends are not particularly pronounced.

8. While most of our statistics only provide indirect evidence of a link between the speed of change and enhanced competitiveness, the slightly speculative statistical experiments in the previous chapter do support such a connection. They show a positive correlation between the growth of individual Member States and the underlying changes in the shares of industries within each country.

## 2. Policy implications

In a world where patterns of demand are changing rapidly, similarly rapid changes in market shares are a sign of an efficient market. Indeed, to the extent that the Single Market programme had the objective of removing market imperfections, at least within Europe, it might be expected (and hoped) that the last ten years would have seen significant structural change in European manufacturing.

On balance, however, the evidence reported here suggests that, although there has been change, it has been rather limited (with exceptions in some of the smaller Member States). It is true that stable market shares are not incontrovertible evidence of an inefficient market – for instance, strong and unchanging consumer preferences can also sometimes give rise to such stability. Nevertheless, bearing in mind the continuing productivity gap vis-à-vis the USA, it is likely that one remaining cause of slow structural change is market imperfections within Europe.

The policy implication must be that efforts to remove remaining imperfections should continue, and probably accelerate. While the root cause of change in any market economy must always be the responses of individual firms to new opportunities, there is still invariably an important facilitating role for policy.

Perhaps, there might have been some cause for caution, if there was evidence that such change as there has been over the last decade has led to undesirable inequalities between the Member States. However, none of the evidence we have reported points in this direction – on the contrary, geographical concentration has weakened.

Overall then, our conclusion is a simple one. In the wake of the Single European Market, the extent of structural change appears to have been, somewhat disappointingly, slow. In this context, even a prudent commentator would be justified in arguing for no let up in the drive towards more efficient markets within the EU.

Of course, it has not been the purpose of this report to investigate the impact of specific policies on these dimensions of structural change. To that extent, it would be inappropriate to end with specific policy proposals. On the other hand, examples of policies which should improve the efficiency of any market include: an active competition policy; continuing managed removal of subsidies for declining industries; no specific protection of national champions; positive upgrading of the infrastructure of regions where low wage, low growth industries are concentrated; continued investment in education and training; provision of support for basic research (to avoid market failure inevitably associated with public goods); and enhanced flexibility in the labour market.

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## **Part Two**

### **Prime forces of structural change**



## Chapter 1

### Physical investment in Europe

Gross fixed capital formation is of crucial importance for the competitiveness of an economy. Periods of strong output growth are always accompanied by substantial physical investment. Such investment not only enhances directly the productivity of labour but is also the means of acquiring new technology embodied in new machinery. Indeed, in most sectors of the economy, the component of technology embodied in fixed capital – including computers – is much more important than disembodied technical change. Very often, capital investment is a necessary condition if we are to fully exploit the returns from R&D expenditures.

In the short run, physical investment is also important as a component of aggregate demand. In many macroeconomic models, the demand side is built around the investment equations. Though fixed capital investment represents commonly less than a fourth of total aggregate demand, its role over the cycle is of particular importance because it is one of the most fluctuating and least predictable demand components.

The role of physical investment often comes under scrutiny when problems of employment are considered. There is little doubt that, to create new durable employment posts, new physical investment is usually needed. This is one of the reasons why most countries have some type of investment promotion policy in place.

On the other hand, particularly in periods of slow output growth, physical investment often accompanies important restructuring programmes that lead to losses of jobs in the short run. In particular in Europe, this role of fixed capital as a substitute rather than a complement to labour has received substantial publicity. Indeed, the received wisdom so far has been that European firms invest more as a share of their value added but create fewer jobs than their US counterparts.<sup>1</sup>

In this chapter, after examining the latest aggregate and sectoral data on investment, we find that the picture has changed substantially in the nineties. In Europe the accumulation process has undergone a

strong deceleration accompanied by a less sharp fall in output growth; in the USA there has been an acceleration of investment activity at almost constant economic growth. Investment and employment creation turn out to be more complements rather than substitutes.

Following the main line of the report, the analysis focuses on investments' structural change within European manufacturing. In particular, it investigates whether the Member States are becoming more specialised or more similar in their investments' structures, and whether industrial investments are becoming more concentrated in fewer individual Member States or more dispersed over all regions.

Considering sectoral specialisation, we find no very marked differences between the larger European economies and the USA. Overall, we detect no consistent pattern of increasing or decreasing investment specialisation over time.

Instead, we do find some evidence of a decreasing geographic concentration of investment of various manufacturing sectors within Europe, possibly as an effect of market integration.

In the last part of this chapter some tentative results are presented on the determinants of sector-specific investment in the EU Member States. In spite of the convergence of regulation structures among Member States and the wide process of economic integration, country differences still remain strong.

#### **1. Investment trends in the economy and in manufacturing**

##### **Investment patterns in total economy**

At the beginning of the nineties the general assessment was that Europe and, even more so, Japan were gradually catching up in the productivity and specialisation race vis-à-vis the USA. This view was often based on the observation that Europe and Japan

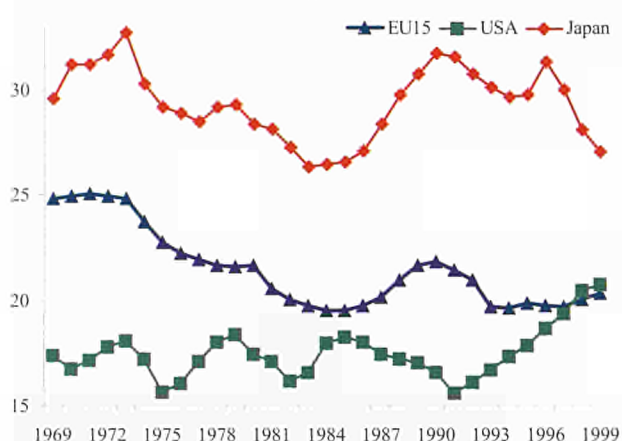
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<sup>1</sup> See European Commission (1997, 1998).

were consistently investing more than the USA in new physical capital.

Indeed, over the last 30 years, the USA has consistently represented the lower bound and Japan the upper bound of investment as a ratio of GDP at constant prices (see Figure 1.1). In the beginning of the nineties, this ratio was around 17% for the USA and over 30% for Japan.

**Figure 1.1: Gross fixed capital formation as a percentage of GDP**



Note: GFCF and GDP are deflated using their own price indices.  
Source: European Commission.

All major European countries consistently fell within this band, though dynamics have varied substantially from one EU Member State to another (see Table 1.1). On average, at the beginning of the nineties, EU countries were investing around 22% of their GDP.

**Table 1.1: Real gross fixed capital formation as a percentage of GDP in EU Member States**

|                | 1970-79 | 1980-89 | 1990-98 | 1995 | 1996 | 1997 | 1998 | 1999 |
|----------------|---------|---------|---------|------|------|------|------|------|
| Belgium        | 20.3    | 16.4    | 18.8    | 18.4 | 18.3 | 18.7 | 19.0 | 19.3 |
| Denmark        | 26.4    | 19.9    | 20.1    | 20.3 | 20.6 | 22.0 | 22.8 | 23.0 |
| Germany        | 25.3    | 22.0    | 22.0    | 22.0 | 21.4 | 21.0 | 20.6 | 20.6 |
| Greece         | 30.0    | 22.5    | 22.9    | 21.5 | 22.8 | 24.2 | 25.6 | 27.4 |
| Spain          | 22.8    | 19.7    | 22.5    | 22.1 | 21.8 | 22.1 | 23.3 | 24.4 |
| France         | 23.1    | 20.0    | 19.5    | 19.1 | 18.7 | 18.3 | 18.5 | 18.8 |
| Ireland        | 23.8    | 20.9    | 16.1    | 15.2 | 16.0 | 16.0 | 16.0 | 16.3 |
| Italy          | 23.5    | 19.8    | 18.5    | 17.8 | 17.8 | 17.6 | 18.0 | 18.2 |
| Luxembourg     | 25.5    | 22.2    | 26.1    | 25.0 | 23.9 | 24.9 | 25.8 | 25.8 |
| Netherlands    | 24.2    | 20.4    | 20.2    | 19.8 | 20.2 | 20.8 | 20.9 | 20.7 |
| Austria        | 23.9    | 21.5    | 24.0    | 24.3 | 24.4 | 24.5 | 25.1 | 25.6 |
| Portugal       | 29.3    | 25.9    | 28.7    | 27.9 | 28.6 | 30.9 | 32.3 | 33.4 |
| Finland        | 30.7    | 27.2    | 20.5    | 17.6 | 18.4 | 19.9 | 20.5 | 21.1 |
| Sweden         | 20.5    | 18.6    | 17.1    | 16.2 | 16.6 | 15.5 | 16.5 | 16.9 |
| United Kingdom | 19.2    | 18.3    | 19.3    | 18.6 | 19.0 | 19.5 | 20.5 | 20.9 |
| EU-15          | 23.4    | 20.4    | 20.3    | 19.8 | 19.7 | 19.7 | 20.0 | 20.3 |
| USA            | 17.2    | 17.3    | 17.6    | 17.8 | 18.6 | 19.3 | 20.4 | 20.7 |
| Japan          | 30.2    | 27.9    | 30.3    | 29.7 | 31.3 | 30.0 | 28.1 | 27.0 |

Note: Figures for 1999 are estimates.  
Source: European Commission.

In the last years, the perception of the highly investing European and Japanese economies and of the laggard USA is changing rapidly.

Investment levels as a percentage of GDP fell in Europe in 1998 for the first time below US levels (20.0 and 20.4 respectively). Estimates suggest that this is likely to be repeated in 1999. Investment activity in Japan also shows clear signs of slowdown.

Growth rates, rather than investment levels, give an even more vivid picture of the changes that have taken place over the nineties. Between 1990 and 1998 the growth rate of investment (at constant prices) of the EU15 fell by two thirds (from 2.5% in the eighties to 0.8% in the nineties), while that of the USA more than doubled (from 2.4% to 5.4%). In Japan, the fall was even sharper (from 5% to -0.4%). (See Table 1.2)

**Table 1.2: Trends in GDP, investment and employment (average annual rate of change)**

|                | GDP     |         |         | GFCF    |         |         | Employment |         |         |
|----------------|---------|---------|---------|---------|---------|---------|------------|---------|---------|
|                | 1970-80 | 1980-90 | 1990-98 | 1970-80 | 1980-90 | 1990-98 | 1970-80    | 1980-90 | 1990-98 |
| Belgium        | 3.4     | 1.9     | 1.7     | 2.3     | 2.3     | 0.9     | 0.2        | 0.2     | 0.2     |
| Denmark        | 2.2     | 2.0     | 2.7     | -0.8    | 1.6     | 4.4     | 0.7        | 0.7     | 0.3     |
| Germany        | 2.7     | 2.2     | 2.0     | 1.2     | 1.6     | 0.9     | 0.1        | 0.6     | -0.5    |
| Greece         | 4.6     | 0.7     | 1.9     | 2.8     | -0.4    | 3.3     | 0.7        | 1.0     | 0.5     |
| Spain          | 3.5     | 3.0     | 2.1     | 1.6     | 5.2     | 1.4     | -0.6       | 0.9     | 0.6     |
| France         | 3.3     | 2.4     | 1.6     | 2.5     | 2.3     | -0.3    | 0.5        | 0.3     | 0.2     |
| Ireland        | 4.7     | 3.6     | 7.7     | 5.7     | 0.5     | 5.6     | 0.9        | -0.2    | 2.9     |
| Italy          | 3.6     | 2.2     | 1.2     | 1.7     | 1.6     | -0.4    | 0.6        | 0.4     | -0.6    |
| Luxembourg     | 2.6     | 4.5     | 5.0     | 2.6     | 3.7     | 5.9     | 1.2        | 1.7     | 3.0     |
| Netherlands    | 3.0     | 2.2     | 2.6     | 0.2     | 1.9     | 2.6     | 0.7        | 1.1     | 1.7     |
| Austria        | 3.6     | 2.3     | 2.1     | 3.7     | 2.5     | 3.1     | 0.3        | 1.1     | 1.1     |
| Portugal       | 4.7     | 3.2     | 2.4     | 4.1     | 3.0     | 4.4     | 0.4        | 1.2     | 0.4     |
| Finland        | 3.4     | 3.1     | 1.5     | 2.1     | 3.4     | -2.5    | 0.9        | 0.6     | -1.3    |
| Sweden         | 2.0     | 2.0     | 1.0     | 0.6     | 3.3     | -2.2    | 0.9        | 0.5     | -1.4    |
| United Kingdom | 1.9     | 2.7     | 2.0     | 0.5     | 4.3     | 2.0     | 0.3        | 0.8     | 0.0     |
| EU-11          | 3.2     | 2.4     | 1.8     | 1.7     | 2.2     | 0.6     | 0.3        | 0.6     | 0.0     |
| EU-15          | 2.9     | 2.4     | 1.8     | 1.5     | 2.5     | 0.8     | 0.3        | 0.6     | 0.0     |
| USA            | 3.2     | 2.9     | 2.7     | 3.6     | 2.4     | 5.4     | 2.4        | 1.8     | 1.3     |
| Japan          | 4.5     | 4.0     | 1.1     | 3.5     | 5.2     | -0.4    | 0.8        | 1.2     | 0.5     |

Source: European Commission.

Within Europe, the fall was sharpest in Finland and Sweden (especially in the beginning of this decade when they were hit by devaluation and the loss of Russian markets) and in the largest countries of continental Europe, France and Italy in particular.

The different patterns of investment between the USA and EU are not only an effect of the falling role of the European public sector investments. Looking at the breakdown of real investment spending, between 1990 and 1998 real government investment spending has dropped by 1.3% p.a. in the EU, while in the USA it was increasing by 3.7% (see Table 1.3). In the same period, the real investment in the private sector has increased merely by one percent in Europe and by 5.7% in the USA.

Interestingly, the rise and fall of investment growth was generally accompanied by similar changes in employment growth, highlighting in this way the

complementary relation between the two<sup>2</sup> (see Table 1.2 above). The USA has registered one of the fastest growth rates in both fixed investment and employment. Within Europe, Luxembourg and Ireland were among the best performers on both accounts.

**Table 1.3: Breakdown of investment into private sector and general government (average annual rate of change)**

|                | Private sector |         |         | General government |         |         |
|----------------|----------------|---------|---------|--------------------|---------|---------|
|                | 1970-80        | 1980-90 | 1990-98 | 1970-80            | 1980-90 | 1990-98 |
| Belgium        | 2.0            | 3.9     | 0.7     | 3.3                | -8.5    | 3.4     |
| Denmark        | -0.6           | 2.5     | 4.3     | -1.9               | -5.1    | 4.8     |
| Germany        | 1.5            | 2.2     | 1.2     | 0.0                | -1.9    | -2.0    |
| Greece         | 3.8            | -0.5    | 2.2     | -0.5               | -0.1    | 7.3     |
| Spain          | 1.7            | 3.7     | 2.1     | -0.4               | 16.2    | -1.9    |
| France         | 2.7            | 2.0     | -0.5    | 1.4                | 3.6     | 0.7     |
| Ireland        | 5.4            | 1.6     | 5.3     | 7.0                | -5.3    | 7.7     |
| Italy          | 1.5            | 1.2     | 0.0     | 3.0                | 3.8     | -2.7    |
| Luxembourg     | 1.1            | 4.8     | 5.8     | 8.5                | 0.3     | 6.0     |
| Netherlands    | 0.4            | 2.3     | 2.6     | -1.0               | -0.7    | 2.5     |
| Austria        | 4.0            | 2.9     | 3.8     | 2.6                | 0.2     | -2.8    |
| Portugal       | 3.4            | 3.3     | 3.8     | 10.5               | 1.4     | 8.4     |
| Finland        | 2.1            | 3.5     | -2.9    | 2.6                | 2.8     | -0.1    |
| Sweden         | 1.5            | 4.1     | -2.1    | -2.4               | -0.5    | -3.1    |
| United Kingdom | 1.9            | 4.5     | 2.8     | -5.0               | 2.7     | -5.2    |
| EU-11          | 1.9            | 2.2     | 0.8     | 1.0                | 2.0     | -1.0    |
| EU-15          | 1.8            | 2.6     | 1.1     | -0.3               | 1.8     | -1.3    |
| USA            | 4.1            | 2.1     | 5.7     | 0.9                | 3.7     | 3.7     |
| Japan          | 2.6            | 5.6     | -1.7    | 8.0                | 3.1     | 5.0     |

Source: European Commission.

### Investment, growth and employment

Not all of the fluctuations in the available factors of production have worked their way through to output growth. Indeed, a characteristic of the nineties, that differs from the stylised facts of previous decades, is that, in Europe, the accumulation process has undergone a strong deceleration in presence of a not so much reduced output growth. In the USA there has been an acceleration of investment activity at almost constant economic growth.

Another way of observing the same relation between capital and output is by calculating the ex post elasticity of capital formation to output growth (the ratio of the investment growth rate to the GDP growth rate) (see Table 1.4). Low ex post elasticity means that higher domestic growth was needed to induce the same investment growth and, conversely, less investment is required to bring about the same output growth.

**Table 1.4: Ex-post elasticities of investment to GDP growth**

|                | Investment / GDP |         |         |
|----------------|------------------|---------|---------|
|                | 1970-80          | 1980-90 | 1990-98 |
| Belgium        | 0.7              | 1.3     | 0.5     |
| Denmark        | -0.3             | 0.8     | 1.6     |
| Germany        | 0.4              | 0.7     | 0.4     |
| Greece         | 0.6              | -0.6    | 1.7     |
| Spain          | 0.4              | 1.7     | 0.7     |
| France         | 0.8              | 1.0     | -0.2    |
| Ireland        | 1.2              | 0.2     | 0.7     |
| Italy          | 0.5              | 0.7     | -0.3    |
| Luxembourg     | 1.0              | 0.8     | 1.2     |
| Netherlands    | 0.1              | 0.9     | 1.0     |
| Austria        | 1.0              | 1.1     | 1.4     |
| Portugal       | 0.9              | 1.0     | 1.9     |
| Finland        | 0.6              | 1.1     | -1.7    |
| Sweden         | 0.3              | 1.6     | -2.2    |
| United Kingdom | 0.2              | 1.6     | 1.0     |
| EU-11          | 0.5              | 0.9     | 0.3     |
| EU-15          | 0.5              | 1.0     | 0.4     |
| USA            | 1.1              | 0.8     | 2.0     |
| Japan          | 0.8              | 1.3     | -0.4    |

Source: European Commission.

For the EU, there has been a fall of this elasticity from 1 to 0.4 between the eighties and nineties. A similar “break” is found also in the USA data but in the opposite direction. The “ex-post” elasticity of investment with respect to GDP has increased to 2 from values below unity.<sup>3</sup>

For some European countries, there has been a strong increase in the investment elasticity but never exceeding that of the USA. Smaller countries registered higher elasticity. Among larger countries, the United Kingdom had an investment elasticity of 1 (though lower than that of the 80's), Germany of 0.4 and France and Italy registered negative values.

The ex post elasticity of employment to investment growth also fell in Europe from 0.3 to around zero. In the USA, it remained positive, albeit lower than in the past (0.2 in the nineties, 0.8 in the eighties).

### Composition of investment expenditures

Aggregate capital spending highlights only part of the whole picture in capital accumulation. It is clearly also important to know on what type of capital the economy is spending and in what uses it puts its

<sup>2</sup> This relation seems to have strengthened over time. The correlation for the European countries is 0.9 in the last decade. It was 0.1 in 1970-80 and 0.3 in 1980-90.

<sup>3</sup> See Caselli et al. (1999). The authors claim that the change in the relation between investment and output is mainly due to the different role played by the uncertainty of aggregate demand in the USA and in the EU.

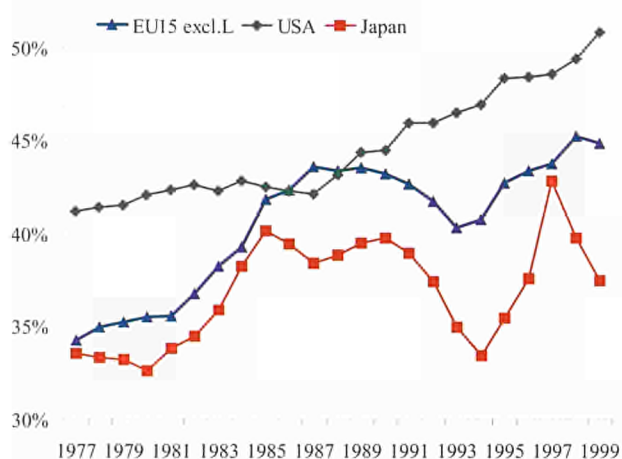


capital. Detailed information in this respect is, unfortunately, scarce and often outdated.

Scattered evidence suggests that the composition of investment is rather different even between the highly industrialised countries.

Looking, for instance, on the weight of investment in equipment over total investment, we find that the EU, as a whole, has consistently invested a smaller part of total investment on equipment compared to the USA. Japan has lagged behind both. In recent years, the trend has been that investment in equipment was increasing faster than total capital spending. The recent US capital spending is characterised by a fast rise in the share of equipment investment on the total (see Figure 1.2).

**Figure 1.2: Equipment investment (as a percentage of total investment)**



Source: European Commission.

Among European countries, Sweden and Italy reach shares higher than the USA (see Table 1.5).

Data on a more detailed breakdown of investment spending is scarce. Ongoing investment in information technology, for example, explains an important part of the investment expansion in the USA (see Table 1.6). Investments in computers have increased, on average, 18 percent in the last expansion phase.

Unfortunately, comparable data do not exist for the EU. Anecdotal evidence suggests that Europe has been much slower in investing in information technology.

From the breaking down of investment figures by macro sectors, it is possible to see the primary role played by private services (see Table 1.7).

**Table 1.5: Equipment investment (as percentage of total investment)**

|                 | 1970 | 1980 | 1990 | 1995 | 1996 | 1997 | 1998 |
|-----------------|------|------|------|------|------|------|------|
| Belgium         | 38.5 | 29.7 | 47.0 | 40.1 | 42.1 | 41.0 | 41.2 |
| Denmark         | 31.8 | 36.7 | 44.3 | 44.9 | 43.8 | 43.2 | 43.3 |
| Germany         | 38.1 | 38.0 | 46.0 | 35.7 | 37.0 | 38.7 | 41.8 |
| Greece          | 31.4 | 27.4 | 35.0 | 38.6 | 38.8 | 37.8 | 37.6 |
| Spain           | 39.5 | 33.3 | 33.1 | 29.6 | 31.0 | 33.3 | 34.2 |
| France          | 34.8 | 34.1 | 39.7 | 40.1 | 41.1 | 40.9 | 42.2 |
| Ireland         | 46.8 | 49.3 | 45.5 | 40.9 | 37.0 | 33.8 | 31.5 |
| Italy           | 36.4 | 47.0 | 49.2 | 51.4 | 51.3 | 51.9 | 53.4 |
| Netherlands     | 39.4 | 33.5 | 44.7 | 42.4 | 42.9 | 42.9 | 43.9 |
| Austria         | 47.3 | 40.8 | 42.6 | 36.9 | 36.6 | 36.8 | 36.6 |
| Portugal        | n.a. | 51.0 | 50.4 | 47.9 | 46.5 | 45.5 | 46.6 |
| Finland         | 35.0 | 34.4 | 34.8 | 39.4 | 40.5 | 38.8 | 39.3 |
| Sweden          | 30.6 | 37.5 | 42.6 | 52.9 | 53.3 | 56.9 | 58.2 |
| United Kingdom  | 47.6 | 46.3 | 42.3 | 47.7 | 48.8 | 48.6 | 48.2 |
| EU-15 excl. Lux | n.a. | 35.5 | 43.2 | 42.7 | 43.4 | 43.7 | 45.2 |
| USA             | 39.4 | 42.1 | 44.4 | 48.3 | 48.4 | 48.6 | 49.4 |
| Japan           | 43.3 | 32.6 | 39.8 | 35.5 | 37.6 | 42.8 | 39.8 |

Source: European Commission.

**Table 1.6: Private fixed capital formation in the USA (average percentage changes)**

|           | Construction |                 | Equipment                                |                              | Total |
|-----------|--------------|-----------------|--|------------------------------|-------|
|           | Residential  | Non residential | Metal products and machinery<br>Computer | Transport equipment<br>Other |       |
| 1983-1991 | 3.6          | -1.5            | 8.9                                      | 1.8                          | 2.3   |
| 1992-1998 | 6.9          | 1.5             | 18.1                                     | 4.3                          | 8.0   |

Source: Caselli et al. (1999)

**Table 1.7: Sectoral composition of investment expenditures (as a percentage of total market economy)**

|                | Agriculture |      |      | Total manufacturing |      |      | Construction |      |      | Market services |      |      |
|----------------|-------------|------|------|---------------------|------|------|--------------|------|------|-----------------|------|------|
|                | 1980        | 1990 | 1996 | 1980                | 1990 | 1996 | 1980         | 1990 | 1996 | 1980            | 1990 | 1996 |
| Belgium        | 3.1         | 2.4  | 1.6  | 21.6                | 34.8 | 30.6 | 2.5          | 2.9  | 2.4  | 72.8            | 59.9 | 65.3 |
| Germany        | 4.3         | 3.7  | 2.6  | 27.5                | 31.4 | 23.6 | 2.9          | 2.3  | 2.2  | 65.3            | 62.6 | 71.5 |
| France         | 4.6         | 3.8  | 4.1  | 19.3                | 21.8 | 18.3 | 4.1          | 3.0  | 2.4  | 72.0            | 71.4 | 75.1 |
| Italy          | 8.9         | 7.4  | 7.9  | 28.3                | 24.6 | 22.2 | 4.5          | 3.3  | 2.9  | 58.3            | 64.7 | 67.0 |
| Finland        | 11.9        | 6.4  | 6.5  | 22.9                | 19.6 | 31.3 | 2.6          | 2.6  | 1.7  | 62.6            | 71.5 | 60.5 |
| Sweden         | 5.7         | 3.5  | 4.4  | 22.9                | 20.0 | 28.3 | 2.4          | 3.3  | 2.3  | 69.0            | 73.1 | 65.0 |
| United Kingdom | 3.8         | 1.8  | 1.3  | 24.7                | 18.3 | 18.2 | 1.7          | 1.2  | 1.4  | 69.8            | 78.7 | 79.0 |
| USA            | 6.4         | 4.2  | 3.8  | 20.7                | 17.6 | 16.6 | 1.9          | 1.0  | 1.4  | 71.0            | 76.8 | 78.2 |

Note: For Italy and Sweden, the last available year is 1994.

Source: European Commission calculations using OECD-ISDB, 1998.

For all the countries, the highest share of investment expenditures (with respect to the investment of total market economy) is carried out by market services. In the last decade the trend has been increasing in all countries (except in Finland and Sweden). Compared with the shares in 1980, the service sector has increased most in the United Kingdom, the USA and Italy. The four countries with shares higher than 70%



are the United Kingdom, France, Germany and the USA.

Total investment in manufacturing industries has instead decreased in the period in the majority of countries. Contrary to this trend, Sweden and Finland have strengthened their manufacturing investment shares.

Growth patterns show that in the nineties the USA has experienced the strongest growth in investment levels both in manufacturing and market services (see Table 1.8). In all the European countries (with the exception of the Netherlands) for which data are available, there has been a decrease in manufacturing investment and for half of them there has been also a reduction in market services investment. The biggest decreases in investment in market services occurred in the two Scandinavian countries.

**Table 1.8: Sectoral composition of value added and investment (average annual growth)**

|                |                 | Value added |         |         | GFCF    |         |         |
|----------------|-----------------|-------------|---------|---------|---------|---------|---------|
|                |                 | 1970-80     | 1980-90 | 1990-98 | 1970-80 | 1980-90 | 1990-98 |
| Belgium        | Manufacturing   | 3.5         | 2.8     | 0.5     | -1.1    | 9.8     | -2.9    |
|                | Market services | 4.1         | 1.7     | 11.6    | 3.5     | 2.5     | 0.3     |
| Germany        | Manufacturing   | 1.9         | 1.5     | 0.1     | -1.0    | 2.9     | -2.5    |
|                | Market services | 3.6         | 2.9     | 2.9     | 0.9     | 1.3     | 2.5     |
| France         | Manufacturing   | 3.5         | 1.0     | 1.2     | 0.4     | 3.0     | -4.0    |
|                | Market services | 4.5         | 3.2     | 1.2     | 3.0     | 2.4     | -0.2    |
| Italy          | Manufacturing   | 5.6         | 2.4     | 1.1     | 3.0     | 0.5     | -5.1    |
|                | Market services | 3.2         | 0.4     | 10.2    | 0.9     | 2.5     | -2.5    |
| Netherlands    | Manufacturing   | 2.2         | 2.3     | 1.7     | -1.8    | 1.1     | 5.9     |
|                | Market services | 4.1         | 2.7     | 2.9     | 1.0     | 1.0     | 1.1     |
| Finland        | Manufacturing   | 3.9         | 3.1     | 3.4     | 0.7     | 3.3     | -2.6    |
|                | Market services | 4.0         | 4.3     | 0.2     | 2.0     | 4.3     | -9.5    |
| Sweden         | Manufacturing   | 1.2         | 2.0     | 1.3     | 0.3     | 3.5     | -5.5    |
|                | Market services | 2.7         | 2.9     | 0.7     | 0.4     | 5.3     | -13.7   |
| United Kingdom | Manufacturing   | -0.3        | 2.0     | 0.5     | -0.9    | 1.3     | -2.2    |
|                | Market services | 2.2         | 3.6     | 3.1     | 1.3     | 5.1     | 0.2     |
| USA            | Manufacturing   | 2.2         | 2.4     | 4.8     | 2.2     | 0.3     | 4.4     |
|                | Market services | 3.9         | 3.5     | 2.8     | 3.6     | 3.0     | 6.2     |
| Japan          | Manufacturing   | 4.4         | 4.9     | 1.2     | -0.6    | 8.5     | -5.6    |
|                | Market services | 5.8         | 4.7     | 2.4     | 3.2     | 6.5     | -2.4    |

Note: Last available data: Italy, 1994; Japan and the Netherlands, 1996.  
Source: European Commission calculations using OECD-ISDB, 1998.

## 2. Investment in manufacturing: specialisation and concentration

### Similarity and convergence in the investment structure of European countries, the USA and Japan

A natural question that arises from the above analysis is whether the sectoral distribution of investment at a more disaggregated level is very different between the various industrialised countries and whether it has been converging or diverging over time. Data availability permits a more detailed analysis only for the manufacturing sector.

