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# **Globalization, Economic Growth and Innovation Dynamics**

With the collaboration of  
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With 15 Figures  
and 15 Tables



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## Preface

Since the 1980s as foreign direct investment has increased strongly, new countries opened up as host countries (or became influential as source countries) and innovative forms of interfirm cooperation have been established. This has led to more intense global competition. Rising foreign direct investment could stimulate economic growth worldwide to the extent that it contributes to technology spillovers, international technology trade, improved use of know-how and a higher overall investment output ratio plus a higher marginal product of capital worldwide. The spatial distribution of foreign investment flows is in turn influenced by regional or local clusters of R&D centers and the availability of human capital or other factors which can be profitably combined with firm specific advantages important for multinational companies (MNCs). Moreover, public support for R&D, and the quality of the education system also play a role for attracting MNCs.

In the 1980s and early 1990s international competition increased notably in the OECD countries, but also worldwide. On the one hand, newcomers from Asian NICs entered medium and advanced technology fields, on the other hand the US, France and the UK as well as Russia reduced their emphasis on military research and development (R&D) after 1990. Hence, the end of the Cold War led to intensified competition in markets for civilian products. The ratio of civilian R&D to GDP has increased in most countries worldwide and there are prospects for a rapid increase in R&D outlays in some NICs and the PR China at the turn of the century. Moreover, the internet has reinforced access to new technological knowledge.

The observable heterogeneity of the global growth process led to a large body of empirical and theoretical research. One of the main conclusions from the empirical literature is that the hypothesis of absolute convergence formerly predicted by growth economists does not hold, i.e. not all countries do automatically converge to the same steady state position. However, if countries are clustered, further statements can be made. Six "clubs" with similar developments in terms of income levels and average growth can be identified: the industrialised elite, the industrialized catching up countries, the strongly catching up countries, the slowly catching up countries, the slowly falling behind and the strongly falling behind countries. Overall a process of "conditional convergence" can be observed for the first four convergence clubs while countries of the last two clubs tend to diverge. Conditional convergence implies that an economy will converge to a steady state that is characterised by a set of fundamentals specific to the country. Meanwhile a thousands of regressions have been run to identify those fundamentals. The most important ones are the investment rate, the human capital endowment, the R&D intensity and the countries integration into world markets. The empirical results therefore strongly support the hypothesis that only countries

with sufficient abilities to innovate or acquire new technologies are able to converge in terms of their productivity levels and income.

EU research is not sufficiently specialized and innovations of EU firms often not in the most dynamic patent classes. Some informal coordination of national R&D policies could be useful in the future and the creation of EU-wide R&D networks could be encouraged. However, - disregarding specific exceptions - the creation of an EU-wide R&D network should not be considered if there is no alternative competing network within Western Europe. EU firms could be encouraged to tap the R&D potential in eastern Europe and Russia where skilled personnel often is available at low costs. At the bottom line it is clear that in the face of globalization EU countries have to improve education, training and R&D efforts in order to maintain a global technological leader status. Low equity-capital ratios of firms in many EU countries raises doubts about the EU's ability to successfully exploit new innovation fields where provision of risk capital is important for survival and expansion of newcomers - more international benchmarking studies are necessary in the future, and one may recommend regular benchmarking in all major policy fields. Capital market policies are important as an indirect way to stimulate R&D in the community.

The most important economic challenge confronting Europe is to restructure economic activity and move out of industries based on the traditional factors of production and into those industries that are knowledge based. The traditional view about the process of structural change is that the large enterprises are the driving force of such structural change. Large organizations have command over vast R&D resources. However, a compelling body of evidence spanning a broad range of countries suggests that small and new firms play a crucial role in triggering structural change. The reason that small and new firms are a driving force behind structural change is that people start firms to pursue ideas that otherwise would not be pursued by the incumbent firms. New firms serve as agents of change, away from the status quo and towards new activities that are controversial and uncertain.

The greatest challenge for achieving efficient R&D policies in Europe is to reduce the barriers impeding the mobility and commercialization of new knowledge. Europe has not performed well in appropriating the returns from the investments made in new knowledge, both in terms of R&D and human capital. Part of this challenge lies in shifting policies away from targeting outputs and outcomes to targeting knowledge inputs.