The similarity in the sectoral composition of investment among countries is measured with the index of Michaely for three different periods (1970-79, 1980-89 and 1990-97). (See Box 1.1)

Figure 1.3 considers the USA as a benchmark but similar results are reached whichever the country of reference might be. Values close to the outside circle

#### Box 1.1: The index of Michaely

The index is estimated on the basis of the investment shares of 28 manufacturing sectors with respect to total manufacturing and takes the values between 0.5 (minimum similarity) to 1 (maximum similarity). The measure is given by

$$IM = 1 - \frac{1}{2} \sum_i | (x_i/X) - (y_i/Y) |$$

where  $x_i$  is investment of sector  $i$  in one country,  $X$  is its total manufacturing investment and  $y_i$  and  $Y$  are respectively investment of the same sector and of total manufacturing of another country. This is constructed on the basis of ten-year average investment shares.

of the cob-web diagram (values close to one) represent high similarity vis-à-vis the investment structure of the USA.<sup>4</sup>

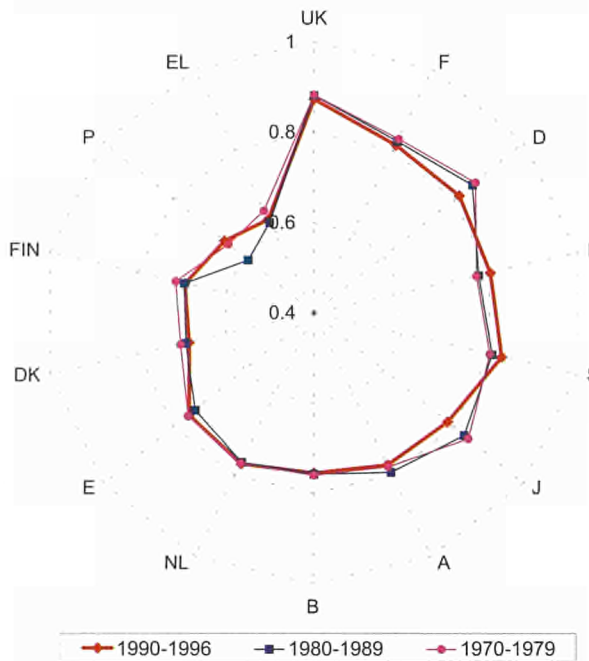
The results suggest that there are no very important differences in investment structures among larger countries. The United Kingdom has an investment structure that resembles that of the USA somewhat more than other large industrialised countries (France, Germany, Italy, but also Sweden). Similarity with Japan is somewhat lower. On the other extreme, the index takes the lowest values for the EU peripheral countries like Finland, Portugal and Greece (but also for Denmark). Austria, the Netherlands, Belgium and Spain record values at the middle.

Moreover, some changes are observed over time (depending also on the phase of the business cycle), but there seems to be no overall tendency of convergence or divergence of investment structures (see Figure 1.3 again). Japan and Germany have relatively changed their investment structure with respect to the USA, and this has mainly happened in the last decade. In the same period, Italy and Sweden have slightly converged towards the USA. Portugal

<sup>4</sup> Note that similar values of the index for, say Italy and Germany, do not necessarily imply that the sectoral pattern of investment of the two is similar, but that both are equally different from the USA.

has now a relatively more similar structure than in the eighties.

**Figure 1.3: Similarity in the investment structure: benchmarking the USA, 1970 to 1996**



Source: European Commission calculations using STAN.

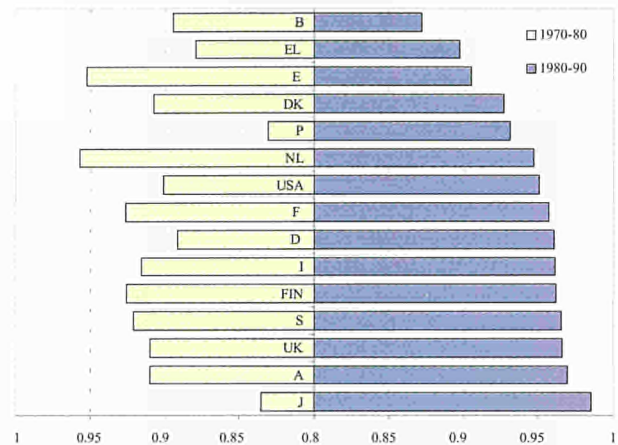
Another way to analyse the similarity in the investment composition is to consider changes within each country across time (see Figure 1.4).<sup>5</sup> This index measures the “speed of adjustment” of the investment structure. Shifts in the investment patterns are often signs of important restructuring processes that aim to take advantage of new economic conditions.

The figure presents comparisons of the investment structure between eighties and seventies (leftward axis), and between nineties and eighties (rightward axis). The countries are ordered in a decreasing level of turbulence in investment structure of the most recent years. The picture can be read as follows: the closer the bar of a specific country is to one the fewer the changes in the country’s investment structure have occurred across time.

With the exception of the USA, in the last decade, the most industrialised countries show a relatively static structure. The biggest changes happened between the seventies and the eighties. Japan and Germany, among the largest countries, and Greece and Portugal, among the smallest ones, report the biggest changes.

<sup>5</sup> The index is again that of Michaely as described in Box 1.1. The only difference is that now the analysis considers the sectors of the same countries in different time spans.

**Figure 1.4: Speed of adjustment of the investment structure**



Source: European Commission calculations using STAN.

**Investment specialisation of countries**

A different question is whether the EU Member States, the USA and Japan have different degrees of specialisation (invest in fewer or more sectors).

One of the empirical findings in the first part of the report is that there has been a slight tendency for production specialisation to increase and a stronger tendency for exports to de-specialise. We next investigate the investment specialisation patterns. The indicators used in the analysis are the same as those used in the previous analysis on production.<sup>6</sup>

The trend is not as clear as in the case of specialisation of value added. The specialisation rates are more fluctuating than the equivalent indicators based on value added. This reflects the fact that investment is much more fluctuating than value added.

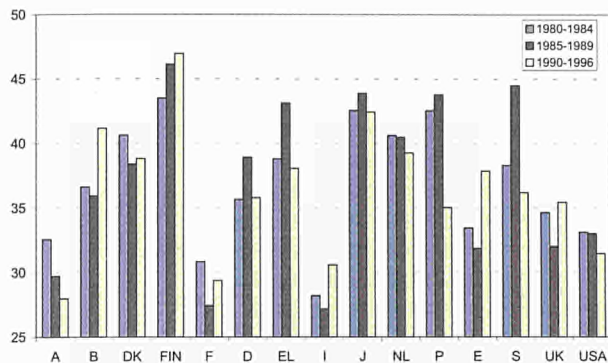
Figure 1.5 shows the average values of the shares of the largest three sectors in each country (CR3). On average, the first three industrial sectors cover almost 37% of total manufacturing investment. The spread ranges from 30% (Austria, France and Italy) to above 40% (Finland and Japan).

Specialisation (as measured by CR3) is closely correlated with the size of a country: the smaller the country is the more specialised the distribution of investment shares will be. There are some exceptions, notably Austria (a small country with a low CR3) and Japan (a big country with high rates of specialisation).

<sup>6</sup> See Box 1.1 in Part One of the report. It is worthy to underline that, due to a different availability of data, a comparison of investment patterns between 1988 and 1998 is not possible. For this reason, this chapter gives more emphasis to the overall trends in country specialisation and geographic concentration of investments starting from 1980.



**Figure 1.5: Investment specialisation: share of the largest three sectors (five-year averages)**



Source: European Commission calculations using STAN.

Looking at five-year time intervals, it can be noticed that for some countries the overall tendency is for despecialisation: Austria, Denmark, the Netherlands and the USA. For Finland, Belgium and, to a lesser extent, Italy the specialisation rate is instead increasing. For the remaining countries the second half of the eighties has represented either a period of peak or trough for the investment shares of the largest sectors. In the first group there are Germany, Greece and Sweden while in the second one France, Spain and the United Kingdom.

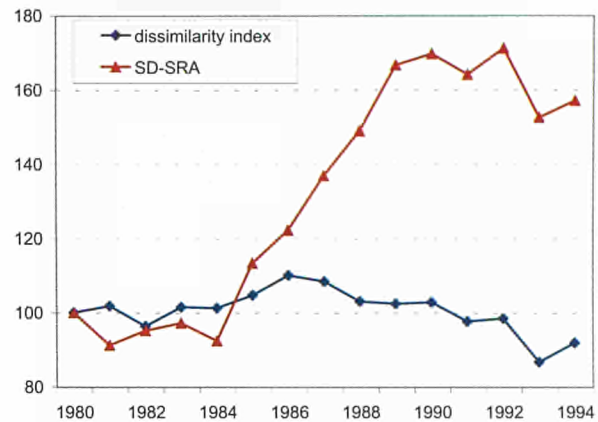
Portugal is the exception: in the period under consideration there has been a decrease in specialisation of 7.5 percentage points. On the opposite, Japan seems to be the most static country. In fifteen years the concentration index changed only by 0.1 percentage points.

Another way of detecting changes in the relative size of industries is to look at the standard deviation of investment shares in each country across time. The highest dispersion has been found in Portugal, Spain and Sweden; the lowest in Denmark, Finland and in the United Kingdom.

If we look at relative indicators like the specialisation rate and the dissimilarity index, the picture is twofold. These indicators give rather a large weight to small countries and small industries and detect their positioning in the European investment structure.

The standard deviation of the specialisation rate (transformed as explained in Box 1.1 of Part One) has become larger in the late eighties (see Figure 1.6). This is explained by the increase of absolute specialisation in some small countries in view of the Single Market. The composite dissimilarity index is instead quite stable all over the period. If any, it shows a general tendency towards the norm.

**Figure 1.6: Trends in the country specialisation: relative indicators (1980 = 100)**



The indicators are indexed and calculated on the basis of unweighted averages across countries

Source: European Commission calculations using STAN.

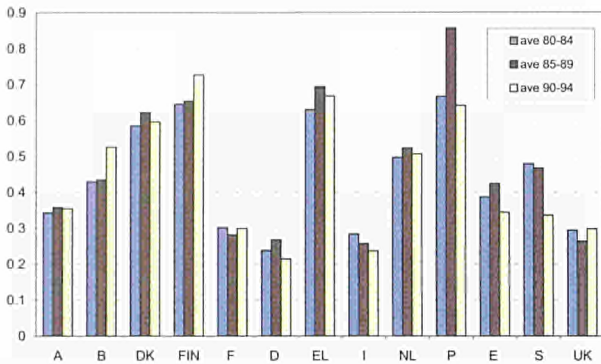
Indeed, the overall picture is the result of different forces (see Figure 1.7). Large countries are, as expected, not very dissimilar from a “European” industrial structure of investment (they report low values of the dissimilarity index). This is the tendency for Austria as well as, in the last period, for Spain and Sweden. Over time, Belgium and Finland are becoming more dissimilar in their investment structure with respect to the European average. Portugal shows a robust decreasing in specialisation similar to the despecialisation process seen already in production.

*Summarising, the evidence does not suggest a consistent pattern of increasing or decreasing specialisation over time. On one side, there has been an increase of absolute specialisation in some small countries, in view of the Single Market, the exception being Portugal. On the other side, large countries are not very dissimilar from an “European” industrial structure of investment and they have not changed very much over time.*

### **Geographic concentration of investment in European industries**

As explained already in Part One of this report, high concentration means that few countries invest most in a given sector while low concentration implies that a sector is evenly distributed across countries. Moreover, absolute indicators implicitly focus on large countries while relative indicators focus on the dynamics in small countries. Four indicators are used here: two absolute and two relative ones.

**Figure 1.7: Trends in country specialisation of industries: dissimilarity index**



Source: European Commission calculations using STAN.

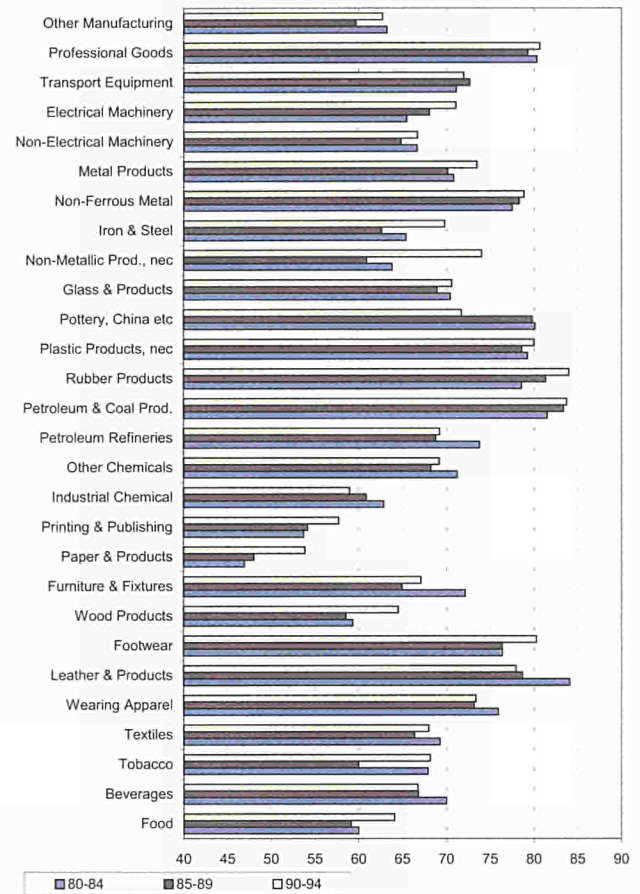
Figure 1.8 reports the five-year average data (1980-1984, 1985-1989 and 1990-1994) of the investment shares of the three largest countries. For each sector, the last two columns can be used to evaluate the effects of the economic integration of Europe on investment.

Over the whole period, 70% of investment is generated in only three countries. These countries are among the largest ones (Germany, Italy, the United Kingdom and France). The most concentrated sector is petroleum and coal products (83%) and the least is paper and products (50%).

The main trend is that the geographic concentration has on average decreased in the last years, possibly as an effect of market integration. The indicator of standard deviation shows that there is less dispersion among sectors now compared to the past. The value has decreased at the beginning of the nineties by one tenth with respect the period 1985-1989 and almost halved since the beginning of the eighties.

The magnitude of the change varies a lot between industries. We identify a group of industries for which the overall trend has been positive: some chemical industries (petroleum and coal products, rubber products), paper industries, some scale intensive industries (food, metal products, non-metallic products, iron and steel), some traditional industries (footwear, wood products), non-ferrous metal and electrical machinery. Then there is a group of industries with a decreasing trend: some traditional industries (textiles, wearing apparel, leather products, pottery and china), some chemical industries (other chemicals, industrial chemicals and petroleum refineries), beverages and furniture and fixtures.

**Figure 1.8: Trends in the geographic concentration of industries: share of the largest three producers (five-year averages)**



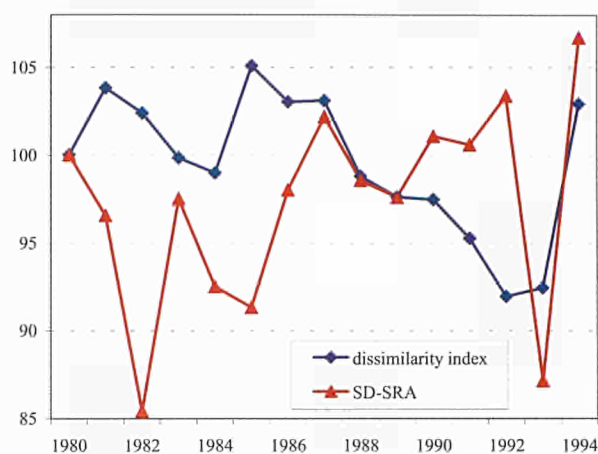
Source: European Commission calculations using STAN.

In terms of relative concentration the results are not so clear-cut. Both indices show an increase between 1982 and 1987. Afterwards, the dissimilarity index decreases while the specialisation rate slightly increases (see Figure 1.9).

However, looking at the trend of single sectors, the general picture is of decreasing concentration. The sectors with a decreasing concentration are 19 for the specialisation rate and 17 for the dissimilarity index.



**Figure 1.9: Trends in the geographic concentration of industries: relative indicators (index 1980 = 100)**



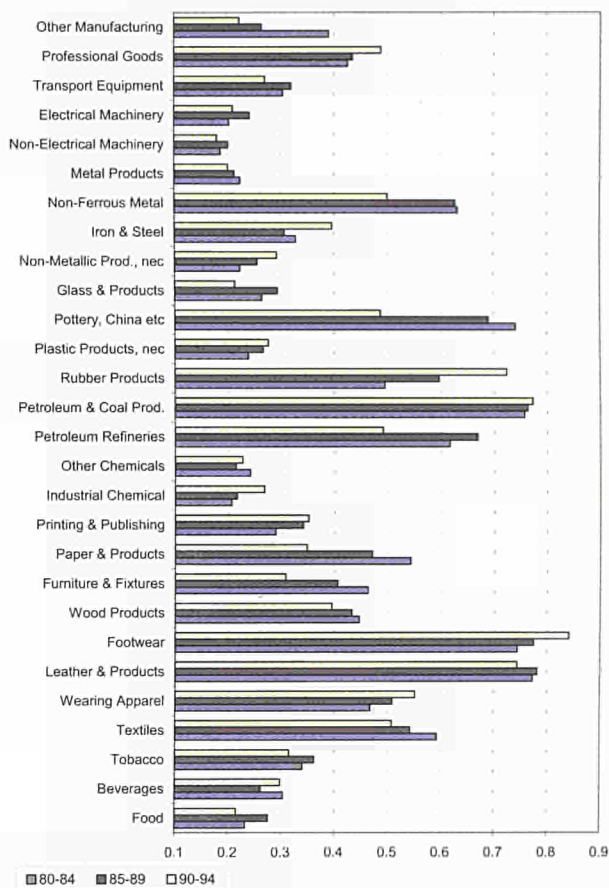
Note: The indicators are indexed and calculated on the basis of unweighted averages across sectors.

Source: European Commission calculations using STAN.

Figure 1.10 shows the concentration trend of each sector using the dissimilarity index. As explained before this is an index that highlights the role of small countries. Indeed, the data show that concentration has increased in industries where also the relative shares of small countries have become bigger. This is the case of Portugal and its shares in the footwear and wearing apparel industries or Belgium in the iron and steel industry. But concentration increased also in the rubber and in non-metallic products, where the leading countries are France, Germany and Italy. On the opposite, the index has decreased most in the sectors of china and pottery, paper and products and furniture and fixtures. These are sectors where the large leading countries have reduced their shares and small countries have relatively increased theirs as Portugal in the sector of pottery and china, Belgium and Spain in the furniture and fixtures sector and Sweden in that of paper and products.

*Summarising, concentration has decreased in some sectors where the large leading countries have reduced their shares. On the other hand, there is evidence that it has increased in industries where the relative shares of small countries have also increased. On the whole, geographic concentration has tended to decline*

**Figure 1.10: Trends in the geographic concentration of industries: dissimilarity index (five-year averages)**



Source: European Commission calculations using STAN.

### 3. Investment determinants: some empirical results

#### Country and industry determinants of investment: analysis of variance

In this section we consider how much the investment patterns described till now are explained by sector and country specific factors. This first part employs an analysis of variance that allows us to focus directly on the existence and on the importance of country, sectors and time effects without having to deal – for the moment – with specific hypotheses.

In a simple descriptive model, real investment (scaled by value added) depends on country characteristics as well as on sectoral factors and on time. We define as “country” factors all those that are common to all sectors of a single country. They can be structural variables more or less constant over time, such as regulation, or they can contain time-varying factors affecting investment, such as macro policies, industrial

relations. "Sectoral" factors are those common for a given sector in all countries. Again they can be time varying, e.g. a world-wide sector-specific demand shock or relatively constant over time, e.g. different sector-specific technologies.

Tables 1.9a-1.9b present the results of the analysis of the variance of investment for a group of European countries for the period 1970-1996. The first model (see Table 1.9a) is based on a simple one-way analysis of variance while the second one (see Table 1.9b) considers also interaction terms.<sup>7</sup>

**Table 1.9a: Country, industry and time effects on investment**

| Analysis of variance of real investment over value added, 1970-1995 |            |      |         |
|---|------------|------|---------|
| Source  | Partial SS | df   | F       |
| Model   | 9.969      | 46   | 39.24 * |
| Country effect  | 4.516      | 12   | 68.15 * |
| Industry effect   | 3.936      | 8    | 89.09 * |
| Time effect   | 1.292      | 26   | 9.01 *  |
| Residual  | 15.645     | 2833 |         |
| Total   | 25.614     | 2879 |         |
| N   | 2880       |      |         |
| Adj.R <sup>2</sup>  | 0.39       |      |         |

Note: SS= explained and unexplained variance, df= degrees of freedom; F = Test of the significance of the model/coefficients (\* = significant at 1%).

Source: European Commission calculations using STAN.

**Table 1.9b: Country, industry and interacted-term effects on investment**

| Analysis of variance of real investment over value added, 1970-1995 |            |      |        |
|---|------------|------|--------|
| Source  | Partial SS | df   | F      |
| Model   | 13.372     | 538  | 4.75 * |
| Country effect  | 4.53       | 12   | 72.2 * |
| Industry effect   | 3.698      | 8    | 88.4 * |
| Country x Time effect   | 2.161      | 310  | 1.33 * |
| Sector x Time effect  | 1.452      | 208  | 1.33 * |
| Residual  | 12.241     | 2341 |        |
| Total   | 25.614     | 2879 |        |
| N   | 2880       |      |        |
| Adj.R <sup>2</sup>  | 0.52       |      |        |

Note: SS= explained and unexplained variance, df= degrees of freedom; F = Test of the significance of the model/coefficients (\* = significant at 1%).

Source: European Commission calculations using STAN.

In the first specification, the model explains 39% of the data variation. Country and sector factors are statistically significant. They both explain approximately the same proportion of investment

variation. Time dummies, that represent common European business cycles, are also significant but explain relatively little of the investment variation.

When the analysis is based on a more refined definition of sectors (28 sectors), the sectoral effect becomes relatively more important. Interestingly, the importance of the country and sectoral effects remain the same even when we consider a more recent period (1985-1995). In spite of the convergence of regulation structures among Member States and the wide process of economic integration, country differences still remain strong.

This simple model does not distinguish between constant and time varying effects. For this reason we introduce the second specification, which takes into account the interaction of country and sectoral effects with time.

As far as countries are concerned, the interaction combines all the country specific time varying effects. We can think of changes in monetary or fiscal policies as well as of whatever factor may affect a country specific business cycle. The interaction of sector and time summarises world-wide factors like waves of technological innovations that are industry specific.

Both the effects are statistically significant but their magnitude is quantitatively lower. The whole model explains 52% of the investment variation.

Additionally, when we consider more recent years those interactive effects disappear. Sectoral characteristics are present throughout the period with constant intensity. The same is true for country specific effects that do not change their intensity over time. This result suggests that structural elements affect investment rather than unsynchronised factors of country specific business cycles.

### Country and industry determinants of investment: regression analysis

We next estimate the effects of some relevant variables on the European investment patterns.

The econometric specification is quite simple. The dependent variable is the same as that used in the analysis of variance, that is the real investment, scaled by real value added.

Among the independent variables, we consider as internal determinants of investment: the internal demand (defined as production minus export plus imports), the labour cost (that includes wages and the costs of supplements such as employers' compulsory pension and medical payments) and the cost of capital (proxied by real long-term interest rates). As an external factor we introduce the net external demand

<sup>7</sup> In the statistical analysis, both country and sector factors are dummy variables.



(exports minus imports in real terms): this variable depends on exchange rate policies and on the relative competitiveness of a country. All variables (except interest rates) are scaled by real value added.

Table 1.10 reports the estimated elasticities calculated on the basis of the coefficients of a panel regression where country, industry and time are considered as fixed effects.

**Table 1.10: Explaining investment: fixed effects regressions**

|                                 | Specification 1: 1970-1995 |                | Specification 2: 1985-1995 |                |
|---------------------------------|----------------------------|----------------|----------------------------|----------------|
|                                 | Short run elasticity       | t value        | Short run elasticity       | t value        |
| lagged investment               | 0.45                       | 52.9 *         | 0.597                      | 38.6 *         |
| internal demand                 | 0.22                       | 11.2 *         | 0.168                      | 7.3 *          |
| long term interest rate         | -0.023                     | -2.3 **        | 0.365                      | 1.2            |
| labour cost                     | 0.319                      | 7.9 *          | 0.204                      | 4.6 *          |
| net external demand             | 0.019                      | 6.9 *          | 0.021                      | 6.2 *          |
|                                 | <b>Coefficients</b>        | <b>t value</b> | <b>Coefficients</b>        | <b>t value</b> |
| Belgium                         | 0.02                       | 2.4 **         | 0.02                       | 3.1 *          |
| Denmark                         | 0.02                       | 2.6 *          | 0.01                       | 1.1            |
| Greece                          | 0.03                       | 3.2 *          | 0.03                       | 3.2 *          |
| Spain                           | -0.01                      | -1.5           | -0.01                      | -1.0           |
| France                          | 0.03                       | 5.4 *          | 0.03                       | 3.7 *          |
| Italy                           | 0.03                       | 4.2 *          | 0.01                       | 1.1            |
| Netherlands                     | 0.01                       | 1.7 ***        | 0.00                       | 0.5            |
| Austria                         | 0.01                       | 2.2 **         | 0.01                       | 0.9            |
| Portugal                        | 0.08                       | 10.4 *         | 0.04                       | 5.5 *          |
| Finland                         | 0.02                       | 3.9 *          | 0.01                       | 1.3            |
| Sweden                          | 0.00                       | 0.2            | 0.00                       | -0.2           |
| United Kingdom                  | -0.02                      | -2.9 *         | -0.01                      | -2.0 **        |
| N                               | 5852                       |                | 2437                       |                |
| R2                              | 0.51                       |                | 0.62                       |                |
| Fixed industry effects          | 12.47 F(27,5782)*          |                | 5.14 F(27,2381) *          |                |
| Fixed country effects           | 19.84 F(12,5782)*          |                | 7.37 F(27,2381) *          |                |
| Fixed time effects              | 3.94 F(25,5782)*           |                | 4.01 F(27,2381) *          |                |
| Fixed vs random industry effect | 751.9 Chi2 (42)*           |                | 159.7 Chi2 (42) *          |                |

**Notes:**

Dependent variable: real investment over value added  
 Internal demand: (production+exports+imports)/value added  
 Net external demand: (exports-imports)/value added  
 Labour cost: wages /value added

\*, \*\*, \*\*\* Significant at 1, 5, 10%.

Source: European Commission calculations using STAN.

The first column shows the results of the estimation for all the sample period (1970-1995), the second one for a more recent period starting in 1985. Net of the effects of the European business cycle, an increase of the internal demand by 1% raises the investment in the short run by 0.2%; the same increase of the external demand raises investment only by 0.02%.<sup>8</sup> In the long run, the elasticity of investment with respect to these two variables doubles. Investments are reduced by 0.2% when long-term interest rates increases by 1%. Interestingly the strongest impact on investment is that of the labour cost. The positive sign of the coefficient confirms the role of fixed capital as a substitute rather than a complement to labour.<sup>9</sup> In the short run,

investment increases by 0.4% when the labour cost increases by 1%.

The first column shows the results of the estimation for all the sample period (1970-1995), the second one for a more recent period starting in 1985. Net of the effects of the European business cycle, an increase of the internal demand by 1% raises the investment in the short run by 0.2%; the same increase of the external demand raises investment only by 0.02%.<sup>10</sup> In the long run, the elasticity of investment with respect to these two variables doubles. Investments are reduced by 0.2% when long-term interest rates increases by 1%. Interestingly the strongest impact on investment is that of the labour cost. The positive sign of the coefficient confirms the role of fixed capital as a substitute rather than a complement to labour<sup>11</sup>. In the short run, investment increases by 0.4% when the labour cost increases by 1%.

In the second column, short run elasticities are reported for the period 1985-1995<sup>12</sup>. The time interval has been chosen in order to focus on the effects of world-wide integration on investment. A first sign of the progress is indirectly given by the fact that the interest rate variable is not any more significant. The increased competition in the financial field as well as the continuing deregulation of financial markets in general has accelerated the emergence of an integrated European financial market. This market is supposed to be more liquid, mature and efficient than existing national markets. Firms have now easier and better access to different forms of capital. Additionally, the results show that internal demand still remains important but it has a reduced impact on short run investment. Also the impact of labour cost on investment is reduced by one third but it remains still a strong determinant of investment as a substitution of labour.

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labour to investment where an increase of labour costs reduces profitability and investment.

<sup>10</sup> Both values are quite low but it has to be remembered that we control for country characteristics in the regression. Therefore these are additional effects of internal or external demand due to different rates with respect to a mean effect.

<sup>11</sup> It is worth noting that we could not separately introduce profitability in order to test the other channel going from labour to investment where an increase of labour costs reduces profitability and investment.

<sup>12</sup> The underlying hypothesis is that investment could have reacted to the Single market program long before its completion. The choice of the time span is based on the availability of data; we do not have enough observations to estimate the model for a longer period after 1992. Additionally, the results do not change much if we exclude from the sample the three countries that joined the EU late in 1995.

<sup>8</sup> Both values are quite low but it has to be remembered that we control for country characteristics in the regression. Therefore these are additional effects of internal or external demand due to different rates with respect to a mean effect.

<sup>9</sup> It is worth noting that we could not separately introduce profitability in order to test the other channel going from

#### 4. Conclusions

One of the main findings of last year's report was the tendency of the European economies to produce with higher capital-intensive and, thus, less employment-creating sectors.

In this chapter we find that the picture has changed substantially in the nineties. Growth of both fixed capital and employment fell sharply in Europe (and in Japan). Instead the growth of physical investment more than doubled in the USA, accompanied by substantial new employment creation and constant output growth. Contrary to received wisdom, therefore, a tentative *new stylised fact of the nineties* is that *in Europe the accumulation process has undergone a strong deceleration accompanied by a less sharp fall in output growth; in the USA there has been an acceleration of investment activity at almost constant economic growth.*

Within Europe, performance has varied substantially. The two Scandinavian countries and the three largest countries in continental Europe have had the weakest performance in both investment and employment.

Considering the degree of *sectoral specialisation* in the manufacturing sector, we find *no very marked differences between the larger European economies and the USA.* Instead, Japan has consistently registered higher rates of investment specialisation compared to the other large economies.

Interestingly, Spain and the USA in the nineties and Japan and Germany in the eighties have registered the highest shifts in their sectoral investment patterns ("investments' speed of adjustment") among the larger economies. Such investments' speed of adjustment is often a sign of important restructuring processes that aim at taking advantage of new economic conditions. Overall, we detect *no consistent pattern of increasing or decreasing investment specialisation over time.*

Instead, we do find some evidence of *decreasing geographic concentration of investment of various manufacturing sectors within Europe.* On the other hand, concentration has increased in some industries where also the relative shares of small countries have become bigger.

As far as the determinants of sector-specific investment are concerned, an analysis of the variance shows that *in spite of the convergence of regulation structures among Member States and the wide economic integration process, national differences do remain strong. Sectoral effects are also important in explaining the variability of investment while European business cycles are less so.* This result is also confirmed by the econometric analysis.

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## Annex 1.1: The sectoral data on investment

The OECD Stan database provides internationally comparable data on industrial activity for 22 countries.<sup>a</sup> The STAN database covers 49 manufacturing industries from 1970-1997. However, for many countries, 1997 figures are available for the main industrial sectors only and are estimates based on short-term indicators. For the GFCF variable the situation is even more problematic. For some European countries (Austria, Italy, the Netherlands and Sweden) and for Japan, data are not reported beyond 1994. For the descriptive purposes of the competitiveness report, the analysis is carried out on the basis of 29 industrial sectors (included total manufacturing) classified according to ISIC rev. The sectors are:

| Sectors                     | ISIC Rev.2 | Sectors                    | ISIC Rev.2 |
|-----------------------------|------------|----------------------------|------------|
| 1. Total manufacturing      | 3000       | 16. Petrol. and coal prod. | 3540       |
| 2. Food                     | 311/2      | 17. Rubber products        | 3550       |
| 3. Beverages                | 3130       | 18. Plastic products, nec  | 3560       |
| 4. Tobacco                  | 3140       | 19. Pottery, china etc     | 3610       |
| 5. Textiles                 | 3210       | 20. Glass and products     | 3620       |
| 6. Wearing apparel          | 3220       | 21. Non-metallic prod, nec | 3690       |
| 7. Leather and products     | 3230       | 22. Iron and steel         | 3710       |
| 8. Footwear                 | 3240       | 23. Non-ferrous metals     | 3720       |
| 9. Wood products            | 3310       | 24. Metal products         | 3810       |
| 10. Furniture and fixtures  | 3320       | 25. Non-electrical mach.   | 3820       |
| 11. Paper and products      | 3410       | 26. Electrical machinery   | 3830       |
| 12. Printing and publishing | 3420       | 27. Transport equipment    | 3840       |
| 13. Industrial chemical     | 3510       | 28. Professional goods     | 3850       |
| 14. Other chemicals         | 3520       | 29. Other manufacturing    | 3900       |
| 15. Petroleum refineries    | 3530       |                            |            |

The analysis of manufacturing investment as a share of value added confirms in part the stylised fact observed at the total economy. Starting from the eighties, Japan and the USA are determining the upper and lower bound in the investment activity. Only countries like Portugal and Greece overcame Japan in the early eighties (as an evident process of catching up), while Spain has recorded values of investment over output lower than the USA.

## Gross fixed capital formation in total manufacturing (as a percentage of value added)

|                | 1970 | 1975 | 1980 | 1985 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 |
|----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Belgium        | 21.9 | 18.6 | 13.5 | 14.4 | 25.7 | 25.4 | 24.0 | 20.7 | 18.4 | 19.1 | 20.9 | 20.4 |
| Denmark        | 16.5 | 14.1 | 14.4 | 17.2 | 15.6 | 16.7 | 14.4 | 12.9 | 11.7 | 12.4 | n.a. | n.a. |
| Germany        | 15.8 | 10.5 | 12.5 | 11.6 | 14.3 | 14.6 | 13.7 | 11.5 | 10.2 | 10.9 | 11.0 | 11.0 |
| Greece         | 20.3 | 22.4 | 21.2 | 13.3 | 22.6 | 20.8 | 20.3 | 18.5 | 19.4 | 20.8 | n.a. | n.a. |
| Spain          | n.a. | n.a. | 6.0  | 7.2  | 9.4  | 10.6 | 9.8  | 10.6 | 9.4  | 10.3 | n.a. | n.a. |
| France         | 17.6 | 13.3 | 14.6 | 14.1 | 17.1 | 16.6 | 15.1 | 12.3 | 12.6 | 12.4 | 12.8 | 12.3 |
| Italy          | 18.6 | 19.1 | 19.4 | 14.0 | 16.9 | 17.2 | 16.2 | 13.7 | 14.1 | n.a. | n.a. | n.a. |
| Netherlands    | 20.6 | 14.3 | 17.9 | 19.9 | 17.9 | 16.9 | 15.7 | 13.6 | 11.8 | n.a. | n.a. | n.a. |
| Austria        | 15.5 | 14.1 | 15.6 | 13.9 | 16.6 | 16.0 | 15.7 | 13.7 | 12.9 | n.a. | n.a. | n.a. |
| Portugal       | 33.6 | 28.7 | 25.7 | 15.9 | 25.1 | 22.5 | 17.9 | 16.6 | 17.5 | 13.2 | n.a. | n.a. |
| Finland        | 23.0 | 25.7 | 18.0 | 17.5 | 20.7 | 17.7 | 15.3 | 12.5 | 12.5 | 14.6 | 16.7 | n.a. |
| Sweden         | 15.5 | 17.3 | 15.8 | 16.8 | 17.7 | 14.8 | 12.3 | 12.2 | 13.9 | n.a. | n.a. | n.a. |
| United Kingdom | 14.1 | 12.5 | 13.3 | 13.2 | 12.8 | 12.4 | 11.3 | 10.6 | 10.8 | 12.4 | n.a. | n.a. |
| USA            | 10.3 | 11.5 | 13.0 | 11.4 | 11.1 | 11.0 | 10.8 | 10.2 | 10.4 | 11.6 | 11.5 | n.a. |
| Japan          | 26.4 | 18.8 | 18.9 | 20.3 | 23.1 | 26.6 | 24.7 | 21.3 | 18.3 | n.a. | n.a. | n.a. |

Source: European Commission calculations using STAN.

<sup>a</sup> No data is available for some EU Member States (notably Ireland and Luxembourg).



# Intangible investment and structural patterns of European manufacturing industry

This chapter explores the structural patterns of European industry in the context of the emerging information society and its associated qualitative changes. It is innovations and diffusion of new technologies which drive the emerging information society, economic growth and employment. The competitiveness of this type of economy depends increasingly on the capacity to generate, process and market knowledge-based products, which marks a shift from tangible to intangible – immaterial – factors of production. Consequently, industry structures move towards industries with higher intensities of intangible factors of production. The Commission has already taken important actions in supporting intangible investments (see Section 3 of this chapter).

In a knowledge based economy, competitiveness of firms is in large extent based on their capability to innovate (introduce new or improved products or processes), produce qualitative changes and new products, to utilise ICT and marketing activities, to introduce new technologies and organisations. In a changing world the competitive advantage of firms is also determined by firm's specific "dynamic capabilities".<sup>1</sup> In particular, a firm's competitiveness is derived from firm-specific intangible assets. These assets include R&D capital, marketing capital, educational organisation, the innovative and entrepreneurial know-how embodied in the persons of the organisation as well as their capabilities to work as a competent team.<sup>2</sup>

Our understanding of the competitive process remains fundamentally incomplete until we acquire basic knowledge regarding the relationship between the economic performance, structural change and intangibles. This justifies the growing need to understand what types of intangibles, what role they play in the competitive race and what this implies for policy making.

Paradoxically, our knowledge about intangibles is still rather poor. Intangibles are, by nature, difficult to measure, and the lack of reliable, comprehensive and internationally comparable data is a major barrier to broad-scale empirical analysis.

Recently, intensive conceptual and empirical work on intangibles has been undertaken. From the conceptual viewpoint, Table 2.1 describes a range of possible compositions of intangible assets.

**Table 2.1: Possible components of intangibles**

|   |
|---|
| <b>1. Computer-related</b>                                      |
| Software  |
| Large databases   |
| Other computer services   |
| <b>2. Production and technology</b>                             |
| R&D   |
| Design and engineering  |
| New quality control systems                                     |
| Patents and licences  |
| Know-how  |
| <b>3. Human resources</b>                                       |
| Organised training  |
| Learning by doing   |
| Activities to improve health and motivation of the workforce    |
| Remuneration for innovative ideas                               |
| <b>4. Organisation of the firm</b>                              |
| New methods of organisation of the firm as a whole              |
| Setting up networks   |
| New working methods in administration and finance               |
| <b>5. External: Marketing and sales</b>                         |
| Market research   |
| Advertising   |
| Brands  |
| Name and symbol of the firm                                     |
| Customer list, subscribers list and list of potential customers |
| Product certification, quality certificates                     |
| Goodwill  |
| <b>6. Industry-specific</b>                                     |
| Mineral exploration   |
| Entertainment, literary and artistic originals                  |
| Milk quotas   |

Source: Young (1998).

From the empirical side, a very useful tool is presented in Peneder (1999a) that provides an industry typology

<sup>1</sup> "The subset of the competencies/capabilities which allow the firm to create new products and processes, and respond to changing market circumstances." See Teece (1998).

<sup>2</sup> See Eliasson (1998).

### Box 2.1: The new WIFO taxonomy of manufacturing industry

Peneder (1999a) introduces two new taxonomies which group individual industries according to their typical combinations of factor inputs and their different requirements for skilled labour, respectively. The first classification ('taxonomy I') reflects the distinction between (i) exogenously given competitive advantages based on *factor endowments* such as physical capital and labour on the one hand, and (ii) endogenously created advantages based on purposeful *investment in intangible assets* such as marketing and innovation, on the other. In contrast, the second classification ('taxonomy II') clusters industries by their respective skill requirements, being both intangible and largely location bound. Both classifications correspond to Eurostat's revised NACE system at the three-digit level. Both taxonomies are presented in Annex 2.1.

The clustering process for taxonomy I is based on data for wages and salaries, investment in physical capital, advertising outlays and expenditures on R&D. Ratios to total value added are considered for wages and physical capital. Expenditures on advertising and R&D are represented by their ratios to total sales. The latter are directly derived from balance sheet data. Data sources are Eurostat's DEBA database (for labour and capital inputs) and Standard & Poor's COMPUSTAT database (for advertising and R&D). Lacking a complete coverage of all dimensions for the EU, the clustering procedure refers exclusively to US manufacturing data.

Taxonomy II reflects the human-resources perspective and is based upon occupational data from the OECD, distinguishing between white- and blue-collar workers and between high- and low-skill labour. The data refer to a non-weighted sample of selected OECD countries.

Compared to earlier classifications, the new WIFO taxonomies are distinguished by the application of cluster analysis. This provides a powerful statistical technique specifically designed for classifying observations on behalf of their relative similarities with respect to a multidimensional array of variables. The basic idea is one of dividing a specific data profile into segments by creating maximum homogeneity within and maximum distance between groups.

About 100 NACE three-digit manufacturing industries have been completely categorised (see Annex 2.1). Taxonomy I comprises the following five mutually exclusive groupings of *mainstream manufacturing*, *labour-intensive*, *capital-intensive*, *marketing-driven* and *technology-driven* industries. In contrast, taxonomy II distinguishes typically *low-skill*, (*medium-skill*) *blue-collar*, (*medium-skill*) *white-collar* and *high-skill* industries. Like any broad classification, these new taxonomies must be interpreted with care, as industries within the categories can still be highly heterogeneous.

by factor intensities (in tangible and intangible investment)<sup>3</sup> as well as in skills. These two new taxonomies of manufacturing industries have been created by means of statistical cluster techniques (see Box 2.1).

The first focuses on comparative advantages depending on location, such as relative endowments of capital and labour, as well as firm-specific advantages endogenously raised by intangible investments in marketing or innovation. The second taxonomy classifies industries by their typical requirements for skilled labour.

Based on such industry taxonomies, one can gain first information about the advancement towards a knowledge-based economy in the EU and about different degrees of advancement across Member States. In particular, these taxonomies enable us to test empirically to what extent intangibles matter for industrial competitiveness. Finally, the structure of industry with respect to the intangible and tangible factors of production provides information on the

underlying sources of competitive strengths and weaknesses of a particular location.

## 1. Performance by industry types

An economy's dynamic capabilities to generate income are invariably linked to its human resources and accumulated intangible assets. Therefore, one expects that economic performances of industries differ according to their intensities in R&D, advertising and skills, in addition to physical capital intensity.

In the following, the new WIFO taxonomies will be applied for investigating EU economic performance variables such as quality differentiation and labour productivity across the industry types.

### The intangible component in EU trade

Unit values reflect the valuation of goods and services by consumers and are therefore directly linked to the potential for quality competition and vertical

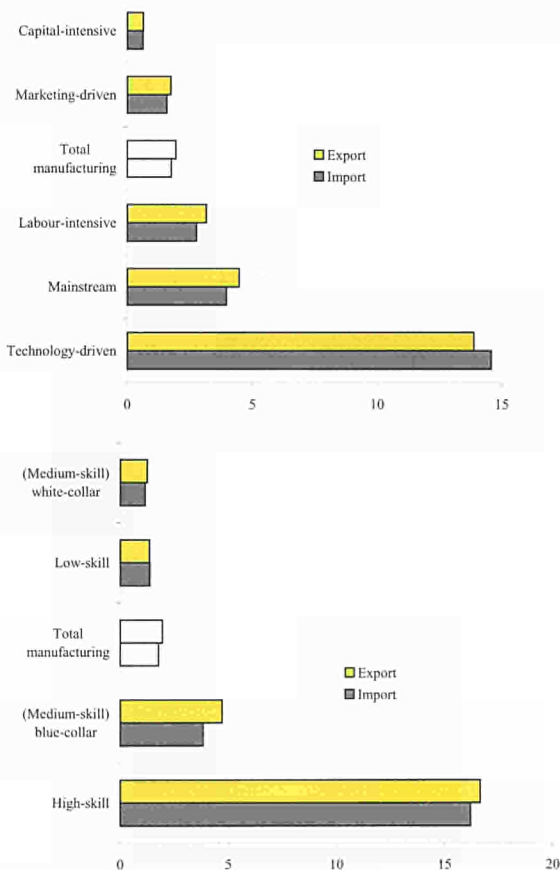
<sup>3</sup> See also European Commission (1998).



differentiation.<sup>4</sup> It is therefore reasonable to assume that industries characterised by high intangible investments and highly skilled labour also tend to exhibit the highest unit values.

The overall picture of the different industry types corresponds well to these expectations (see Figure 2.1).

**Figure 2.1: Unit values in EU trade: 1997, ECU/ kg**



Source: WIFO calculations based on SBS.

Considering data on trade between the EU and the rest of the world, technology-driven industries show by far the highest unit values, presumably because of their ample opportunities for vertical differentiation. Mainstream manufacturing with its high share in the skill dependent and development oriented machinery sector comes second, followed by labour-intensive, marketing-driven and capital-intensive industries.

Looking at the typical skill patterns in relation to the “intangible component”, high-skill industries

outperform all the other types by a wide margin, but low-skill industries are just as good as (medium-skill) white-collar<sup>5</sup> industries.

Besides the illustrative comparison of mean values, additional tests<sup>6</sup> confirm the important stylised fact, that industries indeed differ significantly in terms of the intangible component embedded in traded goods. In particular, technology-driven and high-skill industries exhibit significantly higher unit values relative to all the other groups, while capital-intensive and low-skill industries show significantly lower unit values.

The real surprise is the particularly low unit values for marketing-driven industries, because of their reputation for creating intangible assets, such as specific brand affiliations. One plausible explanation for this is that the value chain is seldom “deep” for these industries.<sup>7</sup> Accordingly, initial material inputs are high as compared to the intangibles emerging along the value chain, and this is true for many industries included within this group, such as processed food products.<sup>8</sup> “

In order to measure the degree of vertical product differentiation more directly, it is of interest to compare the standard deviations of unit values in European trade (see Figure 2.2). A rather robust stylised fact appears, which states that technology-driven as well as high-skill and white-collar industries show significantly higher degrees of vertical product differentiation than any other industry type.

<sup>5</sup> From now on, “medium-skill” is dropped as implicit in both “white-collar” and “blue-collar”.

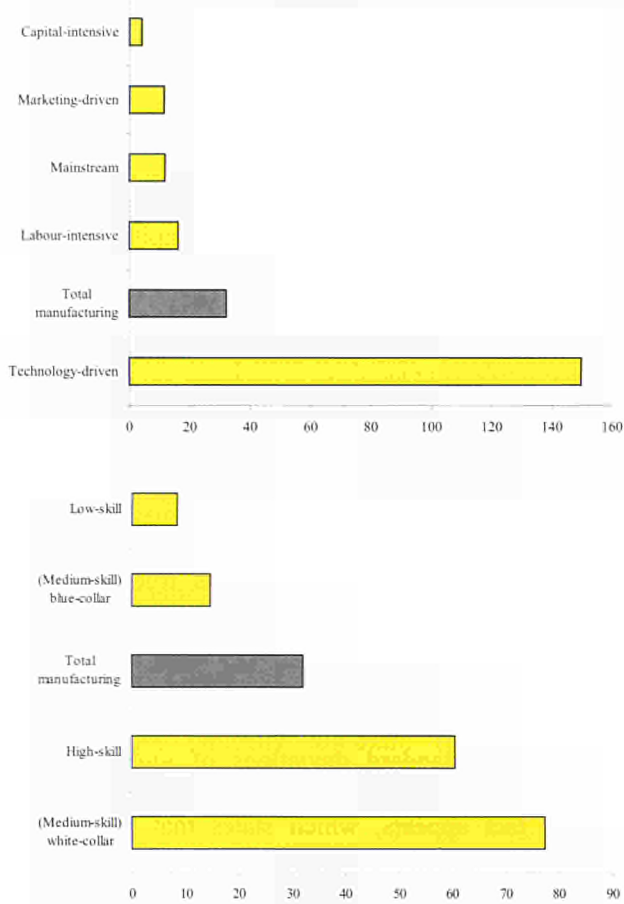
<sup>6</sup> See Peneder (1999b).

<sup>7</sup> The “deeper” the vertical organisation of production (the value chain), the more processing stages precede downstream industries, the more likely that value added created along such production stages (which includes intangibles) is high relative to the initial material inputs.

<sup>8</sup> Another possible explanation follows from the twofold role of advertising. On the one hand, advertising may inform the customers about qualitative differences between products, that arise from introducing new products into the market. This presents vertical differentiation and increases the unit values. On the other hand, advertising may also influence consumer’s loyalty to a particular brand. In this case, the product differentiation becomes horizontal, i.e. it creates quality differences for the consumers. Contrary to vertical differentiability, this does not increase unit values. This is also the case when advertising is aimed on selling large quantities of a rather simple product with a low unit value. Therefore, average unit values might be considerably dampened by the often dualistic nature of marketing-driven industries, where high-quality brands regularly coexist with low-priced unbranded products.

<sup>4</sup> The calculation of unit values is based upon the ratio of nominal values to physical volumes and in this sense reflects the most literal measure of the relative importance of immaterial components. Unit values also tend to rise with respect to their position in the vertical organisation of production.

**Figure 2.2: Standard deviation of unit values in the EU, 1996**



Source: WIFO calculations based on SBS.

**Labour productivity**

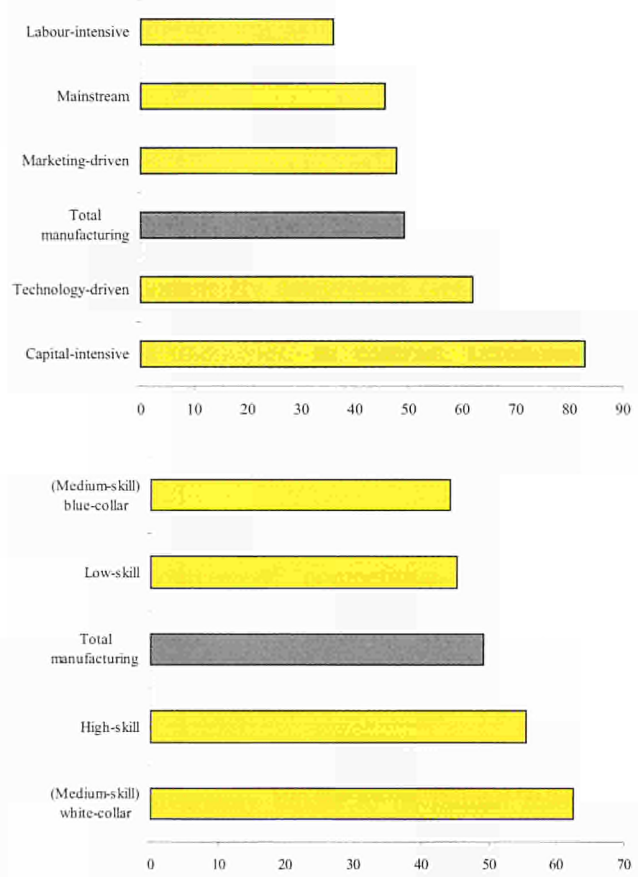
In contrast to unit values, which apply to particular goods, nominal labour productivity is an activity-based measure for economic performance indicating more directly the ability to generate income. The productivity of any single input factor depends on how efficiently it is used and on the amount of complementary inputs used for the production of economic value. Consequently, high amounts of physical capital, installed to support pure labour in production, should imply higher value added per employee.

Comparing the aggregate values for the EU and ranking the industry types according to the level of labour productivity places capital-intensive industries first, followed by technology-driven and marketing-driven industries, as well as mainstream manufacturing (see Figure 2.3).

As shown in Peneder (1999a) the category of labour-intensive industries is mostly characterised by the lack of a pronounced dependence on any additional input

factor other than labour. Consequently, this type ranks lowest in terms of labour productivity. Non-parametric tests of variance confirm that capital-intensive and technology-driven industries significantly outperform all the other categories. In capital-intensive industries, particularly high quantities of complementary capital inputs increase real production per employee. In technology-driven industries, a reasonable explanation draws on the vertical nature of product differentiation, as already observed in discussing the intangible component of traded goods.

**Figure 2.3: Labour productivity in the EU (ECU '000)**



Source: WIFO calculations based on SBS.

With regard to human resources, white-collar industries show the highest levels of labour productivity, followed closely by high-skill industries, whereas low-skill industries as well as blue-collar industries perform considerably worse. In short, labour skills are positively related to productivity, but persons in typically white-collar professions appear to benefit, more than blue-collar workers, from productivity enhancing complementary inputs, such as capital investments, advertising or R&D.

Besides of the correlation between industry type and labour productivity, an interesting question is whether the intangibles and skills influence positively the competitiveness. In order to answer this question, a regression analysis is carried out for the EU, the USA and Japan (see Box 2.2). The main outcome is that, while tangible investments in physical capital have a

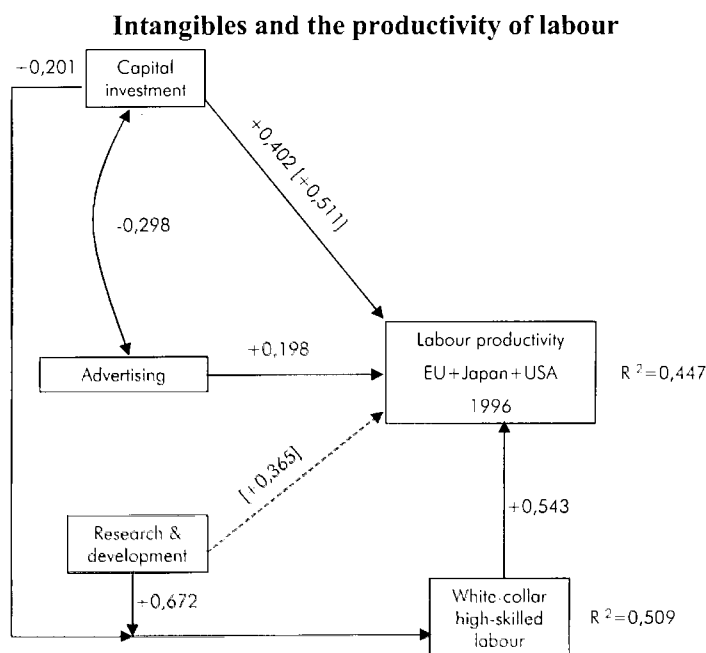
major influence on labour productivity, they still constitute only one among several contributing factors. Taking direct as well as indirect effects into account, the (white-collar) high-skill labour intensity has the strongest positive impact, followed by capital investment, research expenditures and finally, by advertising outlays.

### Box 2.2: Intangibles matter!

A crucial question for economic policy is to understand what factors affect competitiveness. In particular, it is interesting to know whether intangibles have an impact on industry competitiveness, and, if so, what is the relative contribution of different types of intangibles. In order to investigate the impact of tangible versus intangible investments on labour productivity, a small econometric model tests what types of inputs appear to be the most rewarding. The traditional set of tangible factors (physical capital and labour) is extended to take into account intangibles, such as labour skills, R&D and advertising outlays.

Specification details are provided in Peneder (1999b). Due to pronounced endogeneity problems between the two dimensions of intangible investment and human resources, two simultaneous equations were set up. The joint results of the two estimations are illustrated by path analysis represented here below. Arrows indicate the presumed causal links underlying the model. All the coefficients exhibited are significant at least at the 5% level. Numbers in brackets correspond to the total effect on labour productivity, as has been computed by multiplying the standardised coefficients of both regressions. Arrows in dotted lines signal that only an indirect effect via the demand for skilled labour could be established. Bowed lines indicate correlation between variables without any prior causal assumption.

The empirical results confirm that tangible investments in physical capital have a major influence on labour productivity. But it also stresses that capital investments constitute only one among several contributing factors. The coefficients exposed give the percentage change in labour productivity due to an increase of the respective factor intensities (or employment shares) by one percentage point. Taking direct as well as indirect effects into account, the share of white-collar high-skill labour has the strongest positive impact (+0.54), followed by capital investment (+0.51), research expenditures (+0.37) and advertising outlays (+0.20). At the industry level, all of these factors significantly increase the productivity of labour.



Source: Peneder (1999b)

## 2. Intangibles, skills and industry specialisation in the Member States

Although competitive advantages from intangible assets are overwhelmingly determined by firm specific investments, the general economic, political, institutional and scientific framework conditions also have an impact on the extent and type of entrepreneurial opportunities. The specialisation patterns are likely to follow differences in the framework conditions between countries and economic areas. In other words, a comparative study of differences in industrial structure can provide clues on the underlying sources of competitive strengths and weaknesses of particular locations.

### Industry specialisation by skill intensities

The value-added shares of industries classified by skill intensities in the EU (both by Member States and as a whole), USA and Japan are compared in Table 2.2.

**Table 2.2: Value added shares in total manufacturing by skill types in 1997, %**

| Type of industry<br>Country | Low-skill | (Medium-skill)<br>blue-collar | (Medium-skill)<br>white-collar | High-skill |
|-----------------------------|-----------|-------------------------------|--------------------------------|------------|
| EU-15                       | 30.43     | 21.76                         | 31.06                          | 16.75      |
| Belgium                     | 36.42     | 20.68                         | 31.19                          | 11.71      |
| Denmark                     | 34.96     | 19.48                         | 23.51                          | 22.05      |
| Germany                     | 23.65     | 27.32                         | 30.69                          | 18.35      |
| Greece                      | 50.81     | 12.73                         | 29.66                          | 6.80       |
| Spain                       | 40.31     | 25.51                         | 24.35                          | 9.82       |
| France                      | 29.15     | 21.37                         | 32.92                          | 16.56      |
| Ireland                     | 28.38     | 6.17                          | 39.08                          | 26.37      |
| Italy                       | 35.87     | 19.19                         | 26.89                          | 18.05      |
| Netherlands                 | 33.55     | 14.70                         | 39.88                          | 11.87      |
| Austria                     | 33.01     | 22.84                         | 31.83                          | 12.32      |
| Portugal                    | 52.52     | 19.02                         | 22.68                          | 5.79       |
| Finland                     | 23.40     | 15.25                         | 46.30                          | 15.05      |
| Sweden                      | 19.07     | 24.58                         | 38.02                          | 18.33      |
| United Kingdom              | 32.07     | 17.90                         | 32.77                          | 17.26      |
| USA                         | 25.50     | 17.44                         | 38.88                          | 18.19      |
| Japan                       | 29.15     | 21.71                         | 33.67                          | 15.46      |

Source: WIFO calculations based on SBS.

Germany and Sweden clearly exhibit the smallest shares of value added in the group of low-skill industries. In contrast, Portugal has the lowest share in high-skill and the highest share in low-skill manufacturing, immediately followed in both cases by Greece and Spain. The latter additionally enjoys significantly larger shares in blue-collar industries. The most pronounced characteristics of both Ireland and the United Kingdom are their low shares in blue-collar industries. In Italy, the overall pattern slightly favours the extreme poles of low-skill and high-skill industries.

Looking at value added shares within the Triad, Japan exhibits an even distribution, whereas the USA enjoy significantly higher shares in both high-skill and

white-collar industries. For the EU as a whole, the opposite holds true, as the shares of high-skill and white-collar industries are considerably lower than in the USA. Additionally, the share of low-skill industries is quite high in the EU (30.4%).

The pattern of similarity of skill intensities across the Member States provides information relevant for the economic policy design. Figure 2.4 shows a map, which presents the industry specialisation of the Member States according to the labour skills classification.

Germany and Sweden are most distinguished by their large shares of high-skill in total manufacturing, as well as both types of medium-skill industries. In contrast, Italy and Denmark have equal shares in high-skill industries, but perform worse in the medium-skill categories. Finland, Ireland and the Netherlands constitute a heterogeneous group that is difficult to classify. However, their most pronounced common characteristic is that they have particularly high shares of blue-collar as opposed to particularly high shares of white-collar industries. Cluster analysis<sup>9</sup> shows that Austria, Belgium, France and the United Kingdom broadly represent the average pattern, whereas Spain, Portugal and Greece are the most specialised in low-skill industries.

### Industry specialisation by tangible and intangible inputs

Industrial specialisation of the EU Member States according to the distinction by tangible versus intangible factors of production is reported in Table 2.3.

Greece, Portugal and Spain (together with Austria) show value-added shares of technology-driven industries smaller than in any other grouping. Italy performs significantly worse in both marketing-driven and technology-driven industries, as compared to mainstream and labour-intensive manufacturing.<sup>10</sup>

<sup>9</sup> Peneder (1999b) provides statistical cluster analysis grouping the individual Member States according to relative similarity of their specialisation patterns.

<sup>10</sup> Its share of capital-intensive industries is even lower, but similar to the overall share for the EU.



**Table 2.3: Value added shares in total manufacturing by factor inputs in 1997, %**

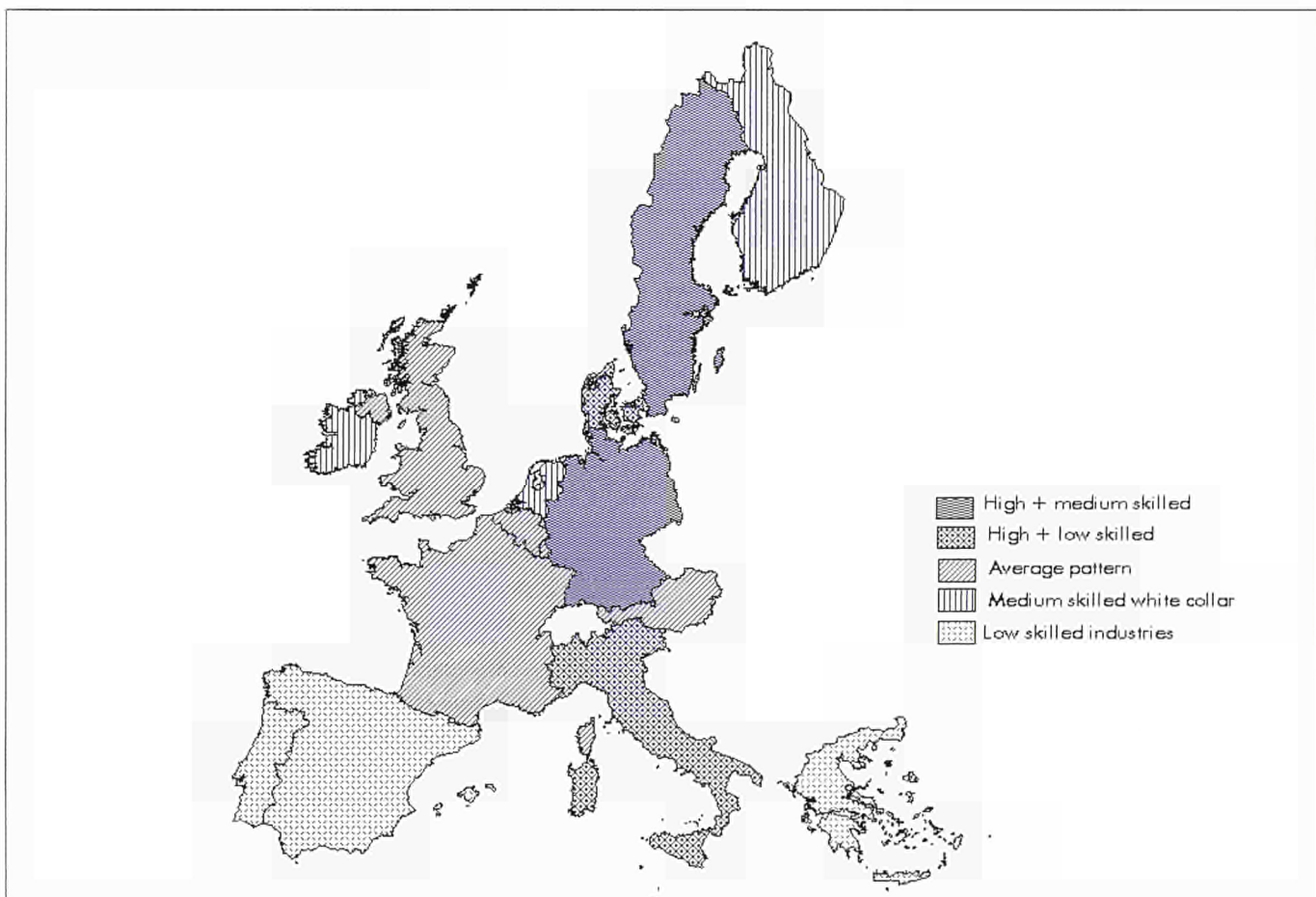
| Type of industry<br>Country | Mainstream<br>manufacturing | Labour-<br>intensive | Capital-<br>intensive | Marketing-<br>driven | Technology-<br>driven |
|-----------------------------|-----------------------------|----------------------|-----------------------|----------------------|-----------------------|
| EU-15                       | 25.41                       | 15.31                | 15.55                 | 21.28                | 22.46                 |
| Belgium                     | 22.12                       | 15.63                | 22.24                 | 21.08                | 18.93                 |
| Denmark                     | 29.50                       | 14.68                | 12.08                 | 28.60                | 15.13                 |
| Germany                     | 28.06                       | 14.13                | 15.46                 | 16.22                | 26.13                 |
| Greece                      | 19.61                       | 17.71                | 19.26                 | 35.36                | 8.06                  |
| Spain                       | 21.17                       | 20.78                | 16.47                 | 26.73                | 14.84                 |
| France                      | 21.94                       | 13.57                | 14.69                 | 22.10                | 27.69                 |
| Ireland                     | 12.06                       | 6.25                 | 12.56                 | 31.48                | 37.66                 |
| Italy                       | 28.88                       | 19.84                | 15.90                 | 17.65                | 17.73                 |
| Netherlands                 | 21.50                       | 11.75                | 19.23                 | 31.20                | 16.32                 |
| Austria                     | 26.39                       | 18.83                | 16.29                 | 24.61                | 13.88                 |
| Portugal                    | 21.92                       | 23.65                | 13.94                 | 29.77                | 10.72                 |
| Finland                     | 22.82                       | 14.98                | 28.59                 | 17.54                | 16.07                 |
| Sweden                      | 21.95                       | 12.07                | 21.25                 | 16.16                | 28.57                 |
| United Kingdom              | 22.85                       | 13.21                | 14.33                 | 25.52                | 24.08                 |
| USA                         | 21.26                       | 12.22                | 13.51                 | 23.17                | 29.84                 |
| Japan                       | 24.86                       | 16.00                | 16.01                 | 21.00                | 22.13                 |

Source: WIFO calculations based on SBS.