In recent years, one important characteristic of labor markets in Anglo-Saxon countries at least has been the pronounced widening in skill differentials. The long-standing shift in favor of skilled labor and away from unskilled labor would appear to have accelerated in the last two decades. The supply of skill has increased less rapidly and unskilled wages have declined relatively (and in the US absolutely). There is little disputation in the US and the UK as to the dominance of the relative demand shifts favoring the higher skilled, though there is more ambiguity in continental Europe given intervals of rising skilled worker

unemployment. The controversy instead has to do with the sources of these relative demand shifts.

The two candidates are increased international trade and skill-biased (i.e. unskilled-labor saving) technological change, each of which falls under the rubric of "globalization." In both the US and the UK, decompositions of the aggregate change in, say, nonmanual employment have indicated that within-industry movements dominate between-industry shifts.

The presence of MNCs with distributed R&D facilities is a matter of fact. Globalised R&D is increasing from a low level in most countries. The net outflow of R&D is a concern for some countries but whether it is better to make „national“ companies work abroad and participate in foreign national systems or to invite foreign companies to the own territory remains largely open. Technology spill-overs and knowledge flows certainly accrue in both cases and the debate of the net R&D flows and their benefits is largely a question of employment within the national territory and also tax revenues from local R&D, production and services.

If not the functional specification but the qualification of the employees serves at a benchmarking criterion for the human-capital intensification, then for major OECD countries one arrives at the following assessment. In the first half of the nineties one has to confirm a trend claimed already earlier that the share of employees with a higher education degree (university, polytechnical or related schools) and the share of academic staff (university degrees only) is increasing in the manufacturing sector and in the service industries. This means that there is tendency to employ relatively more highly qualified persons both in the service sector, which is expanding, and in the manufacturing sector with a loss of jobs.

A series of smaller European countries is strongly oriented towards general universities and other non-oriented research and does spend comparatively little money on oriented research. The Netherlands, Italy, Sweden and Germany also belong to this group with a share of less than 50 per cent dedicated for oriented research. The other EU countries and notably the United Kingdom and France spent relatively little on general basic research and put more emphasis on oriented research (in case of the two last-mentioned countries, for armament also). Thus, we have to conclude, country-specific patterns of spending in basic research persist even within the European Union. Reportedly the United States government with its large share of defense research spends least on general basic research, whereas Japan with a small defense R&D budget resembles the pattern of Germany.

To the extent that a supply side R&D policy prevailed in the European Union we have to emphasize that science-based innovation is important in many cases but not in all. In global innovation, down-stream related processes such as effective national lead-markets and demand stimulation and articulation are also important. In this sense, it is recommended that R&D policy should try to warrant that those lead-markets be in the European Union where strong global players are active in. In so far as by non-R&D measures the rapid and stable development of

those markets can be facilitated, R&D policy should join in with other European policies in order to achieve the maximum benefit.

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Potsdam, May 1999

*Paul J.J. Welfens (coordinator)*

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**1. GLOBALIZATION OF THE ECONOMY  
AND  
INCREASING INTERNATIONAL  
COMPETITION**

## 1.1 Rising International Trade in a Broader Perspective

Economic globalization is a term referring to the fact that trade, investment and technology links are increasing worldwide as is the number of countries which are open to world markets. In addition to this the liberalization of telecommunications – and the rise of the internet which creates a truly global marketplace – has created new opportunities for the international exchange of information and services. Countries able to establish a technological and commercial lead in advanced telecommunications and computer technology are not only in a favorable position to exploit new opportunities, but they can also shape the global economic order. The USA has a clear lead in these fields, but Euroland also enjoys a strong position (e.g. in mobile telephony), while Japan is facing many problems in the wake of the sustained financial market crisis. Japan's catching-up process in the 1960s, 1970s and 1980s was impressive when Japanese manufacturing industry captured increasing world market shares. However, with the accelerated growth of the modern service industry and the growth of OECD foreign direct investment, Japan's weakness in service sector productivity became rather obvious as well as the relatively high barriers against foreign direct investment inflows – much in contrast to Japan's high FDI outflows. As regards the rising number of countries open to the world market, one must take into account the impact of the economic opening-up of the PR of China in the 1980s which went along with rapid structural change and high growth rates of output and exports. After the collapse of the USSR and the socialist Council of Mutual Economic Assistance the formerly socialist countries of eastern Europe and Russia also opened up to the world economy. While the small Visegrad countries (Hungary, Poland, the Czech Republic, Slovenia, and later also Romania) rather successfully embraced the market economy and economic integration, Russia / the CIS faced massive problems in achieving sustained transformation. For reasons which still are somewhat unclear both massive internal policy pitfalls and inadequate policy advice of the IMF / the World Bank – urging fixed exchange rates in the mid-1990s and early capital account liberalization while neglecting institutional reforms and the role of the rule of law (but insisting on traditional IMF medicine of budget deficit reduction and disinflation) – have undermined sustainable transformation and economic opening-up (<http://www.euroeiw.de>).