At the opposite end of the spectrum, Ireland does best precisely in marketing- and technology-driven industries. France also shows the most pronounced specialisation in technology-driven industries and the Netherlands in marketing-driven industries. Denmark is unique in its small share of capital-intensive industries.

Cluster analysis shows two groups with rather similar specialisation patterns. The United Kingdom shares with the USA particularly high shares in both marketing- and technology-driven industries. In contrast, Germany and Sweden (and partly Japan) exhibit similar patterns of specialisation, with high shares in technology-driven industries and low shares in marketing-driven industries. The latter are compensated by high shares in mainstream manufacturing and (especially for Sweden) in capital-

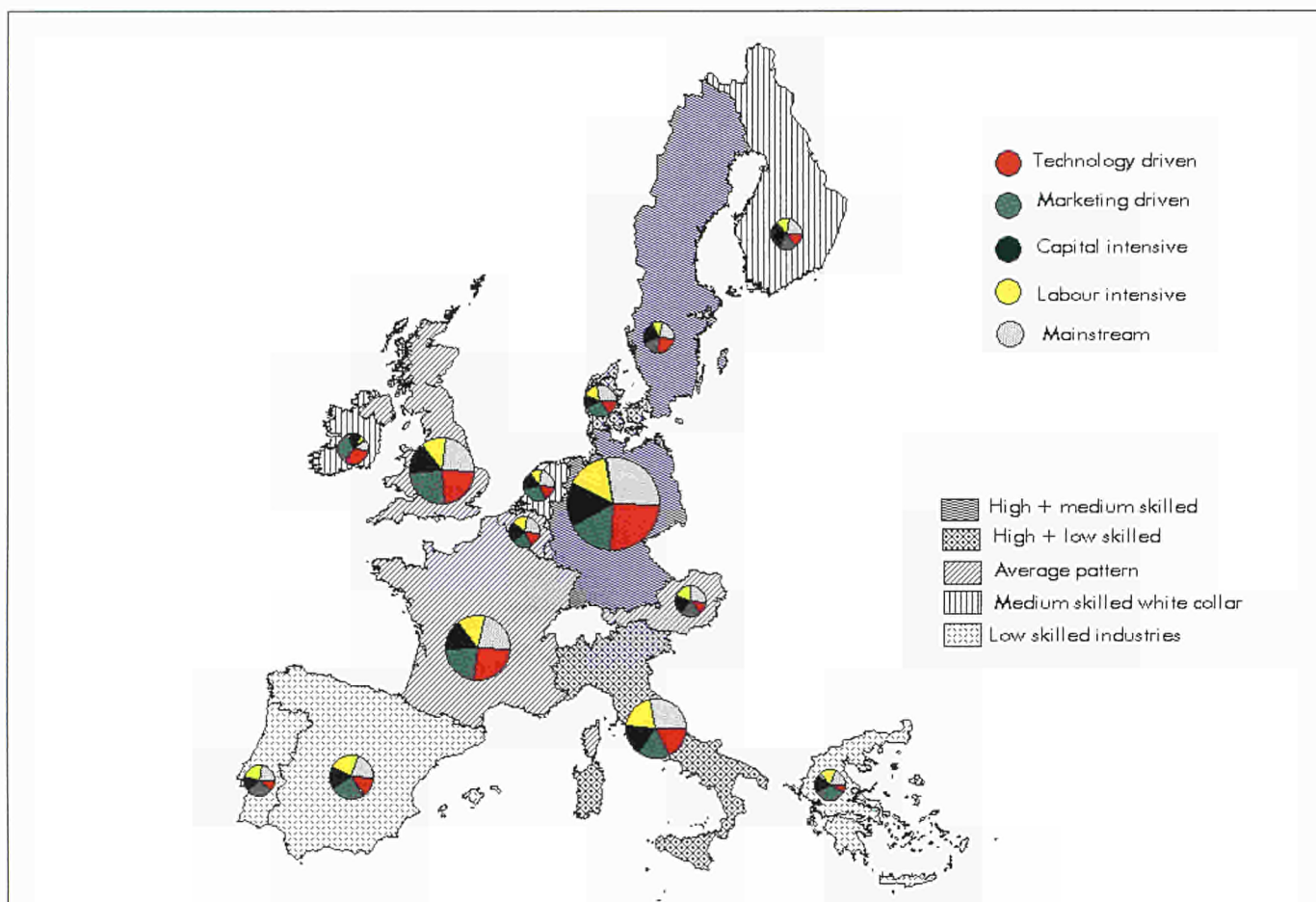
**Figure 2.4: Mapping European specialisation (I): value added shares by skill types in 1997**



Source: WIFO calculations based on SBS.



**Figure 2.5: Mapping European specialisation (II): value added shares by skill types and factor inputs 1997**



*Note:* The size of the pies reporting the information on industrial structure reflects the relative share of the corresponding Member State in the total production of EU manufacturing.

*Source:* WIFO calculations based on SBS.

intensive industries.

Other country clusters show much lower similarity. Finland, Belgium and Italy are often grouped together, seemingly sharing an intermediate position in most variables. The Netherlands, Denmark and Greece on the one hand, and Austria, Portugal and Spain on the other are also often grouped together. In particular, all countries in the first group show high shares in typical marketing industries, while countries in the second group show small shares in technology-driven industries, compensated at different degrees by higher shares of labour-intensive or mainstream manufacturing (as in the case of Austria).<sup>11</sup> Figure 2.5

compares the industrial structures across Member States on top of previous Figure 2.4 (containing information on skill intensities).

### 3. Policy conclusions

The empirical results of this study deliver strong evidence that intangible investments do matter for industrial competitiveness.

The empirical results also account for differences in industrial structure across the Member States in terms of skill intensities, as well as of tangible versus intangible intensities. Different structural patterns reflect differences in utilisation of technology- and skill-intensive methods of production, which generate high labour productivity and high value units. When supporting change towards higher R&D- and skill-intensive methods of production, the availability of

<sup>11</sup> The two latter cases illustrate the danger of overstating results based on rather broad classifications. The industries included therein can still be highly heterogeneous and countries may, to a large extent, differ in their actual factor combinations.

and conditions for accumulating intangible assets are crucial.<sup>12</sup> Therefore, the policy has a role to play in supporting the sufficient supply of such intangibles.

The Community already plays an important role in supporting intangible investments. In order to promote European innovation activities the Community has developed, among other initiatives, the “Action Plan for Innovation” as one of its main policy instruments. The mission and priorities of the Action Plan are set out in Box 2.3.

Such activities want to promote innovation activities mainly by setting up a business environment

the access of firms to finance. Here, there is scope for policy interventions in order to make capital markets function efficiently. In particular, the flexibility for internal changes is crucial as well as the question of whether the available labour force is equipped with the right skills for skill-intensive production or for using ICT efficiently. Most importantly, however, entrepreneurial skills matter. The creativeness and responsiveness of entrepreneurs is at the heart of creating adequate intangibles for competitiveness.

Also here, policy makers can encourage investment in firm-specific intangibles. For example the Community

### Box 2.3: The “Action Plan for Innovation”

The “Action Plan for Innovation” sets the Community framework for innovation policy. It aims at the definition and articulation of a genuine European strategy for promoting innovations.

With this plan the Commission has mobilised instruments for promoting innovation in Europe, in particular with the help of the Framework Research Programme and the Structural Funds.

The Action Plan splits the priorities into three main areas:

- promotion of a real culture of innovation.
- setting up a favourable environment for innovation.
- creation of stronger links between research and innovation.

Marked progress has been made in all three areas particularly for the development of innovation in enterprises, the analysis and exchange of good practices on innovation at the EU level and the financing of innovation.<sup>a</sup> Additionally, the results of the second Community Innovation Survey<sup>b</sup> provide empirical evidence about the improving innovation performance of European enterprises in manufacturing and services.<sup>c</sup>

In particular, the activities of the Action Plan for Innovation – which make possible to develop a policy geared to all European enterprises – take increasingly into account the strong position of the service sector in EU’s production and employment.

<sup>a</sup> European Commission (1999). Innovation and Technology Transfer Newsletter. Special issue on innovation October.

<sup>b</sup> The Community Innovation Survey is a joint action of the European Commission and Eurostat and carries out surveys in a harmonised way in all Member States at a large scale.

<sup>c</sup> Eurostat (1999), Statistics in Focus. Research and Development, No. 2. Mapping innovation performance of European enterprises. Preliminary results from the Community Innovation Survey 1997/1998 (CIS II), Luxembourg.

favourable to innovative entrepreneurship. Furthermore, the science and business networks play a crucial role in supporting interactive learning and in providing business sector with additional technological knowledge.

On the other hand, the supply and accumulation of firm-specific intangibles usually takes place within the firms. Their supply depends, among other things, on

can play an important role in stimulating businesses to apply more intangibles by making them more aware of the need to invest in intangibles and assisting firms willing to do so. Such actions have already been designed and applied in the Commission. Box 2.4 presents the activities already carried out or in planning in order to support the supply of intangibles.

<sup>12</sup> Certain characteristics of intangible assets and the possibility of unfavourable conditions for accumulation easily cause under-investment in intangibles. Policy measures become necessary.

### Box 2.4: Action Plan "Promoting Entrepreneurship and Competitiveness"

The Action Plan "Promoting Entrepreneurship and Competitiveness" which was drawn up in response to the priority recommendations of BEST (Business Environment Simplification Task Force) was endorsed by Industry Ministers on 29<sup>th</sup> April 1999. The main thrust of the Action Plan is promoting enterprises as a mean of improving competitiveness and sustainable growth. Additionally, it foresees a number of actions supporting intangibles and entrepreneurship in Europe. It concentrates on the aspects which are most important to SMEs – new approaches in education, training and the workplace, easier access to finance and innovation, and better public administration. As SMEs make up more than 99 % of enterprises, the measures in the Action Plan will also help to respond to the challenges identified in strengthening the competitiveness of the European economy in the face of globalisation. While the Action Plan sets a time frame within which measures have to be launched, it leaves Member States the decision on exactly what form the measures shall take. This takes account of the fact that national approaches to fostering entrepreneurship differ considerably.

One of the measures included in the Action Plan is BENE, the Business Education Network for Europe. With BENE the Commission plans to set up a network of educational organisations directly involved either in teaching entrepreneurship or in training entrepreneurs. The network allows exchanging experiences, cross-cultural learning, comparative analysis and identification of best practices. The network will also benefit entrepreneurs, who will have a direct access to the information gathered in the BENE database such as training courses on offer. Additionally, in 1999 pilot projects identifying and elaborating innovation management training methods in order to improve innovation management skills of small businesses are supported. Also, the Commission is launching a study on management training for heads of SMEs, hereby using information and communication technologies. As the Commission has recognised the importance of networking for companies, it carries out a study on networking between SME clusters and technology poles.

This study revealed the contributions of intangible investments to the competitiveness. Yet, the diffusion and use of ICT-based knowledge products and services in the industry are also contributing to higher productivity through multiple effects such as lower transaction costs, reduced inventories and shorter production cycles, better access to information among others. Unfortunately, these themes had to be excluded from this report because, for the time being, the appraisal of these effects faces critical measurement problems and would consequently requires the development of new statistical indicators.

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## Annex 2.1: WIFO taxonomies

## TAXONOMY I: industries clustered by input combinations

| <b>Mainstream manufacturing</b>                            | <b>Advertising intensive industries</b>                       |
|--|---|
| 1730 Finishing of textiles                                 | 1510 Meat products  |
| 1770 Knitted and crocheted articles                        | 1520 Fish and fish products                                   |
| 1750 Other textiles  | 1530 Fruits and vegetables                                    |
| 1760 Knitted and crocheted fabrics                         | 1540 Vegetable and animal oils and fats                       |
| 2120 Articles of paper and paperboard                      | 1550 Dairy products; ice cream                                |
| 2430 Paints, coatings, printing ink                        | 1560 Grain mill products and starches                         |
| 2510 Rubber products                                       | 1570 Prepared animal feeds                                    |
| 2520 Plastic products                                      | 1580 Other food products                                      |
| 2610 Glass and glass products                              | 1590 Beverages  |
| 2660 Articles of concret, plaster and cement               | 1600 Tobacco products   |
| 2680 Other non-metallic mineral products                   | 1910 Tanning and dressing of leather                          |
| 2720 Tubes   | 1920 Luggage, handbags, saddlery and harness                  |
| 2870 Other fabricated metal products                       | 1930 Footwear   |
| 2910 Machinery for production, use of mech. power          | 2210 Publishing   |
| 2920 Other general purpose machinery                       | 2220 Printing   |
| 2930 Agricultural and forestry machinery                   | 2230 Reproduction of recorded media                           |
| 2950 Other special purpose machinery                       | 2450 Detergents, cleaning and polishing, perfumes             |
| 2960 Weapons and ammunition                                | 2820 Tanks, reservoirs, central heating radiators and boilers |
| 2970 Domestic appliances n. e. c.                          | 2860 Cutlery, tools and general hardware                      |
| 3110 Electric motors, generators and transformers          | 3350 Watches and clocks                                       |
| 3130 Isolated wire and cable                               | 3630 Musical instruments                                      |
| 3140 Accumulators, primary cells and primary batteries     | 3640 Sports goods   |
| 3150 Lighting equipment and electric lamps                 | 3650 Games and toys   |
| 3540 Motorcycles and bicycles                              | 3660 Miscellaneous manufacturing n. e. c.                     |
| 3550 Other transport equipment n. e. c.                    | <b>Capital intensive industries</b>                           |
| <b>Labour intensive industries</b>                         | 1710 Textile fibres   |
| 1720 Textile weaving                                       | 2110 Pulp, paper and paperboard                               |
| 1740 Made-up textile articles                              | 2310 Coke oven products                                       |
| 1810 Leather clothes                                       | 2320 Refined petroleum products                               |
| 1820 Other wearing apparel and accessories                 | 2410 Basic chemicals  |
| 1830 Dressing and dyeing of fur; articles of fur           | 2470 Man-made fibres  |
| 2010 Sawmilling, planing and impregnation of wood          | 2630 Ceramic tiles and flags                                  |
| 2020 Panels and boards of wood                             | 2650 Cement, lime and plaster                                 |
| 2030 Builders' carpentry and joinery                       | 2710 Basic iron and steel, ferro-alloys (ECSC)                |
| 2040 Wooden containers                                     | 2730 Other first processing of iron and steel                 |
| 2050 Other products of wood; articles of cork, etc.        | 2740 Basic precious and non-ferrous metals                    |
| 2620 Ceramic goods   | 3430 Parts and accessories for motor vehicles                 |
| 2640 Bricks, tiles and construction products               | <b>Research intensive industries</b>                          |
| 2670 Cutting, shaping, finishing of stone                  | 2420 Pesticides, other agro-chemical products                 |
| 2810 Structural metal products                             | 2440 Pharmaceuticals  |
| 2830 Steam generators                                      | 2460 Other chemical products                                  |
| 2840 Forging, pressing, stamping and roll forming of metal | 3000 Office machinery and computers                           |
| 2750 Casting of metals                                     | 3120 Electricity distribution and control apparatus           |
| 2850 Treatment and coating of metals                       | 3210 Electronic valves and tubes, other electronic comp.      |
| 2940 Machine-tools   | 3220 TV, and radio transmitters, apparatus for line telephony |
| 3160 Electrical equipment n. e. c.                         | 3230 TV, radio and recording apparatus                        |
| 3420 Bodies for motor vehicles, trailers                   | 3310 Medical equipment  |
| 3510 Ships and boats                                       | 3320 Instruments for measuring, checking, testing, navigating |
| 3520 Railway locomotives and rolling stock                 | 3330 Industrial process control equipment                     |
| 3610 Furniture   | 3340 Optical instruments and photographic equipment           |
| 3620 Jewellery and related articles                        | 3410 Motor vehicles   |
|  | 3530 Aircraft and spacecraft                                  |

Source: DEBA and COMPET. WIFO calculations.

## Annex 2.1: WIFO taxonomies (continued)

## TAXONOMY II: industries clustered by employment skills

|   |  |
|---|--|
| <b>High skills</b>  |  |
| 2440 Pharmaceuticals  | 2870 Other fabricated metal products             |
| 2910 Machinery for production, use of mech. power             | 3410 Motor vehicles                              |
| 2920 Other general purpose machinery                          | 3420 Bodies for motor vehicles, trailers         |
| 2930 Agricultural and forestry machinery                      | 3430 Parts and accessories for motor vehicles    |
| 2940 Machine-tools  | 3520 Railway locomotives and rolling stock       |
| 2950 Other special purpose machinery                          | 3540 Motorcycles and bicycles                    |
| 2960 Weapons and ammunition                                   | 3550 Other transport equipment n. e. c.          |
| 3000 Office machinery and computers                           | 3610 Furniture                                   |
| 3510 Ships and boats  |  |
| 3530 Aircraft and spacecraft                                  | <b>Low skills</b>                                |
| <b>Medium/white collar skills</b>                             | 1510 Meat products                               |
| 2110 Pulp, paper and paperboard                               | 1520 Fish and fish products                      |
| 2120 Articles of paper and paperboard                         | 1530 Fruits and vegetables                       |
| 2210 Publishing   | 1540 Vegetable and animal oils and fats          |
| 2220 Printing   | 1550 Dairy products; ice cream                   |
| 2230 Reproduction of recorded media                           | 1560 Grain mill products and starches            |
| 2310 Coke oven products                                       | 1570 Prepared animal feeds                       |
| 2320 Refined petroleum products                               | 1580 Other food products                         |
| 2410 Basic chemicals  | 1590 Beverages                                   |
| 2420 Pesticides, other agro-chemical products                 | 1600 Tobacco products                            |
| 2430 Paints, coatings, printing ink                           | 1710 Textile fibres                              |
| 2450 Detergents, cleaning and polishing, perfumes             | 1720 Textile weaving                             |
| 2460 Other chemical products                                  | 1730 Finishing of textiles                       |
| 2470 Man-made fibres  | 1740 Made-up textile articles                    |
| 2970 Domestic appliances n. e. c.                             | 1750 Other textiles                              |
| 3110 Electric motors, generators and transformers             | 1760 Knitted and crocheted fabrics               |
| 3120 Electricity distribution and control apparatus           | 1770 Knitted and crocheted articles              |
| 3130 Isolated wire and cable                                  | 1810 Leather clothes                             |
| 3140 Accumulators, primary cells and primary batteries        | 1820 Other wearing apparel and accessories       |
| 3150 Lighting equipment and electric lamps                    | 1830 Dressing and dyeing of fur; articles of fur |
| 3160 Electrical equipment n. e. c.                            | 1910 Tanning and dressing of leather             |
| 3210 Electronic valves and tubes, other electronic comp.      | 1920 Luggage, handbags, saddlery and harness     |
| 3220 TV, and radio transmitters, apparatus for line telephony | 1930 Footwear                                    |
| 3230 TV, radio and recording apparatus                        | 2510 Rubber products                             |
| 3310 Medical equipment  | 2520 Plastic products                            |
| 3320 Instruments for measuring, checking, testing, navigating | 2610 Glass and glass products                    |
| 3330 Industrial process control equipment                     | 2620 Ceramic goods                               |
| 3340 Optical instruments and photographic equipment           | 2630 Ceramic tiles and flags                     |
| 3350 Watches and clocks                                       | 2640 Bricks, tiles and construction products     |
| <b>Medium/blue collar skills</b>                              | 2650 Cement, lime and plaster                    |
| 2010 Sawmilling, planing and impregnation of wood             | 2660 Articles of concret, plaster and cement     |
| 2020 Panels and boards of wood                                | 2670 Cutting, shaping, finishing of stone        |
| 2030 Builders' carpentry and joinery                          | 2680 Other non-metallic mineral products         |
| 2040 Wooden containers  | 2710 Basic iron and steel, ferro-alloys (ECSC)   |
| 2050 Other products of wood; articles of cork, etc.           | 2720 Tubes                                       |
| 2810 Structural metal products                                | 2730 Other first processing of iron and steel    |
| 2820 Tanks, reservoirs, central heating radiators and boilers | 2740 Basic precious and non-ferrous metals       |
| 2830 Steam generators   | 2750 Casting of metals                           |
| 2840 Forging, pressing, stamping and roll forming of metal    | 3620 Jewellery and related articles              |
| 2850 Treatment and coating of metals                          | 3630 Musical instruments                         |
| 2860 Cutlery, tools and general hardware                      | 3640 Sports goods                                |
|   | 3650 Games and toys                              |
|   | 3660 Miscellaneous manufacturing n. e. c.        |

Source: DEBA and COMPET. WIFO calculations.



## Competitiveness, restructuring and firm location flexibility

Global competition, technological developments and the achievement of the Single Market have stimulated, within Europe, economic restructuring. This process is taking many forms: entry of new firms, downsizing and exit, mergers and acquisitions, as well as transfer of productive activities to other regions inside or outside the EU.

In this chapter, the term “relocation” is taken to express the form of restructuring which arises from the transfers of productive activities. The chapter focuses on the phenomenon of relocation even if it does not seem to constitute the major mode of economic restructuring in Europe. For instance, in Belgium there is well-documented evidence that relocation is responsible for no more than 18% of the jobs lost due to collective layoffs of employees over the period 1990-1995 (see Annex 3.1).

The strong growth of foreign direct investments over the past decade, as well the recent developments in the organisation of MNEs suggest that the phenomenon may become of growing importance in the future.

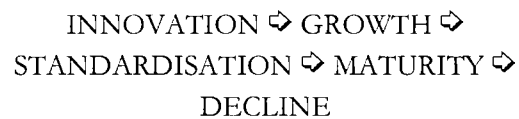
The chapter aims to show the most important elements that encourage MNEs to relocate. It is argued that relocations should be viewed against the background of a new paradigm of industry dynamics and the development of spatial networks. The analysis is concentrated on MNEs for three principal reasons. Firstly, what is happening to MNEs today may well be an indication of what may happen in other enterprises in the future. Secondly, the lack of data at this stage makes it impossible to analyse in detail the relocation phenomenon of any other type of enterprise. Thirdly, much of what follows is essentially confined to those firms and sectors that have already adopted a global or Euro-regional structure.

The chapter is organised as follows: The first section discusses the importance of the productive process associated with automation and relocation in the context of the new industry dynamics paradigm. The second section deals with the passage from a “stand-alone strategy” of MNEs to a “complex integration strategy”, where enterprises operate within interdependent networks. In the third section it is argued that an important part of current international production restructuring follows the formation of two

flexible networks: the “productive network” and the “subcontracting network”. The fourth section stresses the role of operational flexibility as a key element for firms’ competitiveness. Further implications for the location of productive activities are discussed in the fifth section. The final section concludes by providing some policy considerations.

### 1. Industry dynamics and the location of economic activities

The traditional explanation of the spatial location of productive activities refers to the “product life cycle theory”.<sup>1</sup> The underlying hypothesis implies the following phases:



The theory stresses that technological innovation represents an advantage that allows firms to concentrate their initial production in the home market: products are manufactured where conceived. During the “growth stage” there is the first relocation for *market reasons* and production is gradually transferred to other developed countries. During the “standardisation phase” a second reason for relocation arises from *cost factors* and production moves towards low cost countries. The result is a specialisation of developed countries in the most growing sectors and a relocation of the other sectors to low cost countries.

The product life cycle hypothesis implies that the relocation process is always carried out from north to south. This limited and pre-determined character represents the main weakness of the theory.<sup>2</sup> Additionally, it does not explain the dynamics of direct

<sup>1</sup> See Vernon (1966).

<sup>2</sup> Furthermore, it is not always true that relocations are unavoidable, as the theory of product life cycle states, since local developments, such as the location of productive activities, are specific to each place and cannot be pre-determined.

investments or international specialisation.<sup>3</sup> Furthermore, the effects of “rupture” connected with the diffusion of new technologies (automation), the quality improvements, the role of the flexibility of the productive process are not taken into account. These elements play an important role in so far as they enable the more industrialised countries to restore their competitiveness of traditional sectors (e.g. textile, leather, etc.).<sup>4</sup>

In effect, the maturity phase of a product, which is the imitation phase by the less advanced countries, coincides with the exhaustion of the old technological system and the distribution of the new system. This phase is then followed by a changing composition of product variety. Thanks to the introduction of new technologies, the manufacture of “high tech” varieties of the product will be carried out in the most advanced countries, which benefit from the effects of the new growth cycle.<sup>5</sup> On the other hand, the manufacture of all other “low tech” models of the product will take place within the framework of the old system and it will be relocated successively in less advanced countries.<sup>6</sup>

However, at this stage, it is incorrect to assume that for an industrialised country to obtain solid performances it has to give up traditional sectors (the standardised sectors) where demand is declining, and re-deploy resources in the high-growth sectors. Such a choice can lead to a deterioration of industrial competitiveness if a massive relocation of the traditional sectors in low factor costs countries is not followed by a quick re-deployment of the resources made available.<sup>7</sup>

<sup>3</sup> Even the reformulation of the theory carried out successively remains insufficient since the deterministic character is maintained. See Krugman (1979), Vernon (1979), Flam and Helpman (1987).

<sup>4</sup> Porter (1990) stresses that there are advantages (low wages for example) that firms can easily obtain through relocation, while other advantages are not so easily available (training, technology, R&D) and are mainly acquired through improvement, innovation and upgrading.

<sup>5</sup> The theory of the product life cycle regards these new models of products as “standardised”.

<sup>6</sup> The progressive changes in the increasingly differentiated market demand, involves, on the one hand, the more rapid and less expensive adaptation of the offer and, on the other hand, a higher flexibility of the productive process. The latter often follows from the use of innovative technologies, such as biotechnology and new materials. Overall, the production process moves from “rigid” and standardised toward increasingly varied and “flexible”.

<sup>7</sup> See El Mouhoud (1992).

It is sometimes important to increase investments in R&D and in the diffusion of new technologies, in order to carry out structural transformation within the traditional sectors that increasingly enter in connection with growth sectors. This is the case of the textile sector, often mentioned as an example of relocation movements, where the automation of the production process allows maintenance of certain operations in industrialised countries.<sup>8</sup> Moreover, the choice to concentrate on top-of-the-range or fashion-dependent sectors requires a proximity to consumer markets and sophisticated distribution systems. MNEs have internalised this logic of dynamic industry adjustment within their spatial organisation by means of setting up world wide or European wide networks.

## 2. Spatial networks of multinational enterprises

Intensification of international competition and the diffusion of new technologies have favoured the adoption of “complex integration strategies” by MNEs.<sup>9</sup> In the EU, where the European integration process has reduced the “economic distance” between Member States, this phenomenon is particularly evident.

In order to engage in international production in this new economic environment, MNEs –that are a network of activities located in different countries– have to adapt their organisational structures accordingly. Strategies for organising cross-border production involve choices about the international location of different activities and the degree of integration among the various entities that fall under the common governance of the MNE. As illustrated by Table 3.1, the range of possible strategies and structures has grown over time.

The establishment of stand-alone affiliates based on a specific territory, operating autonomously and duplicating activities represents an old strategy.<sup>10</sup> On the contrary, at present an increasing number of MNEs co-operate and organise a much more complex form of integration: global networks.

<sup>8</sup> Italy for example modernised its textile sector by encouraging in particular the design and cut of the fabric.

<sup>9</sup> See Bartlett and Ghoshal (1989); Rugman et al. (1995).

<sup>10</sup> With a stand-alone strategy, an MNE treats its foreign affiliates as autonomous/independent wealth creating units and each foreign affiliate serving a separate host economy. A stand-alone affiliate is responsible for most of the value added in its output.

**Table 3.1: Evolution of the strategies and structures of MNEs**

| Form                             | Types of intra-firm linkages                          | Degree of integration      | Environment  |
|----------------------------------|---|----------------------------|--|
| Stand-alone                      | Ownership, technology                                 | Weak                       | Host country accessible to FDI; significant trade barriers; costly communications and transportation |
| Simple integration               | Ownership, technology, markets, finance, other inputs | Partially strong           | Bilaterally open trade and FDI; non-equity arrangements  |
| Complex international production | All functions   | Potentially strong overall | Open trade and FDI; IT; convergence in tastes; increased competition                                 |

Source: World Investment Report, 1993.

These networks involve the development of production/distribution networks, the setting up of joint subsidiaries and a multiplication of alliances. "MNEs may also use their foreign affiliates or partners as vehicles for seeking out and monitoring new knowledge and learning experiences."<sup>11</sup> Networking permits the MNE to become a more effective competitor. Intensified competition encourages firms to quickly adopt the best practice production methods,<sup>12</sup> including those related to production location, if they want to survive and prosper.<sup>13</sup>

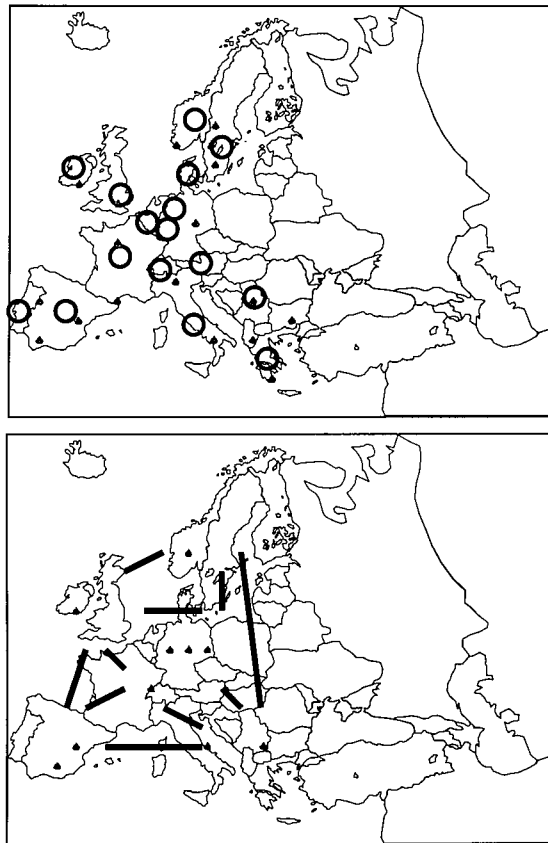
These methods basically consist of more intense international collaboration among producers, and between producers and customers, and less conflictual labour relations. "Alliances are an expedient way to crack new markets, gain skills and technologies, realise economies through reorganisation and exploitation of complementarities, share fixed costs and resources, as well as the ability to monitor and control competitive forces (...) strategic alliances allow firms to spread geographically at a much faster and flexible rate."<sup>14</sup>

Networks combine intra- and inter-firm organisational structures. They involve flows of information and incentives, and complex combinations of horizontal and vertical linkages among firms comprising the networks. The effectiveness of the networks enables firms to reduce their costs, to minimise their risks and, therefore, to maximise their profits. Through networks MNEs can better organise themselves in order to avoid activity duplications. By splitting the productive process (from design to distribution) they can make

better choices about where to locate a particular activity and thus improve efficiency.

The development of global supply chains by means of setting up global networks reflects the deployment of global strategies. However, according to the United Nations, "In Europe, many MNEs have adopted regional strategies, partly in response to the Single Market initiative, which has led to considerable restructuring and concentration of production".<sup>15</sup> In the EU, regional international production systems are present and can be called "European flexible networks" as illustrated by Figure 3.1.

**Figure 3.1: New Euro-organisation: from "everything everywhere" to one integrated system**



Note: Small circles in the upper frame identify national markets, while big circles in the lower frame identify Euro-networks. The ♦ identifies the location of business activities (e.g. production, sales, R&D).

Source: adapted from Vandermerwe (1993).

In this new Euro-organisation, firms are not stand-alone but they operate in an interdependent system. They have an ability to shift production or supply in response to changing market and cost conditions. Firms do so by paying close attention to the optimal location of the different elements of the value chain.

<sup>11</sup> See Dunning (1999).

<sup>12</sup> Firms could follow the example of those successfully organised in an international integrated manner.

<sup>13</sup> See Mucchielli (1992), Buckley and Mucchielli (1997).

<sup>14</sup> See Sleuwaegen et al. (1998), p. 145.

<sup>15</sup> See United Nations (1993).

In the European regional flexible networks, MNEs concentrate their activities on a limited number of regions and at the same time are able to increase productivity. A good example of this European restructuring production is provided by Unilever, which rationalised its manufacturing of toilet soap locations by cutting the number of factories from 13 in 1973, to 2, in 1999.<sup>16</sup> (See Figure 3.2 and Figure 3.3)

Often, MNEs carry out mergers and acquisitions to reach a minimum size that enables them to mobilise the necessary resources and to count on wider sales networks.<sup>17</sup> Larger firms have more options than smaller ones in seeking access to new business opportunities. As compared to small and domestic firms, MNEs have geographically broader horizons, better cost information and larger financial resources to respond quickly to globalisation challenges and opportunities.

### 3. Relocation in two types of networks

It has been argued<sup>18</sup> that the new supply chain system consists of the integration of two networks:

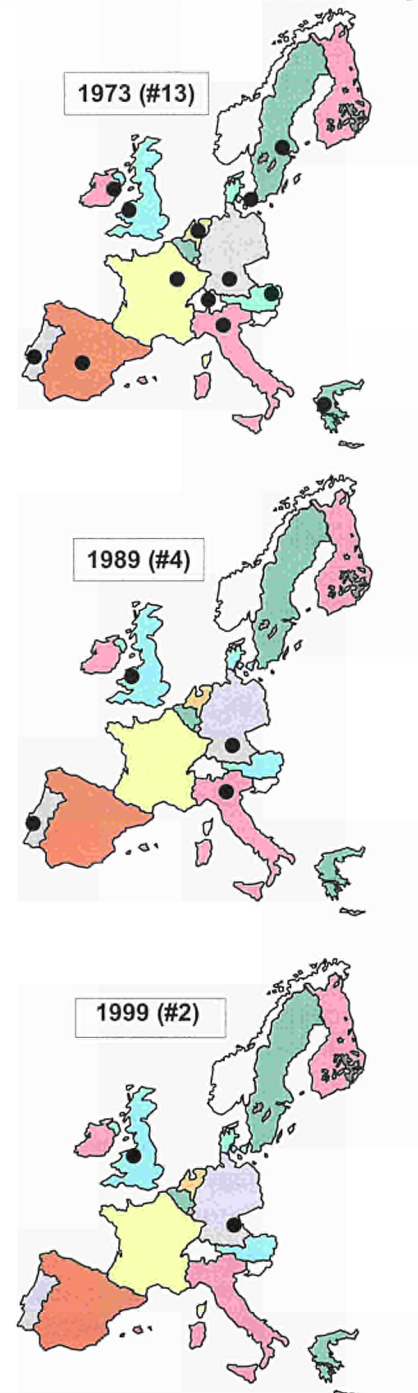
- the “production network” and
- the “subcontracting network”.

Within this system, relocation can take the form of either FDI or subcontracting with independent partners (see Box 3.1).

#### The production network

In the production network, firms concentrate on the core business of the value chain and extend their supply network to new markets. They co-ordinate all production activities internally and are responsible for transmitting technological advances and innovation to the other firms in the network. The core firms control several affiliates in different markets and the decision to shift production is conditioned primarily by the presence of the network and by the level of the “efficiency environment” provided by the host region.

**Figure 3.2: Unilever locations in Europe**



*Note:* Toilet soap manufacturing locations.

*Source:* Henderson Croethwalte / Unilever Home & Personal Care Europe.

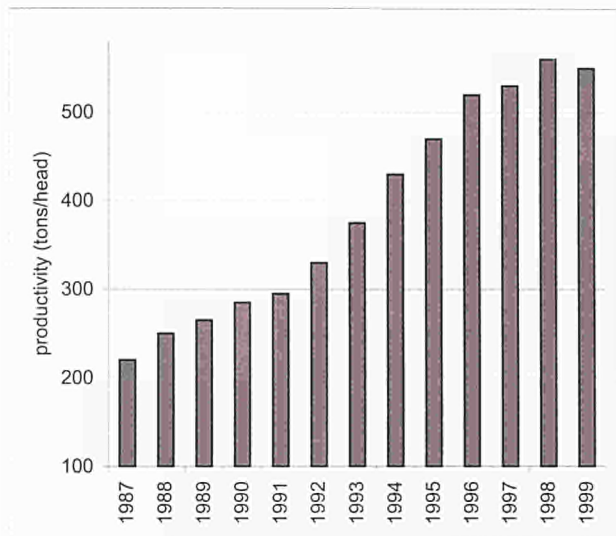
<sup>16</sup> In 1994, Unilever, with a turnover of 38.3bn ECU and 304.000 employees, was the seventh most important group in Europe.

<sup>17</sup> Many firms invest abroad for strategic reasons. A large share of FDI in Europe occurs through mergers and acquisitions.

<sup>18</sup> See Klapwijk (1996).



**Figure 3.3: Unilever European detergent productivity (tons per head, 1978=100)**



Source: Henderson Croethwalte / Unilever Home & Personal Care Europe.

### The subcontracting network

In the subcontracting network, subcontractors are usually specialised in the production of the more intensive labour phases. Subcontracting is cost-driven; therefore the choice of location is determined by the possibility of benefiting from lower cost factors. In this sense, subcontracting allows large firms to concentrate on technologically sophisticated and/or capital-intensive activities and enables them to adjust production more flexibly. It provides large firms a financing advantage as it reduces their need for working capital. Subcontracting occurs frequently in the majority of industrial sectors.<sup>19</sup>

Within this perspective, subcontractors are linked with the MNE and are part of a more integrated production network.<sup>20</sup>

<sup>19</sup> The word “subcontracting” does not have any homogeneous translation in all European languages. However, it is possible to determine a general standard of the subcontracting agreement: “A subcontracting agreement exists whenever:

- the principal contractor takes part in the design of the product by providing totality or a part of the specifications to the producer, these specifications which can go from detailed technical plans to broader specifications, and
- the principal contractor is responsible for the marketing of the product”. See European Commission (1997).

It is important to note that under this chapter, the varieties of the phenomenon connected to the ownership/control are not taken into account.

<sup>20</sup> This would call for an appropriate attention to the specific needs of subcontractors, which is however out of the scope of this chapter. The European Commission is launching studies in the area of subcontracting, in particular on:

Relocation by means of international subcontracting represents the transfer of a stage of the production process abroad with subsequent import of the products that were manufactured before on the spot.<sup>21</sup> The increase of international subcontracting is among the most significant organisational innovations and it is an essential component of the above mentioned organisational practices.

## 4. Operating flexibility

A firm that forms part of a network is more competitive, due mainly to the degree of “flexibility” from which it benefits.

Within this perspective, flexibility can be defined as “the ability to reallocate resources quickly and smoothly in response to changes”<sup>22</sup> and can also be seen as a response to uncertainty of international markets (such as government policies, competitors’ decisions, or the arrival of new technologies).<sup>23</sup> Operating flexibility is an advantage gained by a MNE in the co-ordination of its subsidiaries and partners present in the networks. It adds value to the firm in the sense that it gives MNEs the possibility to respond profitably to changing costs and demand conditions and to uncertain events. Furthermore, through the use of technological innovations<sup>24</sup> and flexible labour, firms can react more quickly to the growing volatility in world markets.<sup>25</sup>

subcontracting development poles, clustering, restructuring, networking, integrated suppliers training, internationalisation of European subcontracting.

<sup>21</sup> Relocation does not necessarily involve the transfer of all the production processes.

<sup>22</sup> See Buckley and Casson (1998), p. 23.

<sup>23</sup> See Kogut and Kulatilaka (1994).

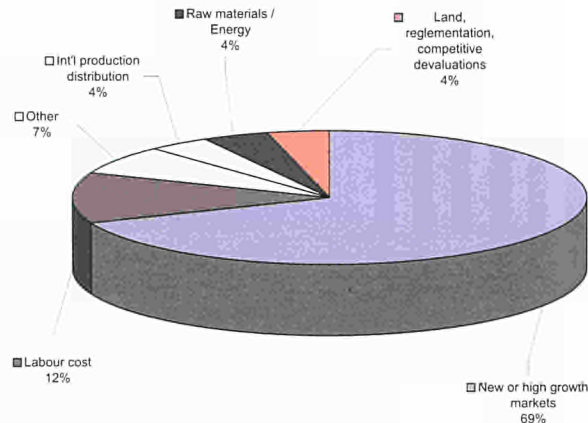
<sup>24</sup> The growth of flexible production technologies allows firms to adapt their “offer” to the different local products. These differences influence the strategies of MNEs.

<sup>25</sup> The high variance of international markets increases the value of operating flexibility.

### Box 3.1: Reasons justifying a FDI and sub-contracting agreements

A recent survey<sup>a</sup> referring to the period 1990-96 shows that the *main reason for investing abroad* is the presence of new emerging markets or markets with strong growth<sup>b</sup> (69% of the answers). The difference in labour cost, on the other hand, is of only secondary importance (12% of the answers). Companies with a high capital/labour ratio prefer to carry out their transfers of production in industrialised countries, while companies with a low capital/labour ratio prefer investing in less advanced countries in order to benefit from lower wages.

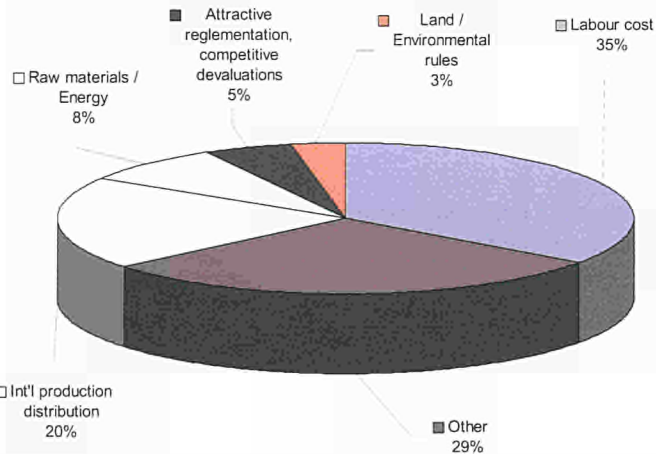
#### The main reasons for choosing FDI, 1990-1996



Source: Federal Planning Bureau, Belgium.

The *main reasons for concluding sub-contracting agreements* abroad are different from those justifying direct investment. The possibility of benefiting from lower wage costs and the geographical proximity of the place of establishment play a major role.

#### The main motives for sub-contracting, 1990-96



Source: Federal Planning Bureau, Belgium.

<sup>a</sup> The survey carried out by the Belgian Federal Planning Bureau in 1997 was directed towards 3,000 companies established in Belgium. Its results are based on the answers of 466 companies. See Van Den Cruyce and Courcelle (1998), p. 16.

<sup>b</sup> FDI often mirrors the willingness to penetrate the local market. Very often, a firm would only get a small share of this market through exports, if it were not supported by local investments.



In the labour perspective, it can also be noted that management's desire to enhance flexibility, adaptability and the quality of production puts particular pressure on the labour force. Providing the necessary conditions for firms to exist and operate in more flexible networks could promote, in a parallel process, the adaptability of labour markets and stimulate new kinds of flexible jobs. For the same reason, the need for more and better qualifications implies the necessity to strengthen education policy in the EU and to promote a stronger partnership between firms, universities and public authorities. Furthermore, it also requires closer concertation and dialogue between employers and labour unions to adapt to new economic realities.

In this context, in a welfare state it is important to find a proper balance between firms' flexibility and labour security.<sup>26</sup> This is an important issue that deserves serious attention.

## 5. Further locational implications

The development of networks helps to explain the continuing increase of intra-industry trade for most EU countries and sectors, particularly in the exchange of vertically differentiated products.<sup>27</sup> (See Table 3.2 and Figure 3.4)

Within Europe the location of activities within the spatial networks will increasingly depend on the attractiveness of the industrial regions, in their capacity as nodal points within networks. Communication and transportation technologies and infrastructures are therefore essential to link the different nodes of the network.

**Table 3.2: Importance of intra-industry trade in total intra-EU trade by sectors**

| Sector  | 1988        | 1997        | Change     |
|---|-------------|-------------|------------|
| Rubber and plastics products                        | 69.8        | 74.3        | 4.5        |
| Other transport equipment                           | 69.5        | 72.2        | 2.7        |
| Fabricated metal products                           | 67.1        | 71.4        | 4.3        |
| Radio, TV and communication equipment               | 67.9        | 67.8        | -0.1       |
| Medical, precision and optical instruments, watches | 65.5        | 67.4        | 1.9        |
| Office machinery and computers                      | 69.2        | 67.4        | -1.8       |
| Motor vehicles, trailers and semi-trailers          | 60.4        | 66.7        | 6.3        |
| Electrical machinery and apparatus n.e.c.           | 61.3        | 65.7        | 4.4        |
| Publishing, printing and reproduction               | 63.9        | 65.5        | 1.6        |
| Chemical and chemical products                      | 62.2        | 65.2        | 3.0        |
| Wearing apparel; dressing and dyeing of fur         | 57.3        | 64.6        | 7.3        |
| Basic metals  | 61.4        | 63.1        | 1.7        |
| Textiles  | 59.4        | 63.0        | 3.6        |
| Machinery and equipment n.e.c.                      | 57.9        | 62.2        | 4.3        |
| Furniture, manufacturing n.e.c.                     | 56.0        | 57.5        | 1.5        |
| Other non-metallic mineral products                 | 54.1        | 55.3        | 1.2        |
| Pulp, paper and paper products                      | 50.1        | 54.4        | 4.3        |
| Food products and beverages                         | 43.4        | 50.1        | 6.7        |
| Wood, products of wood and cork                     | 42.6        | 45.0        | 2.4        |
| Tanning and dressing of leather                     | 37.8        | 44.6        | 6.8        |
| Coke, refined petroleum and nuclear fuel            | 40.8        | 44.4        | 3.6        |
| Tobacco products                                    | 31.2        | 34.6        | 3.4        |
| <b>TOTAL MANUFACTURING</b>                          | <b>58.7</b> | <b>62.8</b> | <b>4.1</b> |

Source: WIFO calculations using COMEXT

As a consequence of these developments, the attractiveness of a region will, to a growing extent, depend on the agglomeration effects. Firms quite often choose sites where similar activities are already located. To explain this process, new economic geography theories combine trade costs with scale economies.<sup>28</sup> Moreover, the location, in the same geographical space, of producers and users facilitates reciprocal knowledge exchanges and creation of confidence relations between partners.<sup>29</sup> Positive externalities generated by agglomerations, in the form of external economies of scale and accumulative indirect effects, encourage concentration of production.<sup>30</sup>

<sup>28</sup> See Krugman (1995) and Chapter 1 in Part One of this report.

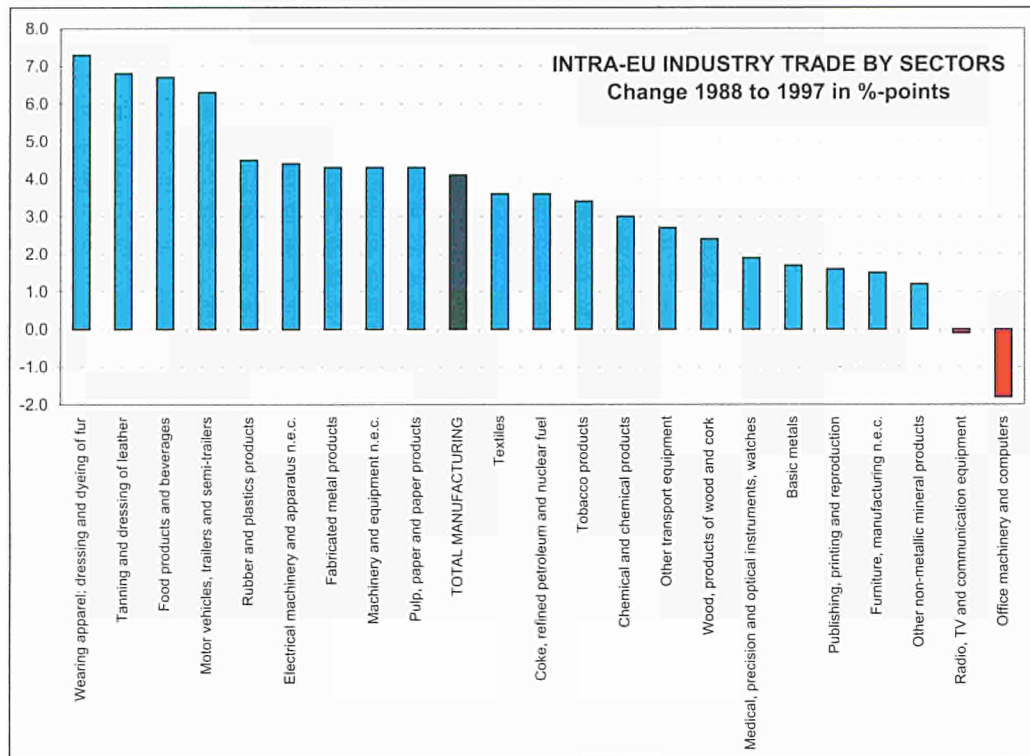
<sup>29</sup> Strong agglomeration effects were found also in empirical analysis of Japanese FDI in Europe: they show that Japanese firms choose to locate in countries where initial investments had been made. See Head and Mayer (1998).

<sup>30</sup> See Friedman et al. (1992).

<sup>26</sup> What it is in interest of firms does not necessarily coincide with the best interests of the labour force.

<sup>27</sup> It could also be explained by the fact that the production made in the host country is not destined for the local market, but is exported to the origin country.

Figure 3.4: Growth of intra-industry trade



Source: WIFO calculations using COMEXT

The productive organisation and the attractiveness of a specific location depend increasingly on the diffusion of Information Communication Technology (ICT).<sup>31</sup> (See Table 3.3)

Table 3.3: ICT expenditure

|                    | 1995             |             | 1996             |             | 1997             |             | 1998             |             |
|--------------------|------------------|-------------|------------------|-------------|------------------|-------------|------------------|-------------|
|                    | ICT/capita (ECU) | ICT/GDP (%) | ICT/capita (ECU) | ICT/GDP (%) | ICT/capita (ECU) | ICT/GDP (%) | ICT/capita (ECU) | ICT/GDP (%) |
| Belgium-Luxembourg | 825              | 4.21        | 913              | 4.53        | 1004             | 4.82        | 1098             | 5.08        |
| Denmark            | 1234             | 4.95        | 1340             | 5.20        | 1454             | 5.36        | 1554             | 5.52        |
| Germany            | 924              | 4.30        | 939              | 4.18        | 996              | 4.31        | 1064             | 4.45        |
| Greece             | 295              | 3.70        | 340              | 3.90        | 391              | 4.09        | 452              | 4.42        |
| Spain              | 366              | 3.39        | 419              | 3.69        | 455              | 3.82        | 497              | 3.93        |
| France             | 866              | 4.35        | 917              | 4.50        | 991              | 4.73        | 1083             | 5.00        |
| Ireland            | 751              | 5.35        | 850              | 5.63        | 942              | 5.78        | 1049             | 5.68        |
| Italy              | 595              | 3.65        | 642              | 3.66        | 697              | 3.77        | 782              | 4.06        |
| Netherlands        | 943              | 5.09        | 1034             | 5.45        | 1136             | 5.75        | 1233             | 5.93        |
| Austria            | 772              | 3.62        | 842              | 3.87        | 921              | 4.13        | 996              | 4.32        |
| Portugal           | 349              | 4.38        | 379              | 4.46        | 432              | 4.76        | 477              | 4.92        |
| Finland            | 857              | 4.68        | 942              | 4.97        | 1026             | 5.21        | 1119             | 5.26        |
| Sweden             | 1256             | 5.88        | 1320             | 6.03        | 1404             | 6.20        | 1520             | 6.49        |
| United Kingdom     | 978              | 5.73        | 1077             | 6.05        | 1163             | 6.22        | 1250             | 6.39        |
| EU                 | 785              | 4.43        | 840              | 4.55        | 907              | 4.76        | 986              | 4.97        |
| USA                | 1498             | 6.76        | 1630             | 7.11        | 1759             | 7.42        | 1890             | 7.62        |
| Japan              | 1196             | 4.25        | 1283             | 4.56        | 1337             | 4.68        | 1287             | 4.39        |

Source: EITO 1999.

These technologies revolutionise methods of production and enable firms to benefit from an economic environment favourable to the development of their activities, thanks in particular to the use of high-quality equipment.

It allows value chains of firms under separate ownership to become more integrated and encourages higher labour productivity levels.

The firms that are most advanced in flexible technologies are more inclined to locate in a region that has developed an innovative and coherent production system. With the introduction of advanced production technologies using ICT, the possible gains from relocating production to low wage countries are partly compensated by a reduction of the weight of these costs and by the possibility of being better able, through a flexible productive process, to adapt supply to demand, which is increasingly characterised by high differentiation.

Similar to the introduction of ICT, the development of European multi-modal transport networks is essential to foster the creation of efficient production and subcontracting networks.

## 6. Conclusions

This chapter introduced the phenomenon of relocation of productive activities. It has been stressed that, as an element of economic restructuring, relocation is not an end in itself but a “means” for firms to increase their competitiveness. Relocation is closely connected with

<sup>31</sup> For the purpose of this chapter ICT refers to IT (the combined industries of hardware for office machines, data processing equipment, data communication equipment and of software and services) plus telecommunication equipment and telecommunication services.

the current process of restructuring of international production and necessarily reflects the strategic behaviour of firms. These strategies involve forming integrated international supply structures, incorporating a production network and subcontracting network. In the former, firms concentrate on core activities while in the latter specialised subcontractors are responsible for the more labour intensive production phases.

In this perspective the competitiveness of a firm and the attractiveness of a region are directly related to their level of integration within these networks. This integration can be fostered through the improvement of network infrastructures, the provision of efficient institutions and the formation of strategic alliances. Furthermore, more investments in R&D, the diffusion of new technologies and the promotion of better professional qualifications could encourage higher internal/external flexibility in European firms.

In the network, firms benefit from specific advantages including:

- strong interdependence;
- easy transferability of proprietary advantages and knowledge;
- agility.

Firms can better rationalise their productive activities and so adapt more easily to changes in market and cost conditions. In short, flexible networks enable them to be more competitive. "To survive and prosper, firms, which are directly or indirectly responsible for creating jobs, are obliged to exist in a state of permanent and rapid adaptation (...) their competitiveness is a function of their agility".<sup>32</sup>

The presence of these networks leads to a number of implications for European industry:

- growth of vertical intra-industry trade within Europe;
- increase FDI between Member States;
- stimulation of structural change through operational flexibility.

The completion of the Single Market will lead to a further reduction in the economic distance between Member States that, in turn, will stimulate the creation of flexible networks. Integration into these networks could also encourage higher economic cohesion between European regions. Certainly, this process should not impinge on social cohesion; there is a clear need to find a proper balance between a firm's flexibility and the aims of the welfare state.

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<sup>32</sup> Competitiveness Advisory Group (1999).

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### Annex 3.1: The case of Belgian relocations

A report issued in 1998 by the Belgian "Federal Planning Bureau"<sup>a</sup> studies the relocations of companies established in Belgium. It seems to be the first systematic attempt to put together information on:

- establishment of foreign subsidiaries by companies already established in Belgium,
- subcontracting agreements,
- collective lay-off of employees.

The information on foreign subsidiaries is drawn from the database "BELFOMI". It contains data on 9,204 subsidiaries established abroad. It provides information on establishment location, type of activity, year of establishment abroad and reasons for investing outside Belgium.

The reasons for investing outside Belgium are known in 57% of the cases (5,260 out of 9,204). They are classified in four categories: "strict" relocation (i.e. the transfer of (part of) the value chain abroad and the consequent closure/reduction of the activity in Belgium), FDI for expansion, FDI for diversification and "no relocation" (whenever the establishment abroad or subcontracting is strictly necessary, according to the definition of the Federal Planning Bureau). In what follows the term "relocation" will only be used when speaking about the first category.

Table 3.A1 shows that closure/reduction of the activity (and thus employment) affects only 1 out of 10 establishments. Additionally, half of these strict relocations (256 out of 498) were carried out within the EU. The phenomenon of relocation is more frequent in manufacturing (25.2%) than in the service sector (1.6%). The contrary is true for FDI for diversification (21% in services and 2.4% in manufacturing). Lastly, FDI for expansion is relevant in both the service sector (26.6%) and manufacturing (59.4%).

Concerning manufacturing, Figure 3.A1 shows that the sectors most affected by relocations are clothing (21.4%) and textile (11.8%).

Table 3.A2 shows that relocations are strongly concentrated within the EU (65%, i.e. 5,979 out of 9,204) and that less than 40% (i.e. 2,950 out of 7,941) took place after 1993.

The information on subcontracting agreements is drawn from a survey promoted by the Federal Planning Bureau on 3,000 companies established in Belgium.<sup>b</sup> Of the 466 companies that answered the survey, 35.6% subcontracted abroad while 31% carried out a transfer of activity towards the foreign countries. The survey also shows that type of activity and geographical proximity are the most important elements in the choice of subcontracting. Concerning the type of activity, subcontracting of high-tech and R&D activities is very limited (17% and 4%, respectively). Concerning geographical proximity, subcontracting with neighbouring countries represents 51% of the total, and the other EU and EFTA countries another 21%.

The survey demonstrates that although subcontracting is not always synonymous with relocation, a relation does exist. 59% of the companies, for which a product formerly produced in Belgium was replaced by import from abroad, have a subcontracting link with foreign countries. This can be interpreted as relocation in the form of subcontracting.

Finally, the information on collective lay-off of employees draws on another survey carried out by the Federal Planning Bureau with the three national trade unions. It targets Belgium during the period 1990-1995. Of 92,480 redundant workers, some 17,279 (18.6%) are directly due to relocation.

In summary, this study shows that some widespread fears related to relocation do not seem to be justified. In particular, the importance of relocation (the most dramatic ones) seems to be limited, and relocation is not the major reason for collective lay-off.

<sup>a</sup> See Van den Cruyce and Courcelle (1998); Bernard et al. (1998).

<sup>b</sup> These companies have more than 20 employees and 53% are multinationals. The period under observation is 1990-1996. The analysis of subcontracts through foreign trade data is rather complicated. Trade data capture only partially the relocation phenomenon. For instance, it is possible to measure vertical integration processes but not horizontal integration. Moreover, in the case of the small enterprises, the company that exports is often different from the one re-importing the semi-finished product.

Annex 3.1: The case of Belgian relocations (*continued*)

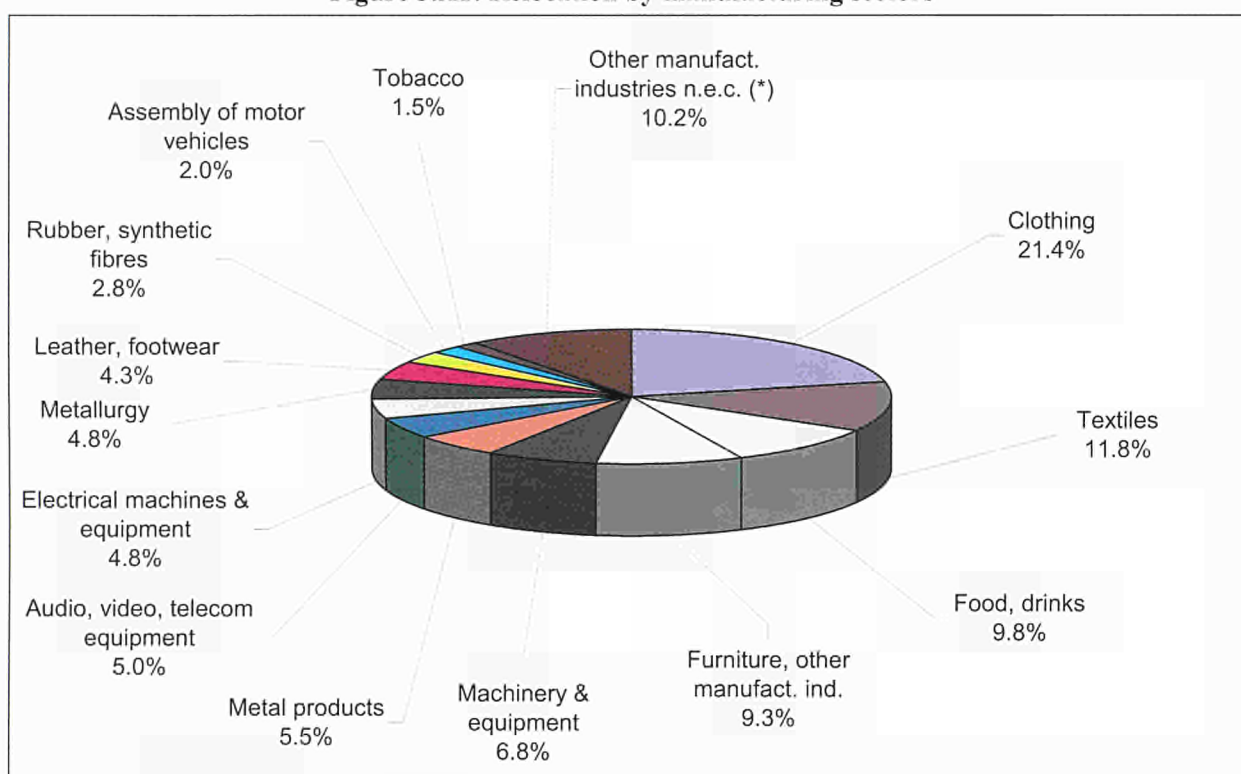
Table 3.A1: Foreign establishments by relocation category and activity branch

| Relocation category                 | Activity branch     |              |                     |              |                   |              |             |                    |              |
|-------------------------------------|---------------------|--------------|---------------------|--------------|-------------------|--------------|-------------|--------------------|--------------|
|                                     | Services            |              | Production          |              | Others            |              | Unknown     | Total              |              |
|                                     | Nr                  | %            | Nr                  | %            | Nr                | %            |             | Nr                 | %            |
| "Strict" relocation                 | 50                  | 1.6          | 434                 | 25.2         | 0                 | 0.0          | 14          | 498 <sup>(a)</sup> | 9.5          |
| FDI for expansion                   | 813                 | 26.6         | 1023                | 59.4         | 144               | 47.2         | 79          | 2059               | 39.1         |
| FDI for diversification             | 641                 | 21.0         | 41                  | 2.4          | 2                 | 0.7          | 2           | 686                | 13.0         |
| No relocation                       | 1549                | 50.8         | 225                 | 13.0         | 159               | 52.1         | 84          | 2017               | 38.3         |
| <b>Subtotal</b>                     | <b>3053</b>         | <b>100.0</b> | <b>1723</b>         | <b>100.0</b> | <b>305</b>        | <b>100.0</b> | <b>179</b>  | <b>5260</b>        | <b>100.0</b> |
| Relocation category not yet defined | 1375                |              | 254                 |              | 67                |              | 2248        | 3944               |              |
| <b>Total</b>                        | <b>4428 (65.3%)</b> |              | <b>1977 (29.2%)</b> |              | <b>372 (5.5%)</b> |              | <b>2427</b> | <b>9204</b>        |              |

<sup>a</sup> 256 out of 498 cases (51%) represent strict relocations within the EU.