The rapid growth of foreign direct investment (FDI) together with privatization, sectoral deregulation and the removal of barriers to invest creates for many countries favorable growth prospects as the prospects for higher trade growth and accelerated technology transfer have improved. As about one-third of trade in leading OECD countries is intra-company trade and since international technology transfer dominantly is in the form of intra-company deals or cross-licensing, the ability of a country to become an active host country and source country of FDI is crucial for growth. The top ten FDI source countries of 1996 – according to UNCTAD – were the US with \$ 74.8 bill., followed by the UK (34.1), France

(30.4), Germany (29.5), Hong Kong (26.4 !), Japan (23.4), the Netherlands (23.1), Canada (8.5) and Belgium/Luxembourg (8.4). The top ten FDI recipients were the US with \$ 76.5 bill., China (40.8), the UK (26.0), France (22.0), Belgium/Luxembourg (14.1), Brazil (11.1), Singapore (9.4), Mexico (8.2), the Netherlands (7.8) and Spain (6.5); relative to GDP and overall investment, FDI inflows played not only a significant role in China, Brazil and Mexico but also in Poland, Hungary and Ireland as well as in Belgium/Luxembourg. It also is noteworthy that Germany was not among the top ten recipients of FDI inflows in the 1990s – a poor record for a country facing high unemployment problems which cannot be overcome without strongly increasing the investment-GDP ratio. The above figures point to very strong FDI asymmetries in the world economy, and countries which are unable to nurture domestic entrepreneurship and stimulate two-way FDI clearly stand to be the economic losers of economic globalization.

Taking into account the catching-up opportunities of poor countries, it is therefore important that they not only achieve sustained economic opening-up of trade which then helps to raise per capita output – stimulating then a shift from inter-industry trade towards more intra-industry trade – but it also is crucial that they accept foreign direct investors and create a domestic policy framework that allows firms to develop owner-specific advantages as a basis for successful investment abroad. Here issues of competition policy, capital market development and political stability play a major role – much neglected in many countries. Moreover, with global competition in markets for products with low (unskilled) labor intensity having intensified so much, there are new questions related to the role of skilled labor, R&D and education policy for economic growth and international integration.

The increasing competition in goods markets has reinforced the role of technology competition and innovation since international Schumpeterian rents in medium-technology products tend to fade away faster than in previous decades. Modern computer technology and the rising role of software – relative to hardware – have contributed to the faster diffusion of new technologies worldwide. This could mean that the return on R&D is falling in some sectors, but the general trend should be upwards in civilian markets if one takes into account the R&D-GDP expenditure ratios in major OECD countries. Above all there are strongly increasing R&D expenditures of European countries in the US – with Switzerland, the UK and Germany clearly leading (France and the Netherlands had slightly more than \$ 1 bill. and \$ 0.5 bill. in the US in 1994) and each representing some \$ 4 bill. in 1995 (BEISE/BELITZ, 1997). US manufacturing firms in turn spent some \$ 10 bill. on R&D abroad where 26%, 19%, and 11% went to Germany, the UK and France, respectively; some 8% went to Japan. Such developments raise new questions for innovation policies both from a US perspective and from an EU perspective. The EU which still has to find a consistent and efficient policy assignment with respect to national and supranational R&D expenditures has to adjust to this new global reality. How can national innovation policy be effective if there are considerable international “leakage effects”? Will exporters and

multinational companies always benefit from positive growth impulses generated by higher R&D abroad? To which extent can tapping the pool of foreign technologies via subsidiaries abroad help to rejuvenate parent companies' technology basis at home? How important are the imperfections in the technology markets?