Source: BELFOMI, Federal Planning Bureau.

Figure 3.A1: Relocation by manufacturing sectors



\* with an individual weight of < 1.5%

Source: Federal Planning Bureau

Table 3.A2: Foreign establishments by localisation and year of implementation

|              | Before 1993  | After 1993   | Year not known | Total        | %          |
|--------------|--------------|--------------|----------------|--------------|------------|
| Intra-EU     | 3,451        | 1,873        | 655            | 5,979        | 65.0       |
| Extra-EU     | 1,540        | 1,077        | 608            | 3,225        | 35.0       |
| <b>Total</b> | <b>4,991</b> | <b>2,950</b> | <b>1,263</b>   | <b>9,204</b> | <b>100</b> |

Source: Federal Planning Bureau.



### **Annex 3.2: Relocation in the “Made in Italy” sector**

A study on the Italian industrial districts<sup>a</sup> considers the relocations in the “Made in Italy” sector (mainly textile, leather and shoes).

Firms that have relocated abroad seem to have better employment performances compared to local industries with a low degree of relocation. A possible explanation is an improvement of competitiveness in international markets, witnessed by increases of exports three times greater.

The decrease in employment of low-skilled labour due to relocation has been counterbalanced by an increase in employment of high-skilled labour, a phenomenon that is not observed in areas characterised by low relocation. This happens although the wage differential between low- and high -skilled workers has increased much more where relocations happen more frequently.

All this might be interpreted as a redesign of the international division of labour, allowing the country which holds the control of final markets to use a more qualified labour force that is paid higher wages. This allows for the achievement, at least in the short run, of higher levels of productivity and competitive skills.

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<sup>a</sup> See Schiattarella. (1999).

### **Annex 3.3: Defining the concept of relocation**

There is no clear and unanimous definition of the concept of industrial “relocation”, either in economic literature or in papers of international organisations. Because of the variety of meanings, an extensive definition of relocation could create confusion rather than clarity. However, it is still necessary to distinguish relocation from other direct investment concepts. For this reason, a strict definition of the phenomenon is proposed here.<sup>a</sup>

Relocation in the strict sense involves the transfer from one place to another (the host country), either to a new site or to an existing site, of all or part of the manufacturing process with the closing-down or reduction of activity and/or employment in the country of origin. The existence of a link could be indicated by the fact that closure or reduction takes place at the same moment or a short time after the setting in operation of the new factory abroad. The most typical relocation involves re-importation of the product that had previously been produced on the spot.

Relocation can consist of simple displacement of production capacity from one site to another, but it involves usually modernisation, rationalisation or more complex restructuring (e.g. concentrating production within the same geographical location instead of in several different areas). A combination between these various forms is possible as well.



## The impact of the financial and economic crisis in Southeast Asia on European industries

### Part Three

## The sensitivity of European industry to external shocks

Prior to the financial and economic crisis that hit the region in 1997, Asia had been viewed as one of the most dynamic regions of the global economy and was expected to make a significant contribution to world growth going into the next century. The financial and economic crisis in Southeast Asia, which threatened to develop into a global crisis, has had major implications for the global economy and brought into question prior expectations regarding growth prospects for this and other emerging market regions.

This chapter seeks to assess some of the implications of the crisis. It examines the linkages between European industries and the crisis-hit region and how these linkages may take various forms. It is clear that one of the main avenues through which the crisis has affected the EU manufacturing sector has been via trade. Prior to the crisis, sustained growth in the Southeast Asia region had resulted in its increasing importance as a trade partner for the European Union. The crisis, however, changed the trade environment for European industries; the collapse in demand in Southeast Asia drastically reduced demand for many European exports and changes in relative exchange rates have boosted the price competitiveness of producers in the crisis-hit region.

The questions to which this chapter will try to provide some answers are as follows: Has the crisis in Asia had an influence on the competitive position of European industries vis-à-vis the crisis-hit region? And, if so, to what extent are European industries sensitive to this type of shock and which industries are more sensitive than others?

The analysis focuses on the impact of the crisis on bilateral (direct) trade between Europe and the Southeast Asia region. This choice has been made because the available trade data is for European exports and imports only and so trade between other regions cannot be analysed. Moreover, the analysis concentrates on trade patterns in value rather than

volume terms due to the lack of appropriate information to analyse EU trade volumes to individual countries and regions. Nonetheless an attempt is made to provide an indication of the magnitude of the effects of the crisis on trade volumes. Finally, the implications of the crisis on European manufacturing production are discussed but in-depth analysis is hampered by the lack of up to date manufacturing production data for European industries.

### 1. Background to the crisis in

Over the last decade a progressive liberalisation of capital markets in developing countries has had a strong impact on the movement of external financial resources to these countries leading to increasing inflows of billions of dollars of investment funds (Koo). In 1993, these inflows were ten times that of 1990 while in 1996 they were 15 times that of 1990.<sup>1</sup> These movements resulted in overvalued currencies, assets and equities, unbalanced asset structures and many poorly performing investments. The situation was made even worse in those Asian economies whose currencies were pegged to the dollar – the rise of the dollar after 1995 led to a worsening of competitiveness in these Southeast Asian countries and significant current account deficits. Lacking the complementary domestic institutions to deal with the consequences of freer capital movements, the crisis in Asian financial markets that first became visible in mid-1997 spread quickly to other sectors with devastating effects on the economies of the region.

The early reactions to the financial crisis were moderate capital withdrawals in Thailand, the Philippines, Malaysia and Indonesia and later in South Korea. This soon escalated into a financial panic exacerbated by the devaluation of local currencies, which spread across the countries of the region in mid-1997. The devaluation of Asian currencies started

<sup>1</sup> This chapter draws on Baker et al. (1999)

<sup>2</sup> See World Bank (1999)





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This chapter<sup>1</sup> seeks to assess some of the implications for European industries of the crisis in Southeast Asia through its impact on European trade. Although linkages between European industries and the affected region may take various forms, it is clear that one of the main avenues through which the crisis has affected the EU manufacturing sector has been via trade. Prior to the crisis, sustained growth in the Southeast Asia region had resulted in its increasing importance as a trade partner for the European Union. The crisis, however, changed the trade environment for European industries, the collapse in demand in Southeast Asia drastically reduced demand for many European exports and changes in relative exchange rates have boosted the price competitiveness of producers from the region.

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## 1. Background to the crisis in Emerging Markets

Over the last decade a progressive liberalisation of capital markets in developing countries has had a strong impact on the movement of external financial resources to these countries leading to increasing inflows of billions of dollars of short-term foreign loans. In 1993, these inflows were ten times that of 1990 while in 1996 they were 15 times that of 1990.<sup>2</sup> These movements resulted in overvalued currencies, assets and equities, unbalanced loan structures and many poorly performing investments. The situation was made even worse in those Asian economies whose currencies were pegged to the dollar — the rise of the dollar after 1995 led to a worsening of competitiveness in these Southeast Asian countries and significant current account deficits. Lacking the complementary domestic institutions to deal with the consequences of freer capital movements, the crisis in Asian financial markets that first became visible in mid-1997 spread quickly to other sectors with devastating effects for the economies of the region.

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<sup>1</sup> This chapter draws on Baker et al. (1999).

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<sup>2</sup> See World Bank (1997).



when short-term foreign debt significantly exceeded the official foreign exchange reserves, which have been drained by the combined effect of the loss of export competitiveness and the panic conversions of domestic assets into foreign exchange. The build-up of speculative pressure forced many currencies to abandon their close links to the US dollar and the volatility of these currencies, which had previously been almost non-existent, shot up dramatically.

The devaluation of currencies of emerging market countries (EMs) in the Southeast Asia region fed through to a wave of bankruptcies of domestic banks and firms and major shifts in capital flows. The outcome was a collapse in domestic demand and imports, high unemployment, stagflation and migration push. What made the Asian financial crisis particular was the speed and virulence with which it spread through the region and threatened to spread financial contagion to the global economic system through trade and financial linkages that had been strengthened by increased global economic interdependence. The apparent vulnerability of EMs in the Southeast Asia region also raised questions about the vulnerability of EMs in other regions. This led to exchange rate market pressure building-up elsewhere, notably in Latin America, Eastern Europe and Russia. In Russia, short-term foreign debt significantly exceeded the official foreign exchange reserves in mid-1998, resulting in balance of payments pressures and devaluation of the Russian rouble. Short-term debt was also above official foreign exchange reserves in Brazil by September 1998.

## 2. Impacts of the crisis on global trade and growth

The global effects of the Asian crisis have been felt through changes in demand. The EU and the USA have already seen significant falls in their exports to the Southeast Asian region. At the same time there has been a surge in imports of products originating not only from the Asian region but also from other regions that could not sell to Southeast Asian markets. The contraction of trade to the Southeast Asian region has already been translated into lower prices of traded goods and primary commodities in particular, excess global capacity, slower growth of global GDP and trade, and intensified competition.

World output and trade growth slowed in 1998, largely as a result of the contraction of activity in Asia (including Japan) and also in other developing regions and the transition economies (see Tables 1.1 and 1.2). World output growth decreased from 4% in 1997 to

2.5% in 1998 while the growth in world trade volumes decreased from around 10.5% in 1997 to 3.5% in 1998. The slowdown of output growth was less pronounced in developed countries than in the rest of the world.

**Table 1.1: Real GDP Growth, IMF projections (annual percentage change)**

|                                      | 1997 | 1998  | 1999 | 2000 |
|--------------------------------------|------|-------|------|------|
| World                                | 4.2  | 2.5   | 2.3  | 3.4  |
| Industrialised countries             | 3.0  | 2.5   | 2.0  | 2.2  |
| USA                                  | 3.9  | 3.9   | 3.3  | 2.2  |
| EU-11 (Euro area)                    | 2.5  | 2.9   | 2.0  | 2.9  |
| Newly industrialised Asian economies | 6.0  | -1.5  | 2.1  | 4.5  |
| Developing countries                 | 5.7  | 3.3   | 3.1  | 4.9  |
| Africa                               | 3.1  | 3.4   | 3.2  | 5.1  |
| Middle East and Europe               | 4.4  | 2.9   | 2.0  | 3.3  |
| Countries in transition              | 2.2  | -0.2  | -0.9 | 2.5  |
| CEECs <sup>a</sup>                   | 3.5  | 2.6   | 3.0  | 4.6  |
| Japan                                | 1.4  | -2.8  | -1.4 | 0.3  |
| China                                | 8.8  | 7.8   | 6.6  | 7.0  |
| Malaysia                             | 7.7  | -6.8  | 0.9  | 2.0  |
| Indonesia                            | 4.6  | -13.7 | -4.0 | 2.5  |
| Hong Kong                            | 5.3  | -5.1  | -1.3 | 3.1  |
| Philippines                          | 5.2  | -0.5  | 2.0  | 3.0  |
| Singapore                            | 8.0  | 1.5   | 0.5  | 4.2  |
| South Korea                          | 5.5  | -5.5  | 2.0  | 4.6  |
| Taiwan                               | 6.8  | 4.9   | 3.9  | 4.8  |
| Thailand                             | -0.4 | -8.0  | 1.0  | 3.0  |
| Argentina                            | 8.6  | 4.2   | -1.5 | 3.0  |
| Brazil                               | 3.2  | 0.2   | -3.8 | 3.7  |
| Chile                                | 7.1  | 3.3   | 2.0  | 4.6  |
| Mexico                               | 7.0  | 4.9   | 2.0  | 3.0  |
| Venezuela                            | 5.9  | -0.4  | -3.6 | 1.8  |
| Russia                               | 0.8  | -4.8  | -7.0 | -    |

<sup>a</sup> Excluding Belarus and Ukraine

Source: IMF (1999)

**Table 1.2: Growth in the volume of world merchandise trade by selected region, 1990-98 (annual percentage change)**

|                                     | Exports         |      |      |      | Imports         |      |      |      |
|-------------------------------------|-----------------|------|------|------|-----------------|------|------|------|
|                                     | Average 1990-95 | 1996 | 1997 | 1998 | Average 1990-95 | 1996 | 1997 | 1998 |
| World                               | 6.0             | 5.5  | 10.5 | 3.5  | 6.5             | 6.0  | 9.5  | 4.0  |
| North America <sup>a</sup>          | 7.0             | 6.0  | 11.0 | 3.0  | 7.0             | 5.5  | 13.0 | 10.5 |
| Latin America                       | 8.0             | 11.0 | 11.0 | 6.5  | 12.0            | 8.5  | 22.0 | 9.5  |
| Western Europe                      | 5.5             | 5.5  | 9.5  | 4.5  | 4.5             | 5.5  | 7.5  | 7.5  |
| EU                                  | 5.5             | 5.5  | 9.5  | 5.0  | 4.5             | 5.0  | 7.0  | 7.5  |
| Transition economies                | 5.0             | 6.5  | 12.5 | 10.0 | 2.5             | 16.0 | 17.0 | 10.0 |
| Asia                                | 7.5             | 5.0  | 13.0 | 1.0  | 10.5            | 6.0  | 6.0  | -8.5 |
| Japan                               | 1.5             | 1.0  | 12.0 | -1.5 | 6.5             | 5.5  | 1.5  | -5.5 |
| Six East Asian traders <sup>b</sup> | 11.5            | 7.5  | 11.5 | 2.0  | 12.0            | 4.5  | 6.5  | -    |
|                                     |                 |      |      |      |                 |      |      | 16.0 |

<sup>a</sup> Canada and the USA.

<sup>b</sup> Taiwan, Hong Kong, Malaysia, South Korea, Singapore and Thailand  
Source: WTO (1999)

The volume of world merchandise exports increased by only 3.5% in 1998 in comparison to impressive growth rate of 10.5% in 1997 and an average growth rate of 6% in the period 1990-95 (see Table 1.2). The volume of world merchandise imports increased by 4%

in comparison to 9.5% in 1997. Most regions, with the exception of the EU and Western Europe, recorded a slowdown in import growth in 1998. In North America, despite falling slightly in 1998, import growth remained above the average level for recent years. By contrast, Asian imports fell sharply by nearly 8.5%, Japanese imports fell by 5.5 per and imports by the six Asian traders by 16%. Stagnation or a decrease in import volumes is estimated for Africa and the Middle East.<sup>3</sup> In North America and Europe the initial worries stemming from the crisis in Southeast Asia were that the decrease in Asian demand and the increased competitiveness of Asian imports could lead to a substantial increase in the trade deficit of the USA and the EU with Southeast Asia. In turn it was feared that this could lead to slower economic growth. In the USA, the counter argument put forward by many economists was that US economy would be able to cushion itself against these negative external shocks. Moreover the crisis could have beneficial effects on the domestic economy. The arguments behind this reasoning were that the slowdown of US exports to Southeast Asian region and the pressure of cheap Asian imports would force domestic competitors to hold down their prices and, thus, produce a dampening effect on inflation. This dampening effect would remove the need to increase interest rates in order to slow down the US economic growth rate towards more sustainable levels. Economic growth in the USA over the last two years was above its estimated long-term trend, which resulted in the increasing pressure on labour markets.

Indeed, the developments in 1998 confirm the expectations of those economists who believed in the ability of the US economy to successfully deal with the external shock brought about by the crisis in Southeast Asia. The US economy experienced acceleration in private consumption and continued double-digit investment growth. GDP growth stayed unchanged at 4% in 1998. Weakening global demand together with excess supply of many goods has caused the decline of interest rates in the USA. In addition, other factors have worked in the direction of boosting the US economy. These include the diversion of foreign investments away from Asia to US government securities and expansion of two large industries, construction and motor vehicle industry. High consumer and investment spending and the low level of long-term interest rates stimulated capital spending and expanded productive capacity. The booming US economy stimulated intra-NAFTA trade, and exports and output growth of its main trading partners.

Similarly to the USA, Western Europe has experienced an expansion of consumption and increasing growth of output. In 1998, stronger demand growth helped to maintain imports, which for the first time in the latest years grew faster than exports (see Table 1.2). The acceleration of consumption in the USA has stimulated EU exports and this helped the share of Western Europe in world merchandise trade to recover to 44%, following a marked decrease between 1990 and 1997. The overall macroeconomic picture, as influenced by events in EMs, is that the spread of negative effects of the Asian crisis world-wide have been offset by the economic growth in the USA and the EU countries. The diversion of capital flows from EMs to the USA and the EU also contributed to low interest rates in the USA and EU. In addition, falling primary commodities' prices led to weaker import prices and real income gains for net importers of these products.

*Apparently the crisis had a limited impact on the overall macroeconomic situation of developed countries. However, this does not mean that it had no important consequences for individual industries or countries.*

### 3. The composition of EU trade with emerging markets

This section describes the overall composition of European trade to EM regions. Three specific emerging market regions<sup>4</sup> (Southeast Asia, Latin America and CEEC) and two additional individual countries (China and Russia) are analysed.

The purpose of the section is to identify the most important manufacturing sectors and industries<sup>5</sup> in terms of their shares of exports and imports to and from EMs. Moreover, the importance of EM regions within total imports and exports for individual sectors

<sup>4</sup> In this and subsequent sections the following definitions are used for EM regions: Southeast Asia – Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, Taiwan, Thailand; Latin America – Argentina, Brazil, Chile, Columbia, Ecuador, Mexico, Uruguay, Venezuela; CEEC – Albania, Belarus, Bosnia-Herzegovina, Bulgaria, Croatia, Czech Rep, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Poland, Romania, Slovak Rep., Slovenia, Ukraine, Yugoslavia. For convenience the term EMs is used to group these regions, even though in is more generally accepted to describe the CEEC countries and Russia as “transition economies”.

<sup>5</sup> Throughout the analysis the following convention is used: higher aggregated levels corresponding to NACE two digits will be referred to as “sectors”, while the term “industry” will be used for lower aggregations corresponding to NACE three digits.

<sup>3</sup> See World Trade Organisation (1999).

and industries will be examined. A more detailed analysis of trade with Southeast Asia will follow.

All together, the main EM regions accounted for over a third of both extra-EU exports and imports in 1998; for manufactured goods they accounted for 36% of EU exports and 40% of imports. The importance of individual regions in terms of the shares of exports and imports by industry is as follows:

- Southeast Asia accounted for 9% of total extra-EU exports and nearly 13% of total EU imports in 1998.<sup>6</sup> In terms of the region's share in total EU exports by individual manufacturing sectors, Southeast Asia is a particularly important destination for EU exports of: tobacco products, radio, television and communication equipment, electrical machinery, medical precision and optical instruments and leather and leather products. On the import side, Southeast Asia accounts for over two-fifths of EU imports of office machinery and computers and is an important supplier of radio, television and communication equipment; textiles; rubber and plastic products and furniture and other manufactured goods.
- The Latin American region accounted for 6% of total EU exports but only 2.3% of total EU imports of manufactured products in 1998. The region is an important destination for EU exports of machinery and equipment, motor vehicles, publishing and printing and electrical machinery. For each of these sectors, Latin America accounted for around 8% of total EU exports in 1998. With respect to the share of the region in total EU imports by sectors, nearly two-fifths of EU imports of food products and beverages and one-fifth of tobacco products come from this region.
- The CEECs accounted for over 14% of extra-EU exports and over 10% of EU imports in 1998. For most manufacturing sectors, the CEECs account for the highest share of total EU exports among the selected EM regions. For all but two sectors (other transport equipment and medical, precision and optical equipment) the region accounted for over 10% of extra-EU exports in 1998. Moreover, for around half of manufacturing sectors, the CEECs have the largest share in total EU imports originated from the EM regions.

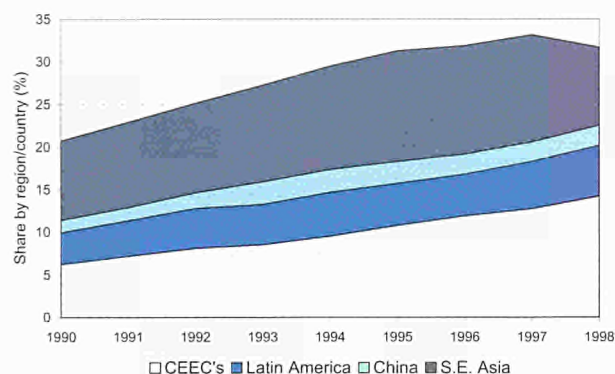
The main findings, with regard to European trade with EMs in general, are as follows:

- *Trade in manufactured goods dominates European trade with EMs.*
- *European exports to EMs are concentrated in a limited number of sectors but imports are more diversified. At an industry level, the concentration of exports to and imports from EMs is generally higher than for trade with the world as a whole.*
- *Industries that represent a high proportion of European exports to most EM regions are to be found in the sectors of chemicals, machinery and equipment, communication equipment and motor vehicles.*
- *Industries that represent a high proportion of European imports from the majority of EM regions identified are to be found in the sectors of chemicals, basic metals, wearing apparel, office machinery and computers, communication equipment.*

#### 4. The impact of the crisis on aggregate European trade

During the nineties, the share of the main emerging market regions (Southeast Asia, Latin America and CEEC) in total extra-EU trade increased steadily (Figure 1.1 and 1.2).

**Figure 1.1: Emerging market shares of total extra-EU exports: 1989 to 1998**



Source: COMEXT, NEI Calculations

By 1996, the share of extra-EU exports destined to the main EMs<sup>7</sup> had risen to 32% compared to 19% in 1989. For imports, the corresponding change was from 23 to 30%<sup>8</sup>.

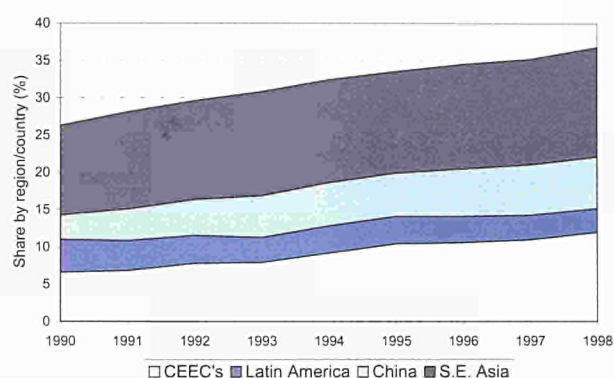
<sup>6</sup> The corresponding figures in 1996 were, exports 12.5% and imports 11.5%.

<sup>7</sup> Including China but excluding Russia for which trade data are not available for early years.

<sup>8</sup> The analysis of EU trade with the emerging markets and other selected countries has been based on extra-EU15 trade data.



**Figure 1.2: Emerging market shares of total extra-EU imports: 1989 to 1998**



Source: COMEXT, NEI Calculations

Prior to the crisis, the rapid growth in EU trade with the main emerging markets had resulted in growing EU trade surpluses with these regions (Table 1.3). The main exceptions have been China<sup>9</sup> and, to a lesser extent, Russia where the EU continued to show a trade deficit.

**Table 1.3: EU trade balance by region / country**

|                | Value ECU bn |       |       |       |       |
|----------------|--------------|-------|-------|-------|-------|
|                | 1989         | 1993  | 1996  | 1997  | 1998  |
| Southeast Asia | -7.4         | 0.1   | 11.9  | 10.2  | -24.7 |
| China          | -3.0         | -8.8  | -15.3 | -21.0 | -24.5 |
| Latin America  | -10.4        | 1.7   | 4.7   | 9.9   | 12.5  |
| CEEC           | -0.9         | 9.1   | 21.9  | 27.2  | 28.9  |
| Russia         | -2.0         | -4.1  | -3.8  | 2.6   | -2.0  |
| USA            | -6.7         | 0.6   | 1.7   | 3.5   | 8.7   |
| Japan          | -29.6        | -27.7 | -16.8 | -23.7 | -34.1 |
| Total          | -37.3        | 5.2   | 45.9  | 48.5  | 19.2  |

Source: COMEXT, NEI calculations

A similar picture emerges for trade in manufactured goods which dominates EU trade with EMs, especially as far as EU exports are concerned (Table 1.4).

Between 1996 and 1998, however, the EU trade surplus fell from ECU 46bn to ECU 19bn (Table 1.3). Over the same period, the trade balance for manufacturing fell from ECU 135bn to 105bn (Table 1.4).

**Table 1.4: Extra-EU manufacturing trade balance by region / country**

|                | Value ECU bn |       |       |       |       |
|----------------|--------------|-------|-------|-------|-------|
|                | 1989         | 1993  | 1996  | 1997  | 1998  |
| Southeast Asia | -7.3         | -0.1  | 11.3  | 10.3  | -22.8 |
| China          | -2.8         | -8.5  | -15.1 | -20.7 | -24.0 |
| Latin America  | -1.9         | 8.9   | 12.8  | 20.3  | 22.3  |
| CEEC           | 0.0          | 9.2   | 21.9  | 28.0  | 27.8  |
| Russia         | 4.9          | 4.3   | 7.1   | 11.5  | 8.7   |
| USA            | -0.2         | 4.9   | 7.6   | 8.6   | 14.6  |
| Japan          | -30.6        | -28.7 | -17.9 | -24.9 | -34.3 |
| Total          | 35.9         | 82.3  | 135.0 | 147.3 | 105.2 |

Source: COMEXT, NEI calculations

Underpinning this decrease was a fall in the manufacturing trade balance between the EU and Southeast Asia from a surplus ECU 11bn to a deficit of ECU 23bn (see Table 1.4). At the same time, the EU trade deficit with Japan increased from ECU 18bn to ECU 34bn and with China from ECU 15bn to ECU 24bn. These negative movements were only partially offset by increases in the EU trade surplus with Latin America, CEEC and the USA (see Table 1.3).

## 5. The impact of the crisis by manufacturing industry

Trade patterns prior to the crisis can provide an indication of the potential exposure of European industry to direct trade effects resulting from economic crisis in Southeast Asia. Industries for which the Southeast Asia region represented an important destination for production (high export ratio) may, a priori, be thought to be particularly sensitive to a collapse in demand in the region. Similarly, industries that are already exposed to a high degree of competition from Southeast Asia within European markets (high import penetration) may also be expected to be more sensitive to the crisis.

At an aggregate level, growth in the economies of Southeast Asia has resulted in an increase in their importance as a trade partner for Europe. Between 1989 and 1996 the share of exports to Southeast Asia in total manufactured goods increased from 9 to 13% and the equivalent share for imports increased from 12 to 14%.

<sup>9</sup> Specific trade patterns apply for China due to the fact that goods destined for and coming from the country pass via third countries (Hong Kong, Singapore etc.), which tends to overstate the EU trade deficit.

**Table 1.5: EU manufacturing trade with Southeast Asia,  
high export coverage and import penetration industries (1996)**

|  |  | Production<br>(ECU bn) | Export<br>Ratio<br>(%) | Export<br>Specialisation | Import<br>Penetration<br>(%) | Import<br>Specialisation | Net Trade<br>Ratio<br>(%) |
|--|--|------------------------|------------------------|--------------------------|------------------------------|--------------------------|---------------------------|
| <b>High export – high import, exports &gt; imports</b> |  |                        |                        |                          |                              |                          |                           |
| 322  | TV, and radio transmitters, apparatus for line telephony | 49.7                   | 5.7                    | 1.7                      | 3.0                          | 1.3                      | 3.1                       |
| 294  | Machine-tools  | 27.7                   | 6.2                    | 1.3                      | 2.0                          | 0.5                      | 4.6                       |
| 311  | Electric motors, generators and transformers             | 22.2                   | 7.0                    | 1.6                      | 5.0                          | 1.4                      | 2.6                       |
| 315  | Lighting equipment and electric lamps                    | 10.7                   | 2.7                    | 1.0                      | 2.4                          | 1.0                      | 0.4                       |
| 262  | Ceramic goods  | 10.4                   | 3.8                    | 1.1                      | 2.4                          | 1.2                      | 1.7                       |
| 362  | Jewellery and related articles                           | 7.6                    | 19.7                   | 1.4                      | 22.1                         | 1.4                      | 5.0                       |
| 192  | Luggage, handbags, saddlery and harness                  | 5.1                    | 10.6                   | 1.8                      | 7.8                          | 1.1                      | 2.2                       |
| 183  | Dressing and dyeing of fur; articles of fur              | 0.8                    | 32.1                   | 2.9                      | 7.8                          | 0.7                      | 27.9                      |
| <b>High export – high import, imports &gt; exports</b> |  |                        |                        |                          |                              |                          |                           |
| 300  | Office machinery and computers                           | 56.9                   | 2.9                    | 0.8                      | 18.5                         | 2.8                      | -22.4                     |
| 182  | Other wearing apparel and accessories                    | 50.2                   | 2.6                    | 0.9                      | 6.4                          | 1.1                      | -5.9                      |
| 323  | TV, radio and recording apparatus                        | 27.3                   | 3.7                    | 1.2                      | 13.1                         | 2.5                      | -11.9                     |
| 316  | Electrical equipment n. e. c.                            | 27.1                   | 2.7                    | 1.1                      | 5.6                          | 1.7                      | -3.3                      |
| 321  | Electronic valves and tubes, electronic comp.            | 23.5                   | 20.6                   | 3.2                      | 21.7                         | 2.5                      | -7.9                      |
| 351  | Ships and boats  | 20.2                   | 2.5                    | 0.6                      | 3.5                          | 1.3                      | -0.2                      |
| 172  | Textile weaving  | 19.5                   | 4.6                    | 0.8                      | 6.5                          | 1.6                      | -0.4                      |
| 366  | Miscellaneous manufacturing n. e. c.                     | 9.1                    | 3.6                    | 0.9                      | 7.0                          | 1.5                      | -3.6                      |
| 334  | Optical instruments and photographic equipment           | 8.5                    | 8.0                    | 1.3                      | 8.4                          | 1.3                      | -0.5                      |
| 314  | Accumulators, primary cells and batteries                | 5.1                    | 3.1                    | 1.2                      | 4.3                          | 1.1                      | -1.6                      |
| 176  | Knitted and crocheted fabrics                            | 3.6                    | 3.3                    | 0.8                      | 4.3                          | 2.0                      | -0.2                      |
| 335  | Watches and clocks                                       | 1.4                    | 18.7                   | 1.6                      | 21.6                         | 1.6                      | -33.0                     |
| 363  | Musical instruments                                      | 0.9                    | 4.8                    | 0.9                      | 13.9                         | 1.8                      | -14.0                     |
| 181  | Leather clothes  | 0.6                    | 4.6                    | 1.1                      | 5.0                          | 0.5                      | -9.2                      |
| <b>Export dominant industries</b>                      |  |                        |                        |                          |                              |                          |                           |
| 241  | Basic chemicals  | 153.2                  | 2.6                    | 1.0                      | 0.9                          | 0.4                      | 1.7                       |
| 295  | Other special purpose machinery                          | 90.6                   | 7.4                    | 1.4                      | 0.7                          | 0.3                      | 7.0                       |
| 292  | Other general purpose machinery                          | 83.0                   | 4.9                    | 1.4                      | 1.1                          | 0.7                      | 4.1                       |
| 271  | Basic iron and steel, ferro-alloys (ECSC)                | 74.0                   | 2.4                    | 1.2                      | 0.2                          | 0.2                      | 2.2                       |
| 291  | Machinery for production, use of mech. power             | 67.1                   | 4.6                    | 1.2                      | 0.9                          | 0.4                      | 3.9                       |
| 312  | Electricity distribution and control apparatus           | 65.1                   | 2.5                    | 1.4                      | 0.8                          | 0.7                      | 1.7                       |
| 211  | Pulp, paper and paperboard                               | 52.8                   | 2.3                    | 1.1                      | 0.2                          | 0.1                      | 2.1                       |
| 274  | Basic precious and non-ferrous metals                    | 44.9                   | 3.0                    | 1.0                      | 0.9                          | 0.2                      | 1.8                       |
| 353  | Aircraft and spacecraft                                  | 43.1                   | 6.4                    | 0.8                      | 1.3                          | 0.2                      | 5.4                       |
| 246  | Other chemical products                                  | 32.7                   | 5.8                    | 1.1                      | 1.7                          | 0.4                      | 4.4                       |
| 332  | Instruments for measuring, checking, etc.                | 32.6                   | 5.2                    | 1.2                      | 1.9                          | 0.5                      | 3.4                       |
| 175  | Other textiles   | 19.3                   | 2.3                    | 0.8                      | 0.9                          | 0.4                      | 1.5                       |
| 331  | Medical equipment  | 17.8                   | 3.2                    | 0.6                      | 1.3                          | 0.3                      | 2.0                       |
| 313  | Isolated wire and cable                                  | 17.6                   | 3.7                    | 1.8                      | 1.3                          | 0.8                      | 2.5                       |
| 272  | Tubes  | 17.6                   | 2.7                    | 0.9                      | 0.4                          | 0.3                      | 2.4                       |
| 283  | Steam generators   | 13.3                   | 4.3                    | 1.9                      | 0.0                          | 0.1                      | 4.3                       |
| 352  | Railway locomotives and rolling stock                    | 9.7                    | 3.0                    | 1.5                      | 0.0                          | 0.1                      | 3.0                       |
| 263  | Ceramic tiles and flags                                  | 8.0                    | 3.4                    | 1.1                      | 0.1                          | 0.2                      | 3.4                       |
| 191  | Tanning and dressing of leather                          | 6.9                    | 14.1                   | 2.8                      | 1.4                          | 0.3                      | 12.8                      |
| 267  | Cutting, shaping, finishing of stone                     | 6.1                    | 5.7                    | 2.0                      | 0.1                          | 0.2                      | 5.6                       |
| <b>Import dominant industries</b>                      |  |                        |                        |                          |                              |                          |                           |
| 251  | Rubber products  | 32.3                   | 1.1                    | 0.7                      | 3.5                          | 2.0                      | -2.5                      |
| 286  | Cutlery, tools and general hardware                      | 25.4                   | 2.0                    | 0.8                      | 2.6                          | 1.3                      | -0.5                      |
| 154  | Vegetable and animal oils and fats                       | 22.7                   | 0.2                    | 0.2                      | 5.4                          | 1.9                      | -5.9                      |
| 193  | Footwear   | 21.1                   | 2.0                    | 0.6                      | 6.6                          | 1.7                      | -4.7                      |
| 171  | Textile fibres   | 15.4                   | 1.7                    | 1.1                      | 2.1                          | 0.9                      | -0.4                      |
| 201  | Sawmilling, planing and impregnation of wood             | 12.7                   | 0.3                    | 0.2                      | 3.1                          | 0.9                      | -3.3                      |
| 202  | Panels and boards of wood                                | 12.3                   | 0.8                    | 0.8                      | 2.7                          | 1.4                      | -2.1                      |
| 177  | Knitted and crocheted articles                           | 11.2                   | 1.6                    | 0.8                      | 9.0                          | 2.1                      | -9.4                      |
| 152  | Fish and fish products                                   | 11.0                   | 1.1                    | 0.6                      | 4.3                          | 0.7                      | -5.3                      |
| 354  | Motorcycles and bicycles                                 | 6.7                    | 0.7                    | 0.5                      | 8.2                          | 1.6                      | -10.4                     |
| 365  | Games and toys   | 6.2                    | 1.0                    | 0.5                      | 6.9                          | 1.1                      | -9.4                      |
| 205  | Other products of wood                                   | 5.4                    | 0.6                    | 0.4                      | 3.7                          | 1.3                      | -3.5                      |
| 364  | Sports goods   | 2.9                    | 1.8                    | 0.4                      | 13.4                         | 1.9                      | -14.7                     |
| <b>Other industries</b>                                |  |                        |                        |                          |                              |                          |                           |
| 341  | Motor vehicles   | 255.5                  | 1.2                    | 0.6                      | 0.7                          | 0.7                      | 0.6                       |
| 159  | Beverages  | 80.3                   | 1.6                    | 1.1                      | 0.0                          | 0.1                      | 1.6                       |
| 343  | Parts and accessories for motor vehicles                 | 75.7                   | 1.7                    | 0.7                      | 0.3                          | 0.2                      | 1.4                       |
| 361  | Furniture  | 61.4                   | 0.8                    | 0.6                      | 1.3                          | 1.1                      | -0.4                      |

Source: COMEXT, NEI calculations and estimates.



These increases have been reflected in higher export and import penetration ratios for EU trade with the region. Between 1989 and 1996, the level of EU manufactured goods exports to the region as a share of production doubled from 1.1% to 2.2%. The penetration of imports from the region in EU consumption of manufactured goods also increased, albeit less rapidly, from 1.4% in 1989 to 1.9% in 1996.

Table 1.5 reports EU export and import penetration ratios in Southeast Asia (for 1996).<sup>10</sup> The industries reported are those with at least one of such ratios above the overall manufacturing average<sup>11</sup>. Four additional industries (categorised as “other”) are also included, because the subsequent analysis reveals that they experienced large absolute deterioration in their trade balances with Southeast Asia since 1996. Industries have been categorised according to whether both indicators are above average (high export, high import), have only an above average export ratio (export dominant) or have only an above average import penetration ratio (import dominant). The first category has been subdivided depending on whether the net trade balance is positive (exports > imports) or negative (imports < exports). Within each category, industries have been ranked according to their value of production in 1996 (first column of data).

Two distinct groups make up the majority of industries for which both indicators are greater than average. First are relatively sophisticated research-intensive industries (e.g. office machinery, electronics and electronic components, optical instruments) and which are typically R&D intensive. The second group consists of labour intensive industries (e.g. clothing, textile weaving, leather and ceramic goods).

<sup>10</sup> The export ratio measures exports as a share of production, while the import penetration ratio measures imports as a share of apparent consumption. In addition, Table 1.5 provides indicators of the regional specialisation of export and imports to Southeast Asia. These indicators are defined as the share of each industry's exports (imports) to the Southeast Asia region in total extra-EU exports (imports) of the industry normalised by dividing the equivalent share for total manufacturing trade. Values of these indicators that are greater than one indicate that the industry is relatively specialised in trade with the region in the sense that the share of exports (imports) with the region for the industry is greater than the weight of the region in total manufactured goods exports (imports). Finally, an indication of the overall trade situation of industries is provided by the net trade ratio that measures the net trade balance (exports less imports) with Southeast Asia as a share of European production. The net trade ratio may also be used as a measure of the revealed comparative advantage of industries.

<sup>11</sup> The export ratio for manufacturing as a whole is 2.2% and the import penetration ratio is 1.9%.

The category of industries for which European exports dominate also includes a relatively high number of research intensive industries such as aircraft and spacecraft, measuring instruments, medical equipment and other chemicals. By contrast, the category of industries for which imports from Southeast Asia dominate over European exports includes a high proportion of final consumption goods such as footwear, motorcycles, games and toys and sports goods. Final consumption goods industries are almost entirely absent among those sectors for which European exports dominate over imports<sup>12</sup>.

*Taken together, the changes for these industries amount to 91% of the total fall in exports and 95% of both the increase in imports and the change in the aggregate trade balance for manufacturing.*

In absolute terms the greatest falls in trade balances are mainly to be observed in the following broadly defined sectors:

- mechanical engineering (special purpose machinery, general purpose machinery, machine tools, machinery for the production and use of mechanical power);
- motor vehicles (motor vehicles, parts and accessories, motorcycles);
- electrical engineering and electronics (television and radio transmitters, electric motors and generators, electronic components, computers);
- chemicals (basic chemicals);
- basic metals (basic iron and steel, basic precious metals);
- clothing (other wearing apparel).

The changes in trade balances with respect to Southeast Asia may be compared with those for extra-EU trade as a whole. Despite the slowdown in export growth in 1998, many EU industries showed an improvement in their overall trade balance between 1996 and 1998 (Table 1.6).

Of the 20 EU industries showing the greatest increase in their trade balance between 1996 and 1998 only 2 industries, namely refined petroleum products and vegetable and mineral oils and fats, had a trade deficit in 1998. Of those industries that saw the greatest deterioration in their trade balance, most were industries with an existing trade deficit in 1996.

Analysis across all 95 (NACE three-digit) industries confirms the general pattern shown in Table 1.6. On the one hand, industries with pre-existing trade

<sup>12</sup> Both tobacco and beverages have export specialisation ratios for Southeast Asia that are above one but both have export ratios well below the average for total manufacturing.

**Table 1.6: Total extra-EU trade, manufacturing industries with greatest change in trade balance between 1996 and 1998**

| 20 industries with largest improvement             | Trade Balance (ECU bn) |       |        | 20 industries with largest deterioration      | Trade Balance (ECU bn) |       |        |
|--|------------------------|-------|--------|---|------------------------|-------|--------|
|  | 1996                   | 1998  | Change |   | 1996                   | 1998  | Change |
| 244 Pharmaceuticals                                | 8.9                    | 14.6  | 5.7    | 201 Sawmilling, planing of wood, etc.         | -2.1                   | -2.7  | -0.6   |
| 322 TV and radio transmitters, line telephony      | 5.8                    | 8.0   | 2.2    | 316 Electrical equipment n.e.c.               | -1.7                   | -2.3  | -0.6   |
| 232 Refined petroleum products                     | -0.5                   | 1.6   | 2.1    | 335 Watches and clocks                        | -1.9                   | -2.6  | -0.7   |
| 343 Parts, accessories for motor vehicles          | 6.5                    | 8.1   | 1.6    | 247 Man-made fibres                           | -0.5                   | -1.3  | -0.8   |
| 252 Plastic products                               | 3.4                    | 4.5   | 1.1    | 192 Luggage, handbags, saddlery etc.          | -0.4                   | -1.2  | -0.9   |
| 246 Other chemical products                        | 5.8                    | 6.7   | 0.9    | 354 Motorcycles and bicycles                  | -2.4                   | -3.4  | -0.9   |
| 154 Vegetable and animal oils and fats             | -2.9                   | -2.1  | 0.8    | 193 Footwear                                  | -0.3                   | -1.2  | -1.0   |
| 272 Tubes  | 3.0                    | 3.8   | 0.8    | 361 Furniture                                 | 2.0                    | 1.0   | -1.0   |
| 160 Tobacco products                               | 0.9                    | 1.7   | 0.8    | 177 Knitted and crocheted articles            | -2.5                   | -3.5  | -1.1   |
| 292 Other general purpose machinery                | 15.4                   | 16.1  | 0.7    | 365 Games and toys                            | -3.1                   | -4.3  | -1.3   |
| 158 Other food products                            | 6.2                    | 6.9   | 0.7    | 323 TV, radio and recording apparatus         | -5.4                   | -6.9  | -1.5   |
| 351 Building and repairing of ships and boats      | 4.1                    | 4.7   | 0.6    | 294 Manufacture of machine-tools              | 4.6                    | 2.9   | -1.7   |
| 332 Instruments for measuring, checking, etc.      | 1.8                    | 2.4   | 0.6    | 152 Fish and fish products                    | -5.6                   | -7.8  | -2.2   |
| 312 Electricity distribution and control apparatus | 4.3                    | 4.7   | 0.5    | 353 Aircraft and spacecraft                   | 6.9                    | 3.8   | -3.0   |
| 172 Textile weaving                                | 4.6                    | 5.0   | 0.5    | 241 Basic chemicals                           | 7.4                    | 4.1   | -3.3   |
| 342 Bodies (coachwork) for motor vehicles          | 0.8                    | 1.2   | 0.5    | 341 Motor vehicles                            | 26.8                   | 22.6  | -4.3   |
| 243 Paints, varnishes etc.                         | 2.5                    | 2.9   | 0.4    | 182 Other wearing apparel and accessories     | -16.4                  | -21.2 | -4.9   |
| 245 Soap, detergents, etc.                         | 5.4                    | 5.8   | 0.4    | 271 Basic iron and steel, ferro-alloys (ECSC) | 6.3                    | 1.0   | -5.3   |
| 281 Structural metal products                      | 1.8                    | 2.2   | 0.4    | 274 Basic precious and non-ferrous metals     | -13.7                  | -20.0 | -6.3   |
| 263 Ceramic tiles and flags                        | 1.8                    | 2.1   | 0.4    | 300 Office machinery and computers            | -20.8                  | -31.2 | -10.4  |
| Total of above                                     | 79.4                   | 101.0 | 21.6   | Total of above                                | -22.9                  | -74.4 | -51.5  |

Source: COMEXT; NEI calculations.

surpluses generally show positive changes in their extra-EU trade balances. On the other hand, those industries for which the EU is a net importer further increased their trade deficits.

There are however some important exceptions to the above finding. In particular, among the industries showing a large absolute deterioration in their trade balances are several for which the EU was a large net exporter in 1996, such as motor vehicles, basic chemicals, aircraft and spacecraft, basic iron and steel, and machine tools.

For many of the industries recording the largest absolute deterioration in overall extra-EU trade balances, the deterioration of trade with Southeast Asia was a contributing factor. Of the ten industries with the largest decrease in total extra-EU trade balances, seven fall into the same category with respect to trade with Southeast Asia. At the same time, and in contrast to the general picture, the group of ten industries with the largest falls in total extra-EU trade balances also includes the two industries with the largest increase in the absolute level of trade balances with Southeast Asia, namely aircraft and spacecraft and television and radio receivers.

*Overall, although the contraction of export markets in Southeast Asia did contribute to a deterioration in the overall trade balance of some industries, it did not prevent many leading EU export industries from improving their overall extra-EU trade surpluses.*

The analysis in this section considers changes in the value of trade between the EU and Southeast Asia. If, as may be expected, the crisis led to changes in the price of traded goods, the observed changes in trade values may understate the impact of the crisis on the

volume of trade. Unfortunately, information on trade volumes and price changes (unit value estimates) is not available at an industry level for EU trade with Southeast Asia, but is available for total extra-EU trade. Volume estimates for industry level trade with Southeast Asia are therefore obtained by using as a proxy for the (unavailable) price deflators of Southeast Asia, the implicit industry level price deflators for total extra-EU trade.<sup>13</sup>

*This broad analysis of price and volume effects suggests that falls in the volume of exports were greater than indicated by changes in export values. Moreover, there appears to be a negative relationship between price and volume changes for exports, implying that EU industries that were best able to hold down their prices suffered less in terms of loss of export volumes. A relationship between price and volume changes is less evident for EU imports, although imports for some products do appear to be highly price elastic.*

The preceding analysis looked at industries with the largest absolute changes in their trade balances. Focusing on absolute changes naturally tends to draw attention to the largest trading industries and away from smaller industries for which changes to their trade balances may be no less important in relation to the size of their total trade (exports plus imports). It is therefore worthwhile taking a further look at changes in trade balances by using an indicator of revealed comparative advantage (RCA). This indicator takes into account the level of total trade as well as the overall trade position for manufacturing as a whole. This latter characteristic allows ranking industries

<sup>13</sup> See Baker et al. (1999).

according to their trade performance.<sup>14</sup> In the current context, an industry may be observed to suffer a large absolute deterioration in its trade balance but if, for example, this has only compounded an existing weak position then it need not imply a major change in its RCA ranking. On the contrary, significant changes in the RCA ranking of a particular industry may signal that the direct trade impacts of the crisis had an influence on its overall trade performance, although this does not provide conclusive proof.

Ninety-five three-digit NACE industries were analysed (for each year between 1989 and 1998) for both total extra-EU trade and trade with Southeast Asia. They were then classified according to whether their RCA ranking remained stable or was unstable during the period prior to the crisis (i.e. from 1989 to 1996),<sup>15</sup> as well as according to a typology based on factor input intensities.<sup>16</sup>

The general picture that emerges is that those industries that saw an improvement in their trade position vis-à-vis Southeast Asia fall into two groups:

- technically sophisticated, research intensive industries (e.g. pharmaceuticals, medical and surgical equipment, measuring instruments, television and radio receivers, television and radio transmitters); and
- industries closely related to traded commodities (e.g. animal and vegetable oils and fats, animal feeds, other foods, wood, wood containers), for which the EU is a net importer and for which the improvement in the RCA ranking appears to have been driven by falls in world commodity prices.

Industries for which their RCA position vis-à-vis Southeast Asia deteriorated are the following:

- capital intensive industries: pulp and paper, cement, lime and plaster, basic iron and steel
- labour intensive industries: bodies for motor vehicles;
- advertising intensive: beverages, fish products and meat products;
- mainstream: paper articles.

The most significant category is capital intensive industries. Products from these industries are typically

relatively homogeneous and markets resemble those for traded commodities and hence prices are particularly sensitive to changes in aggregate demand. Moreover, given the capital intensive nature of production and important economies of scale, short-term adjustments to capacity are difficult to undertake, thus there is an incentive in the short run to allow prices adjustments rather than changes in output levels to clear markets.

*This finding would suggest that despite the overall negative impact of the crisis on European trade with Southeast Asia, the general pattern of comparative advantage has so far been maintained. Most of the observed movement in the RCA ranking is found to be among middle ranked industries and those for which the historical pattern indicates a volatile or cyclical pattern. Thus, most industries with either a (stable) strong revealed comparative advantage or disadvantage did not significantly change their RCA ranking.*

In order to estimate the direct trade implications of the crisis on European production three methodologies are used.

- Methodology 1 is based on changes in the observed *values* of exports and imports.
- Methodology 2 uses implicit price deflators for total extra-EU trade to estimate changes in *volumes*, as previously discussed.
- Methodology 3 uses estimates of the expected value of exports and imports had the crisis in Southeast Asia not occurred.

The calculated changes using each methodology have then been compared to production levels prior to the crisis in order to estimate the impact on European production.<sup>17</sup>

With regard to the third methodology, it has been chosen because estimates of the impact of the crisis based on observed trade changes do not take into account the fact that EU trade with the Southeast Asia region had been growing strongly prior to the crisis<sup>18</sup>. It can be argued that an assessment of the full impact of the crisis should take into account not only the actual change in exports and imports but also the difference between 1996 values and those that would have been expected in 1998 had the crisis not occurred. To estimate the expected values of exports and imports we use the simplifying assumption that

<sup>14</sup> Although RCA measures do not provide an indicator of overall competitiveness, for which many factors should be taken into account, they do provide an indication of the relative trade performance of industries.

<sup>15</sup> See Baker et al. (1999). The basic rule observed is that industries showing an upward movement in five or more years were classified as improving and those showing a downward movement in five or more years as deteriorating.

<sup>16</sup> See Peneder (1995, 1998) and European Commission (1998).

<sup>17</sup> It is not possible to make use of production data for 1998 as these are not available on a basis consistent with the trade data used. Accordingly data for 1996 (i.e. the last full year before the crisis) are used throughout.

<sup>18</sup> The average annual growth rate of exports, in value, between 1991 and 1996 was 16% and for imports 7%.

exports and imports would have continued to grow in 1997 and 1998 at the same average rate as observed in the five years prior to the crisis. This permits the calculation of “expected” values of exports and imports for 1998. The differences between the expected and observed outcomes provide an additional measure of the direct trade impact of the crisis.

Details of the estimated impact for individual industries using the first two methodologies are shown in Table 1.7. The changes to exports and imports and the trade balance are expressed as a percentage of 1996 production levels. Results for the third methodology (“expected values”), are shown in Table 1.8. Each table shows both the difference between the expected and recorded values for 1998 and these differences as a share of 1996 production levels.

As far as the relationship between changes in trade and changes to production are concerned, on the one hand, it seems reasonable to assume that falls in exports from the EU to Southeast Asia represent a direct loss in European production. On the other hand, the link between imports and European production is more tenuous.

For individual products (or industries), the impact of increased imports on European production will depend upon the extent that these imported products are in competition with European production. It may be that increased imports from Southeast Asia, rather than displacing European production, displace imports that would otherwise have come from elsewhere. Alternatively, increases in cheaper imported inputs into European production may serve to boost rather than diminish production.

Moreover, globalisation of production implies increases in linkages within the production chain among firms and production facilities from different geographical locations. Particularly for research and capital intensive industries, but also for other labour intensive industries such as clothing, imported products may in fact contain a significant amount of domestic (European) content<sup>19</sup>.

As a final point, increased imports from Southeast Asia may result from increased demand in Europe that domestic production is unable to meet and, hence, do not represent a loss of potential market for European producers, at least in the short run.<sup>20</sup>

Comparing across the different estimates of the impact of the crisis on production for individual industries there is little difference across the calculations based on actual values and estimated volumes (methodologies 1 and 2). For the third methodology, based on expected trade values for 1998, the estimated negative impacts of falls in exports are greater than for the other methodologies. For imports, however, the effects tend to be similar to or smaller than those found using the other methodologies. Thus, the minimum (export effect) and upper bounds (exports and imports) for individual industries are generally higher for methodology 3 but differences between the two are similar to or smaller than those found using the other methodologies.

Considering the impact on individual industries, measured as a proportion of production, many of the greatest losses from reduced exports are to be found in luxury goods industries:

- specialised clothing sectors (furs, leather clothes);
- leather goods (luggage and handbags, tanning and dressing of leather);
- miscellaneous manufacturing (jewellery, watches and clocks, beverages).

<sup>19</sup> See OECD (1996).

<sup>20</sup> If all of the change in exports but only part of the increase in imports represents a loss of European production, then combining the two figures may overstate the impact of trade changes on European production. Thus, for each methodology described above, the export effect can be considered as a minimum estimate of the direct trade impact

of the crisis and the trade balance (exports less imports) should be viewed as an indicator of the upper bound for the estimated direct trade impact of the crisis.

**Table 1.7: EU manufacturing trade with Southeast Asia (methodologies 1 and 2)  
Estimated impact of the crisis on European production by industry, 1996-1998**

|  | Change in value                  |         |               | Change in volume                |         |               |
|--|----------------------------------|---------|---------------|---------------------------------|---------|---------------|
|  | (share of production in 1996, %) |         |               | (share of production in 1996 %) |         |               |
|  | Exports                          | Imports | Trade balance | Exports                         | Imports | Trade balance |
| <b>High export – high import, exports &gt; imports</b> |                                  |         |               |                                 |         |               |
| 322 TV, and radio transmitters, line telephony         | 0,3                              | 0,9     | -0,7          | -0,2                            | 0,3     | -0,5          |
| 294 Machine-tools                                      | -3,4                             | 0,7     | -4,2          | -3,9                            | 0,6     | -4,4          |
| 311 Electric motors, generators and transformers       | -0,7                             | 1,2     | -1,9          | -0,6                            | 0,9     | -1,5          |
| 315 Lighting equipment and electric lamps              | -0,4                             | 0,2     | -0,6          | -0,5                            | 0,1     | -0,6          |
| 262 Ceramic goods                                      | -1,7                             | 0,3     | -2,0          | -1,9                            | 0,1     | -2,0          |
| 362 Jewellery and related articles                     | -5,7                             | 0,3     | -6,0          | :                               | :       | :             |
| 192 Luggage, handbags, saddlery and harness            | -3,7                             | 0,3     | -4,0          | -3,8                            | 0,0     | -3,8          |
| 183 Dressing and dyeing of fur; articles of fur        | -24,2                            | 0,4     | -24,6         | -25,3                           | 0,3     | -25,6         |
| <b>High export – high import, imports &gt; exports</b> |                                  |         |               |                                 |         |               |
| 300 Office machinery and computers                     | 0,2                              | 14,7    | -14,5         | -0,2                            | 13,8    | -14,0         |
| 182 Other wearing apparel and accessories              | -0,9                             | 1,2     | -2,1          | -0,9                            | 0,4     | -1,3          |
| 323 TV, radio and recording apparatus                  | -0,1                             | -1,4    | 1,3           | -0,3                            | -1,6    | 1,3           |
| 316 Electrical equipment n. e. c.                      | -0,2                             | -0,3    | 0,1           | -0,3                            | 0,1     | -0,4          |
| 321 Electronic valves and tubes, electronic comp.      | 5,4                              | 6,8     | -1,4          | 6,3                             | 9,4     | -3,1          |
| 351 Ships and boats                                    | -0,1                             | 0,3     | -0,4          | :                               | :       | :             |
| 172 Textile weaving                                    | -1,6                             | 0,6     | -2,1          | -1,7                            | 0,4     | -2,1          |
| 366 Miscellaneous manufacturing n. e. c.               | -1,2                             | 0,9     | -2,0          | -1,2                            | 0,6     | -1,8          |
| 334 Optical instruments and photographic equipment     | 0,9                              | 1,7     | -0,8          | 2,0                             | 0,9     | 1,1           |
| 314 Accumulators, primary cells and batteries          | -0,2                             | 0,7     | -0,9          | 0,0                             | 1,1     | -1,1          |
| 176 Knitted and crocheted fabrics                      | 0,0                              | 8,5     | -8,5          | 0,1                             | 8,1     | -8,0          |
| 335 Watches and clocks                                 | -3,8                             | 5,8     | -9,6          | 1,8                             | 1,7     | 0,1           |
| 363 Musical instruments                                | -1,8                             | -2,3    | 0,5           | -1,6                            | -3,4    | 1,7           |
| 181 Leather clothes                                    | -2,9                             | -3,6    | 0,7           | -3,0                            | -4,3    | 1,3           |
| <b>Export dominant industries</b>                      |                                  |         |               |                                 |         |               |
| 241 Basic chemicals                                    | -0,6                             | 0,6     | -1,2          | -0,6                            | 0,5     | -1,1          |
| 295 Other special purpose machinery                    | -3,1                             | 0,3     | -3,4          | -3,7                            | 0,2     | -3,9          |
| 292 Other general purpose machinery                    | -1,5                             | 0,1     | -1,6          | -1,8                            | 0,0     | -1,8          |
| 271 Basic iron and steel, ferro-alloys (ECSC)          | -1,6                             | 1,2     | -2,8          | -1,7                            | 1,1     | -2,8          |
| 291 Machinery for production, use of mech. power       | -0,9                             | 0,1     | -1,1          | -1,2                            | 0,1     | -1,3          |
| 312 Electricity distribution and control apparatus     | -0,3                             | 0,3     | -0,6          | -0,4                            | 0,2     | -0,6          |
| 211 Pulp, paper and paperboard                         | -0,7                             | 0,4     | -1,1          | -0,7                            | 0,4     | -1,1          |
| 274 Basic precious and non-ferrous metals              | 0,5                              | 2,9     | -2,4          | 0,4                             | 2,9     | -2,5          |
| 353 Aircraft and spacecraft                            | 4,0                              | 2,6     | 1,4           | 3,5                             | 1,6     | 1,9           |
| 246 Other chemical products                            | -0,1                             | 0,6     | -0,7          | -0,3                            | 0,5     | -0,8          |
| 332 Instruments for measuring, checking, etc.          | 0,8                              | 0,3     | 0,5           | 0,4                             | 0,2     | 0,2           |
| 175 Other textiles                                     | -0,6                             | 0,3     | -0,9          | -0,6                            | 0,2     | -0,9          |
| 331 Medical equipment                                  | -0,2                             | 0,5     | -0,7          | -0,4                            | 0,4     | -0,7          |
| 313 Isolated wire and cable                            | -1,5                             | 0,3     | -1,8          | -1,4                            | 0,2     | -1,7          |
| 272 Tubes  | -0,5                             | 0,2     | -0,7          | -0,7                            | 0,2     | -0,9          |
| 283 Steam generators                                   | -0,7                             | 0,0     | -0,7          | -1,1                            | 0,0     | -1,1          |
| 352 Railway locomotives and rolling stock              | 1,0                              | 0,0     | 0,9           | 0,6                             | 0,0     | 0,6           |
| 263 Ceramic tiles and flags                            | -1,1                             | 0,1     | -1,2          | -1,1                            | 0,1     | -1,2          |
| 191 Tanning and dressing of leather                    | -6,0                             | 0,1     | -6,2          | -6,4                            | 0,1     | -6,5          |
| 267 Cutting, shaping, finishing of stone               | -2,2                             | 0,0     | -2,2          | -2,3                            | 0,0     | -2,3          |
| <b>Import dominant industries</b>                      |                                  |         |               |                                 |         |               |
| 251 Rubber products                                    | -0,3                             | 0,7     | -1,0          | -0,3                            | 0,7     | -1,0          |
| 286 Cutlery, tools and general hardware                | -0,6                             | 0,6     | -1,2          | -0,6                            | 0,4     | -1,1          |
| 154 Vegetable and animal oils and fats                 | 0,8                              | 0,8     | -0,1          | 0,8                             | 1,1     | -0,3          |
| 193 Footwear   | -0,8                             | 0,2     | -1,0          | -0,9                            | -0,2    | -0,7          |
| 171 Textile fibres                                     | -0,3                             | 0,4     | -0,7          | -0,3                            | 0,3     | -0,6          |
| 201 Sawmilling, planing of wood etc.                   | 0,6                              | 0,1     | 0,5           | 0,6                             | -0,1    | 0,7           |
| 202 Panels and boards of wood                          | 0,1                              | 0,6     | -0,5          | 0,1                             | 0,4     | -0,3          |
| 177 Knitted and crocheted articles                     | -0,7                             | 1,8     | -2,5          | -0,7                            | 0,6     | -1,3          |
| 152 Fish and fish products                             | -0,4                             | 4,1     | -4,4          | -0,5                            | 2,6     | -3,1          |
| 354 Motorcycles and bicycles                           | -0,2                             | 5,8     | -6,0          | -0,2                            | 4,8     | -5,1          |
| 365 Games and toys                                     | -0,1                             | -1,8    | 1,7           | -0,2                            | -2,3    | 2,0           |
| 205 Other products of wood                             | -0,2                             | 0,2     | -0,4          | -0,3                            | -0,1    | -0,2          |
| 364 Sports goods                                       | -0,7                             | -1,1    | 0,4           | -0,8                            | -3,2    | 2,4           |
| <b>Other industries</b>                                |                                  |         |               |                                 |         |               |
| 341 Motor vehicles                                     | -0,6                             | 0,6     | -1,2          | -0,6                            | 0,6     | -1,2          |
| 159 Beverages (-)                                      | -0,7                             | 0,0     | -0,7          | -0,7                            | 0,0     | -0,8          |
| 343 Parts and accessories for motor vehicles           | -0,5                             | 0,0     | -0,6          | -0,6                            | 0,0     | -0,6          |
| 361 Furniture  | -0,3                             | 0,6     | -0,9          | -0,3                            | 0,5     | -0,8          |

Source: NEI calculations based on COMEXT, Linda and Panorama.



**Table 1.8: EU manufacturing trade with Southeast Asia (methodology 3)  
Estimated impact of the crisis on trade values and European production by industry**

|  | Change in value<br>(ECU mio) |         |                  | Change as a share of production<br>in 1996 (%) |         |                  |
|--|------------------------------|---------|------------------|--|---------|------------------|
|  | Exports                      | Imports | Trade<br>balance | Exports  | Imports | Trade<br>balance |
| <b>High export – high import, exports &gt; imports</b> |                              |         |                  |  |         |                  |
| 322 TV, and radio transmitters, line telephony         | -1963                        | -61     | -1902            | -3,9   | -0,1    | -3,8             |
| 294 Machine-tools                                      | -1515                        | 112     | -1626            | -5,5   | 0,4     | -5,9             |
| 311 Electric motors, generators and transformers       | -934                         | -124    | -810             | -4,2   | -0,6    | -3,7             |
| 315 Lighting equipment and electric lamps              | -180                         | 32      | -212             | -1,7   | 0,3     | -2,0             |
| 262 Ceramic goods                                      | -300                         | 39      | -339             | -2,9   | 0,4     | -3,3             |
| 362 Jewellery and related articles                     | -854                         | -153    | -702             | -11,2  | -2,0    | -9,2             |
| 192 Luggage, handbags, saddlery and harness            | -439                         | 88      | -526             | -8,7   | 1,7     | -10,4            |
| 183 Dressing and dyeing of fur; articles of fur        | -326                         | 5       | -331             | -41,9  | 0,7     | -42,5            |
| <b>High export – high import, imports &gt; exports</b> |                              |         |                  |  |         |                  |
| 300 Office machinery and computers                     | -692                         | 3034    | -3726            | -1,2   | 5,3     | -6,5             |
| 182 Other wearing apparel and accessories              | -1178                        | 1154    | -2332            | -2,3   | 2,3     | -4,6             |
| 323 TV, radio and recording apparatus                  | -541                         | -413    | -128             | -2,0   | -1,5    | -0,5             |
| 316 Electrical equipment n. e. c.                      | -371                         | -872    | 501              | -1,4   | -3,2    | 1,8              |
| 321 Electronic valves and tubes, electronic comp.      | -1102                        | -1501   | 399              | -4,7   | -6,4    | 1,7              |
| 351 Ships and boats                                    | -174                         | 27      | -201             | -0,9   | 0,1     | -1,0             |
| 172 Textile weaving                                    | -559                         | 99      | -658             | -2,9   | 0,5     | -3,4             |
| 366 Miscellaneous manufacturing n. e. c.               | -172                         | 177     | -349             | -1,9   | 1,9     | -3,8             |
| 334 Optical instruments and photographic equipment     | -372                         | 38      | -410             | -4,4   | 0,4     | -4,8             |
| 314 Accumulators, primary cells and batteries          | -97                          | -31     | -66              | -1,9   | -0,6    | -1,3             |
| 176 Knitted and crocheted fabrics                      | -66                          | 264     | -330             | -1,8   | 7,3     | -9,2             |
| 335 Watches and clocks                                 | -65                          | 59      | -124             | -4,7   | 4,3     | -9,0             |
| 363 Musical instruments                                | -29                          | -31     | 2                | -3,4   | -3,6    | 0,2              |
| 181 Leather clothes                                    | -24                          | 16      | -40              | -4,3   | 2,7     | -7,0             |
| <b>Export dominant industries</b>                      |                              |         |                  |  |         |                  |
| 241 Basic chemicals                                    | -1876                        | 466     | -2342            | -1,2   | 0,3     | -1,5             |
| 295 Other special purpose machinery                    | -4811                        | 189     | -5001            | -5,3   | 0,2     | -5,5             |
| 292 Other general purpose machinery                    | -2759                        | -377    | -2381            | -3,3   | -0,5    | -2,9             |
| 271 Basic iron and steel, ferro-alloys (ECSC)          | -1484                        | 855     | -2339            | -2,0   | 1,2     | -3,2             |
| 291 Machinery for production, use of mech. power       | -1475                        | -13     | -1462            | -2,2   | 0,0     | -2,2             |
| 312 Electricity distribution and control apparatus     | -752                         | 55      | -807             | -1,2   | 0,1     | -1,2             |
| 211 Pulp, paper and paperboard                         | -643                         | 67      | -710             | -1,2   | 0,1     | -1,3             |
| 274 Basic precious and non-ferrous metals              | -111                         | 922     | -1033            | -0,2   | 2,1     | -2,3             |
| 353 Aircraft and spacecraft                            | 712                          | 756     | -44              | 1,7  | 1,8     | -0,1             |
| 246 Other chemical products                            | -540                         | 205     | -745             | -1,7   | 0,6     | -2,3             |
| 332 Instruments for measuring, checking, etc.          | -326                         | -65     | -261             | -1,0   | -0,2    | -0,8             |
| 175 Other textiles                                     | -203                         | 45      | -248             | -1,1   | 0,2     | -1,3             |
| 331 Medical equipment                                  | -272                         | 50      | -322             | -1,5   | 0,3     | -1,8             |
| 313 Isolated wire and cable                            | -640                         | 30      | -670             | -3,6   | 0,2     | -3,8             |
| 272 Tubes  | -194                         | 21      | -215             | -1,1   | 0,1     | -1,2             |
| 283 Steam generators                                   | -678                         | -1      | -677             | -5,1   | 0,0     | -5,1             |
| 352 Railway locomotives and rolling stock              | -36                          | 2       | -37              | -0,4   | 0,0     | -0,4             |
| 263 Ceramic tiles and flags                            | -155                         | 10      | -166             | -2,0   | 0,1     | -2,1             |
| 191 Tanning and dressing of leather                    | -817                         | 8       | -825             | -11,8  | 0,1     | -11,9            |
| 267 Cutting, shaping, finishing of stone               | -272                         | 3       | -275             | -4,5   | 0,0     | -4,5             |
| <b>Import dominant industries</b>                      |                              |         |                  |  |         |                  |
| 251 Rubber products                                    | -228                         | -129    | -98              | -0,7   | -0,4    | -0,3             |
| 286 Cutlery, tools and general hardware                | -296                         | 121     | -417             | -1,2   | 0,5     | -1,6             |
| 154 Vegetable and animal oils and fats                 | 172                          | -104    | 276              | 0,8  | -0,5    | 1,2              |
| 193 Footwear   | -373                         | 257     | -631             | -1,8   | 1,2     | -3,0             |
| 171 Textile fibres                                     | -149                         | 29      | -178             | -1,0   | 0,2     | -1,2             |
| 201 Sawmilling, planing of wood etc.                   | 22                           | 71      | -49              | 0,2  | 0,6     | -0,4             |
| 202 Panels and boards of wood                          | -91                          | 113     | -204             | -0,7   | 0,9     | -1,7             |
| 177 Knitted and crocheted articles                     | -156                         | 263     | -419             | -1,4   | 2,3     | -3,7             |
| 152 Fish and fish products                             | -67                          | 473     | -539             | -0,6   | 4,3     | -4,9             |
| 354 Motorcycles and bicycles                           | -29                          | 371     | -400             | -0,4   | 5,5     | -6,0             |
| 365 Games and toys                                     | -22                          | -46     | 24               | -0,4   | -0,7    | 0,4              |
| 205 Other products of wood                             | -23                          | 23      | -46              | -0,4   | 0,4     | -0,9             |
| 364 Sports goods                                       | -46                          | -17     | -28              | -1,6   | -0,6    | -1,0             |
| <b>Other industries</b>                                |                              |         |                  |  |         |                  |
| 341 Motor vehicles                                     | -2824                        | 235     | -3058            | -1,1   | 0,1     | -1,2             |
| 159 Beverages  | -861                         | 14      | -875             | -1,1   | 0,0     | -1,1             |
| 343 Parts and accessories for motor vehicles           | -893                         | -50     | -843             | -1,2   | -0,1    | -1,1             |
| 361 Furniture  | -435                         | 261     | -696             | -0,7   | 0,4     | -1,1             |

Source: NEI calculations and estimates based on COMEXT, Linda and Panorama.

For engineering industries, falls in exports as a share of production are relatively large for machine tools and special purpose machinery irrespective of the methodology used. However, taking into account expected growth in exports (methodology 3) a much greater number of industries are found to have had suffered large losses in production.

In terms of increased imports as a share of production, a number of individual industries stand out:

- office machinery and computers, for which it is noticeable that the increase in imports is significantly less when using expected measure of imports;
- electronic components, for which a large increase in imports as a share of production is found using actual values for 1996 and 1998, but for which the value of imports is estimated to be below its expected value for 1998.
- knitted and crocheted fabrics;
- basic iron and steel, and basic precious metals;
- fish and fish products;
- motorcycles and bicycles.

In terms of the aggregate impact on aggregate manufacturing production as whole (see Table 1.9), this is smallest when calculated using the actual differences in values between 1996 and 1998 (methodology 1) and highest when using the difference between expected and actual values for 1998 (methodology 3). Overall, the analysis suggests that the direct trade impact of the crisis represented a loss of around 0.4% of European production with an upper bound somewhere in excess of 1% of European production. To place this figure in perspective, during the 1990s the average absolute annual change in manufacturing production was 3.0% in volume and 4.5% in value. In 1993, the low point of the last recession, manufacturing production fell by 3.3% in volume and 4.5% in value.

*Overall the analysis indicates a rather diverse pattern of production effects across industries. Nonetheless some important findings do appear to stand out. First, luxury goods industries stand out as being hit hardest in terms of the potential impact on production, especially furs and leather industries. Second, engineering industries also appear to have been highly exposed to the crisis, especially taking into account the loss of potential growth of exports to the Southeast Asia region. Third, basic metals industries appear to have been exposed to the crisis, not only as a result of lost exports but also from increased imports from the region.*

**Table 1.9: EU manufacturing trade with Southeast Asia (Estimated aggregate impact of the crisis on European manufacturing production)**

|                                | Change as a share of production in 1996 |         |                                |
|--------------------------------|---|---------|--------------------------------|
|                                | Exports<br>(lower bound)                | Imports | Trade balance<br>(upper bound) |
| Method 1:<br>actual values     | -0.36                                   | 0.66    | -1.03                          |
| Method 2:<br>estimated volumes | -0.44                                   | 0.59    | -1.02                          |
| Method 3:<br>expected values   | -1.18                                   | 0.22    | -1.40                          |

*Note:* Total manufacturing production has been calculated on the basis of production for those industries covered by the analysis and excludes some industries with no recorded trade. For volume changes total manufacturing excludes, also, those industries for which no price information is available.

*Source:* NEI calculations

*The analysis of the aggregate impact of the crisis on manufacturing suggests that it was equivalent to a loss of between a half to one percent of aggregate production. Moreover, as the impact of the crisis is not concentrated in sectors with high labour shares relative to the value of production, there is little reason to believe that the aggregate impact of the crisis on employment will be significantly greater than that found for production.*

## 6. The impact of the crisis by Member State

In 1996, in most EU Member States exports destined to Southeast Asia accounted for between 10% and 16% of their respective total extra-EU exports (except for Greece, Portugal, Spain and Austria, where the share was between 5% and 9%). For most Member States the share of Southeast Asia in total extra-EU imports was between 9% and 12%, with lower shares for Italy, Finland and Austria (less than 8%) and higher shares for the United Kingdom, the Netherlands and Ireland (above 15%).

The relative importance of the Southeast Asia region for Member States extra-EU trade can be seen from Table 1.10, which shows the value of trade with the region by Member State and an indicator of the regional specialisation of trade.

Table 1.10: EU manufacturing trade with Southeast Asia, 1996 and 1998

|                               | Exports      |              | Imports      |              | Trade Balance |               |
|-------------------------------|--------------|--------------|--------------|--------------|---------------|---------------|
|                               | 1996         | 1998         | 1996         | 1998         | 1996          | 1998          |
| <b>France</b>                 |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>10.90</b> | <b>11.29</b> | <b>6.71</b>  | <b>9.25</b>  | <b>4.20</b>   | <b>2.04</b>   |
| Region Specialisation (index) | 0.99         | 1.20         | 0.81         | 0.84         |               |               |
| Sector Exposure (%)           | 40.0         | 30.6         | 49.47        | 43.44        |               |               |
| <b>Belgium-Luxembourg</b>     |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>3.17</b>  | <b>2.74</b>  | <b>3.00</b>  | <b>4.00</b>  | <b>0.17</b>   | <b>-1.27</b>  |
| Region Specialisation (index) | 0.95         | 0.91         | 0.80         | 0.78         |               |               |
| Sector Exposure (%)           | 51.1         | 53.9         | 38.7         | 48.6         |               |               |
| <b>Netherlands</b>            |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>4.27</b>  | <b>3.42</b>  | <b>9.06</b>  | <b>14.05</b> | <b>-4.79</b>  | <b>-10.62</b> |
| Region Specialisation (index) | 1.13         | 1.18         | 1.47         | 1.63         |               |               |
| Sector Exposure (%)           | 56.9         | 45.2         | 59.1         | 70.7         |               |               |
| <b>Germany</b>                |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>21.79</b> | <b>17.40</b> | <b>15.81</b> | <b>18.12</b> | <b>5.98</b>   | <b>-0.71</b>  |
| Region Specialisation (index) | 1.01         | 0.94         | 0.96         | 0.84         |               |               |
| Sector Exposure (%)           | 63.6         | 54.6         | 46.6         | 48.4         |               |               |
| <b>Italy</b>                  |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>11.26</b> | <b>6.89</b>  | <b>4.13</b>  | <b>5.93</b>  | <b>7.13</b>   | <b>0.95</b>   |
| Region Specialisation (index) | 1.04         | 0.83         | 0.64         | 0.71         |               |               |
| Sector Exposure (%)           | 71.3         | 66.4         | 53.8         | 52.9         |               |               |
| <b>United Kingdom</b>         |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>11.31</b> | <b>11.27</b> | <b>15.46</b> | <b>21.18</b> | <b>-4.14</b>  | <b>-9.90</b>  |
| Region Specialisation (index) | 1.15         | 1.32         | 1.26         | 1.24         |               |               |
| Sector Exposure (%)           | 52.5         | 45.6         | 48.8         | 57.9         |               |               |
| <b>Ireland</b>                |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>1.46</b>  | <b>1.78</b>  | <b>1.91</b>  | <b>3.36</b>  | <b>-0.45</b>  | <b>-1.58</b>  |
| Region Specialisation (index) | 1.16         | 1.21         | 1.67         | 1.70         |               |               |
| Sector Exposure (%)           | 34.2         | 33.5         | 69.0         | 63.4         |               |               |
| <b>Denmark</b>                |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>1.14</b>  | <b>1.06</b>  | <b>1.03</b>  | <b>1.40</b>  | <b>0.12</b>   | <b>-0.34</b>  |
| Region Specialisation (index) | 0.82         | 0.92         | 0.89         | 0.96         |               |               |
| Sector Exposure (%)           | 45.1         | 32.9         | 47.2         | 39.6         |               |               |
| <b>Greece</b>                 |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>0.12</b>  | <b>0.09</b>  | <b>0.98</b>  | <b>1.13</b>  | <b>-0.85</b>  | <b>-1.04</b>  |
| Region Specialisation (index) | 0.28         | 0.24         | 1.29         | 1.19         |               |               |
| Sector Exposure (%)           | 69.6         | 42.5         | 32.4         | 33.0         |               |               |
| <b>Portugal</b>               |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>0.22</b>  | <b>0.16</b>  | <b>0.60</b>  | <b>0.70</b>  | <b>-0.38</b>  | <b>-0.53</b>  |
| Region Specialisation (index) | 0.49         | 0.47         | 1.05         | 0.89         |               |               |
| Sector Exposure (%)           | 32.6         | 36.8         | 29.4         | 35.8         |               |               |
| <b>Spain</b>                  |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>2.38</b>  | <b>1.42</b>  | <b>2.28</b>  | <b>3.64</b>  | <b>0.10</b>   | <b>-2.22</b>  |
| Region Specialisation (index) | 0.72         | 0.61         | 0.89         | 1.02         |               |               |
| Sector Exposure (%)           | 62.0         | 48.0         | 49.7         | 47.2         |               |               |
| <b>Sweden</b>                 |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>3.33</b>  | <b>2.55</b>  | <b>1.47</b>  | <b>1.64</b>  | <b>1.86</b>   | <b>0.91</b>   |
| Region Specialisation (index) | 0.93         | 0.94         | 0.77         | 0.72         |               |               |
| Sector Exposure (%)           | 53.2         | 40.7         | 44.1         | 44.6         |               |               |
| <b>Finland</b>                |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>2.01</b>  | <b>1.46</b>  | <b>0.59</b>  | <b>0.70</b>  | <b>1.43</b>   | <b>0.76</b>   |
| Region Specialisation (index) | 1.15         | 0.96         | 0.68         | 0.63         |               |               |
| Sector Exposure (%)           | 53.6         | 53.2         | 45.8         | 35.0         |               |               |
| <b>Austria</b>                |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>1.12</b>  | <b>0.88</b>  | <b>0.78</b>  | <b>0.85</b>  | <b>0.35</b>   | <b>0.02</b>   |
| Region Specialisation (index) | 0.57         | 0.51         | 0.50         | 0.42         |               |               |
| Sector Exposure (%)           | 52.7         | 48.4         | 49.7         | 48.1         |               |               |
| <b>EU</b>                     |              |              |              |              |               |               |
| <b>ECU bn</b>                 | <b>74.5</b>  | <b>62.4</b>  | <b>63.8</b>  | <b>85.9</b>  | <b>10.7</b>   | <b>-23.5</b>  |
| Region Specialisation (index) | 1.00         | 1.00         | 1.00         | 1.00         |               |               |
| Sector Exposure (%)           | 56.8         | 47.5         | 49.7         | 54.1         |               |               |

Note: The calculations exclude trade in "other manufactured" goods that are not assigned to a specific industry or sector. For this reason, EU trade balances shown in Table 1.10 do not match exactly those shown in Table 1.4.

Source: COMEXT, NEI calculations

The indicator of specialisation is defined as the share of each Member States trade (exports or imports) to Southeast Asia in total extra-EU trade to the region, normalised by dividing by the Member States share in total extra-EU trade. A value of the indicator greater than one indicate that the Member State is relatively specialised in trade with the region. Finally, for each Member State, the aggregate share of total exports and imports for those sectors containing a high proportion of industries identified as being most adversely affected by the crisis is shown.

For this indicator, denoted as “sector exposure”, the relevant sectors are defined as: textiles, wearing apparel and furs etc., leather and leather products, pulp, paper and paper products, chemicals, basic metals, machinery and equipment, office machinery and computers, and motor vehicles.

Among Member States, the United Kingdom, the Netherlands and Ireland are revealed as being relatively specialised in trade to Southeast Asia, both for exports and imports and both prior to the crisis and in 1998. The latter two countries and also France saw their relative specialisation increase between 1996 and 1998. Spain, Greece, Portugal and Austria are found to have the lowest specialisation of exports to the Southeast Asia region but, with the exception of Austria, have a higher degree of specialisation for imports from the region.

Between 1996 and 1998 all Member States with the exception of France and Ireland saw the value of their manufacturing exports to the Southeast Asia region fall, the greatest percentage falls being recorded by Spain and Italy (see Table 1.11, actual changes). Imports increased for all Member States but growth rates were highest for Ireland, Spain, the Netherlands and Italy.

With the exception of Greece, Portugal and Belgium-Luxembourg, falls in the machinery and equipment sector made a significant contribution to overall falls in exports for all Member States. For countries relatively specialised in the export of textiles, clothing and leather products (Spain, Italy and Portugal) these sectors also made a significant contribution to the aggregate drop in exports. Declines in exports of chemicals were important for the Netherlands and Greece as were falling exports of basic metals, which were also important for Belgium-Luxembourg, Spain, Sweden and Finland. Motor vehicles made an important contribution to aggregate falls in exports from Germany, Spain and Sweden.

**Table 1.11: EU manufacturing trade with Southeast Asia, 1996 and 1998 (actual and adjusted changes to exports and imports)**

|                    | Exports            |                       | Imports            |                       |
|--------------------|--------------------|-----------------------|--------------------|-----------------------|
|                    | % change 1996-1998 | Adjusted <sup>a</sup> | % change 1996-1998 | Adjusted <sup>a</sup> |
| France             | 3.5                | -1.5                  | 37.9               | 33.8                  |
| Belgium-Luxembourg | -13.5              | -20.1                 | 33.6               | 28.1                  |
| Netherlands        | -19.8              | -14.7                 | 55.1               | 37.7                  |
| Germany            | -20.1              | -19.8                 | 14.6               | 33.6                  |
| Italy              | -38.8              | -26.8                 | 43.9               | 36.0                  |
| United Kingdom     | -0.3               | -14.4                 | 37.0               | 34.1                  |
| Ireland            | 21.7               | 3.8                   | 75.4               | 43.3                  |
| Denmark            | -7.4               | -16.9                 | 36.7               | 32.1                  |
| Greece             | -26.7              | -24.9                 | 15.6               | 56.3                  |
| Portugal           | -26.5              | -6.0                  | 16.0               | 27.3                  |
| Spain              | -40.2              | -20.4                 | 59.6               | 37.4                  |
| Sweden             | -23.5              | -15.6                 | 11.8               | 28.8                  |
| Finland            | -27.7              | -15.6                 | 19.0               | 29.3                  |
| Austria            | -22.1              | -19.7                 | 9.8                | 32.1                  |

<sup>a</sup> Using actual weights (sector shares in total extra-EU imports and exports in 1996) for the Member State concerned but assuming average EU growth rates (1996-1998).

Source: COMEXT, NEI calculations.

Increased imports within the chemicals sector made an important contribution to the overall increase in manufacturing imports for France, Belgium-Luxembourg, Spain and Italy. Increased imports of basic metals were important for Belgium-Luxembourg, Italy, the United Kingdom and Spain. Imports of office machinery and computers were particularly important for Ireland and the Netherlands, where they accounted for two fifths of the total increase in imports from Southeast Asia between 1996 and 1998. Increased imports of office machinery and computers were also important for Germany, the United Kingdom and Austria. Motor vehicles made an important contribution to aggregate increases in imports for Italy, Spain, Greece and Portugal.<sup>21</sup>

*The analysis of trade values<sup>22</sup> does indicate that the sector specialisation of exports was an important contributing factor to aggregate falls in the value manufacturing exports to Southeast Asia for Germany, Italy, Spain, Sweden, Austria, Belgium-Luxembourg and Portugal. Concerning Italy and Spain an even*

<sup>21</sup> For individual Member States that, for example, suffered greater percentage falls in their exports (or increases in imports) relative to other Member States, the falls may be due to the fact that the country is specialised in exports (imports) from industries most adversely affected by the crisis. Alternatively, it may simply be that exports from the industries of a Member State performed worse (i.e. suffered large percentage falls) than the same industries elsewhere in the EU.

<sup>22</sup> The analysis of effects by country has been undertaken using trade values rather than volumes and it is possible that different results would have been obtained using the latter basis of measurement.

*stronger negative effect came through the poor performance of individual industries relative to the EU as a whole.*

*The analogue effect through import specialisation is much weaker.*

## 7. Conclusions

Viewed from the perspective of European industries, the crisis in Southeast Asia represents an exogenous shock that reduced aggregate demand for its products and influenced their relative price competitiveness. In this sense, the analysis contained in this chapter differs from the main body of this report, in that it is concerned with exogenous rather than endogenously driven changes to European industry. The analysis is also, relatively speaking, short-run. The data used only cover the period up to the end of 1998, thus only a year and a half of data is available since the crisis began and even less since the impact on European trade became clearly visible.

The shortness of the period should also be borne in mind when considering the conclusions that may be drawn from the analysis. In the longer term, the prospects for European trade with Southeast Asia will depend, in part, on the strength of recovery which seems to be underway in the region<sup>23</sup> and its future prospects. Moreover, industries within Southeast Asia have as a result of the crisis been forced to undertake major restructuring of production. Ultimately, if this restructuring is orientated towards enhancing the competitiveness and export capacity of industries in the region, it may have a more pronounced influence on European trade than has already been observed.

1. At a macroeconomic level, the apparent impact of the crisis in Southeast Asia on aggregate growth in developed countries, with the exception of Japan, has been limited. Domestic growth in North America and Europe offset the negative impacts of the crisis on these regions. For manufactured goods, the dominant component of trade with the region, the EU trade balance with Southeast Asia fell dramatically between 1996 and 1998, from a surplus of ECU 11bn to a deficit of 23bn. Despite this decline, and declines with respect to Japan and China, the EU maintained a healthy trade surplus in manufactured goods of ECU 105bn in 1998.
2. The analysis of changes in the revealed comparative advantage (RCA) of EU industries tends to confirm the finding that the crisis in Southeast Asia has tended to reinforce the existing relative trade position of EU industries with respect to the region. Those industries with either a stable high or a low RCA ranking prior to the crisis did not for the most part see significant changes in their ranking. However, more technically sophisticated research intensive industries do appear to have suffered the least from the effects of the crisis.
3. Four industries are found to have had large decreases in their trade balances with Southeast Asia and a significant deterioration in their RCA ranking for trade with the region. The change in the RCA ranking for pulp and paper, as is the case for iron and steel, came about as a result both of the collapse in exports and a surge in imports from Southeast Asia. The deterioration in the RCA ranking of the beverages industry was driven almost exclusively by the collapse in exports, as imports from the Southeast Asia region are virtually insignificant. Finally, for the fish products industry, it is the increase in imports rather than falling exports that has been responsible for the change in Europe's revealed comparative advantage vis-à-vis Southeast Asia. For this industry, however, the increase in European imports from Southeast Asia was part of a much greater increase in total European imports, suggesting that the change may not entirely be due to the crisis.
4. The impact of the crisis on aggregate European manufacturing production is found to be relatively small. Overall the effects of the crisis is estimated to a loss between 0.4% and 1.4% (upper bound) of manufacturing production. Although this figure is not trivial it does not indicate a major crisis for the EU. Moreover, there seems little reason to expect a more pronounced effect on employment than that for production. However the aggregate impact is found to be highly concentrated in a relatively small group of sectors: machinery and equipment, motor vehicles, chemicals and basic metals.
5. The analysis of the impact on production for individual industries indicates a rather diverse pattern, both in terms of the overall effect and the relative importance of changes to exports and imports. Luxury goods industries (furs, tanning of leather, luggage and handbags etc., jewellery) appear to have been hardest hit in terms of the impact on production. Engineering industries also appear to have been highly sensitive to the crisis,

<sup>23</sup> See International Monetary Fund (1999).



especially when taking into account the loss of potential growth of exports to Southeast Asia. Basic metals industries appear to have been highly exposed to the crisis, not only as a result of lost exports but also from increased imports from the region.

6. Sector specialisation of exports appear to have been an important contributing factor to aggregate falls in the value manufacturing exports to Southeast Asia for Germany, Italy, Spain, Sweden, Austria, Belgium-Luxembourg and Portugal. Among these countries, the specialisation of exports for Italy and Spain appears to have had a smaller influence than the poor performance of individual industries relative to the performance of the same industries for the EU as a whole. For imports, it is less evident that the Member States' specialisation of imports (prior to the crisis) was an important factor in determining growth rates for the value of imports from Southeast Asia between 1996 and 1998.

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### Annex 1.1: Potential trade related effects of the crisis on European industry

Given the impacts of the crisis on global trade and growth, the potential effects for European industries may be categorised as follows: direct trade effects stemming from trade with affected regions, indirect effects resulting from trade diversion and, finally, effects resulting from the slowdown in global economic growth.

The main negative direct trade-related effects (i.e. effects resulting from bilateral trade with the region) that may be expected as a result of the crisis in Southeast Asia may be summarised as follows:

- *lower demand for European exports in crisis-hit countries* as a result of the collapse in demand and increased price competitiveness of domestic producers due to the devaluation of local currencies;
- *increased imports into the EU from crisis-hit countries* as a result of local producers giving a higher priority to exporting in order to counter depressed activity in the region and alleviate excess supply; supported by increased competitiveness from lower exchange rates.

To these may be added the following indirect trade related effects:

- *increased imports from third countries* that divert exports from the crisis affected countries to European markets;
- *increased competition in other foreign markets* due to both exports from the affected region and from third countries diverting trade away from the affected region;
- *lower demand for European exports in commodity exporting countries* as a result of reductions in their incomes brought about lower world prices of raw materials and, also, intermediate goods.

As far as the direct trade effects of the crisis are concerned there are a number of offsetting factors that could be expected to work towards limiting the possible expansion of imports from Southeast Asia and to reduce the impact of Asia's initial price competitiveness gains:

- the lack of foreign exchange to buy necessary foreign inputs into production, the share of which is quite high in final output of Asian products, could push Asian export prices up;
- the lack of domestic financial resources (e.g. subsidies and export credits) may constrain possible increases of exports and export-orientated production capacity;
- rising inflation in Asia will partially eliminate Asia's initial price competitiveness gains.

Moreover, not all of the potential trade effects that may be expected as a result of the crisis are negative. Among the potentially positive trade related effects that could come about as a result of the crisis are the following:

- European consumers may benefit from lower prices for imported consumer goods and imported for oil products, this implies higher real incomes of European consumers that may in turn stimulate demand for EU manufactured goods;
- European industries may benefit from lower input costs due to falling prices for imported raw materials and other goods, which may boost their competitiveness.

Notwithstanding the above offsetting factors and positive effects, the crisis can be expected to have an overall negative impact on the trade balance of European industries with respect to the Southeast Asia region. The direct trade impact of the crisis in Southeast Asia could affect European industries either through a reduction in exports or as a result of increased imports from the region displacing domestic production destined for European markets. In principle, the industries that may be expected to be the most adversely affected by the crisis are those with high levels of exports to or imports from Southeast Asia. But the absolute levels of trade flows are not the only factor that will determine whether individual industries may be thought to be more or less sensitive to the crisis. To the extent that the sensitivity of industries can be thought of in terms of the potential impact on production and/or employment, European industries may be considered to be sensitive to the direct trade effects of the crisis because:

- A high proportion of production and/or employment is dedicated to exports to affected markets. A priori, industries for which the Southeast Asia region represented an important destination for production (high export ratio) or a high share of total exports, may be expected to be particularly sensitive to a collapse in demand in the region.
- A high proportion of the domestic market is exposed to imports from the affected region (high import penetration). Industries that sell to EU markets that already have high import penetration by Southeast Asia may be expected to be more sensitive to the crisis. High import penetration by products from Southeast Asia can be taken as an indicator of their ability to compete on European markets and gain market share.

Other characteristics of traded products may, also, influence the sensitivity of individual industries to the crisis.<sup>a</sup>

<sup>a</sup> Industries may be thought to be additionally sensitive to the crisis because:

- The products exported by the industry have a high-income elasticity of demand and accordingly are likely to be hit harder by a collapse in demand in the Asian region than industries producing products for which demand is relatively income inelastic.
- The industry produces exports for which price is an important component in competitiveness (high price elasticity of demand). Given that the change in relative exchange rates implies an increase in the price of European exports relative to local production, such products may be expected to be more adversely affected than those for which other attributes are more important in determining demand.
- The products sold by the industry on European markets have a high price elasticity of demand and are in competition with imports from the Asian region. Again, the change in relative exchange rates in favour of Southeast Asian producers should have a greater impact on the competitiveness of imports than for price inelastic products.
- The industry is dependent on inputs into the production process coming from the affected region. This may have a positive impact if imported inputs become cheaper or, alternatively, if supply constraints arise there may be a negative impact on European industries.
- The industry is in competition with producers from the affected region who are unable to adjust capacity in response to the fall in local demand and are therefore more likely to seek to push their export levels.

European Commission

**The competitiveness of European industry — 1999 Report**

Luxembourg: Office for Official Publications of the European Communities

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