Import penetration and export coverage in the manufacturing industry of OECD countries have been growing continuously during the 1970s and 1980s, with growth accelerating in the 1990s (Tab. 1). The export share in industry has increased in the US and other OECD countries, whose exports partly represent exports by US foreign subsidiaries. It is indeed remarkable that the share of the US in world exports is gradually declining while that of US multinational firms has remained relatively constant. Trade increasingly represents trade in upstream inputs (Tab. 2) and international exchange of differentiated products – reflecting a rise in intra-industry trade (Tab. 3). The rise in trade is, therefore, less conflict prone than in the past, during the era of dominant inter-industry trade where the expansion of some sectors was accompanied by the elimination of sectors in which other countries' firms had a comparative advantage. The high share of imported intermediate inputs in some countries implies that trade in finished products is highly dependent on an open trading system which facilitates the exploitation of specialization gains and economies of scale.

As regards trade, globalization shows clusters of regional trade flows, where the EU dominates in western and eastern Europe, the US in the Americas, and Japan – together with the US and China – dominates in Asia. Until the financial market crisis in 1997, the Asian NICs were characterized by robust growth. But the need to correct overvalued exchange rates and excessive asset prices will impair prospects for high growth in the medium term. As is clearly evident from the Asian crisis, insufficient competition within the banking system and the absence of efficient prudential supervision can cause serious regional instabilities and uncertainties which particularly impair long term investment and innovation.

## **1.2 The Increasing Role of Foreign Direct Investment**

### *Capital Flows*

International portfolio capital flows increased strongly in the 1970s and 1980s (Tab. 4), leaving countries vulnerable to sudden reversals in capital flows and to external interest rate shocks. Foreign investment also rose in the 1980s, with foreign direct investment outflows largely dominated by the US, the UK, Germany, France, the Netherlands, Switzerland, Canada, Italy and Belgium. As regards portfolio investment outflows as well as inflows it is possible to discern a series of regional shifts and, sometimes, sudden changes in response to anticipated devaluations or major policy problems. Foreign direct investment inflows have concentrated on OECD countries and China, and, only recently, on eastern Europe and Russia.

While the growth rate in trade among OECD countries exceeded that in foreign direct investment in the 1970s (18.9% p.a. compared to 15.9% p.a.), the 1980s showed a different pattern. The growth rate in foreign investment reached 16.3% p.a., which was clearly above the 6.2% of OECD trade growth. The growth rate in foreign direct investment is likely to exceed that in trade in the 1990s, since eastern Europe's transforming economies increasingly attract foreign direct investment. While it is true that east-west trade in Europe is growing at high rates,

**Tab. 1: Import penetration and export coverage in manufacturing**

	Average annual growth				
	1970	1980	1991	1970-80	1980-91
Imports as a percentage of total domestic demand					
United States <sup>1</sup>	5.1	8.7	14.0	5.5	4.5
Canada <sup>1</sup>	25.3	30.7	35.9	2.0	1.4
Japan	4.0	5.5	6.1	3.2	1.0
Denmark	41.1	43.8	52.5	0.6	1.7
France	15.8	21.3	30.9	3.1	3.4
Germany	13.3	19.6	27.3	3.9	3.0
Italy <sup>1</sup>	15.7	19.9	20.9	2.4	0.4
Netherlands	42.0	53.0	66.4	2.3	2.1
United Kingdom	14.7	22.9	30.2	4.5	2.6
Finland	27.9	27.8	30.3	0.0	0.8
Norway	39.8	38.7	43.2	0.3	1.0
Sweden	29.5	35.9	40.6	2.0	1.1
Australia <sup>1</sup>	16.2	21.6	25.4	2.9	1.5
Exports as a percentage of production					
United States <sup>1</sup>	5.3	9.2	11.0	5.6	1.6
Canada <sup>1</sup>	26.7	30.2	34.5	1.3	1.2
Japan	8.5	11.9	11.4	3.4	-0.4
Denmark	34.6	41.9	54.4	1.9	2.4
France	16.9	22.6	30.2	2.9	2.7
Germany	18.4	25.0	30.0	3.1	1.7
Italy <sup>1</sup>	18.3	22.1	22.5	1.9	0.2
Netherlands	40.9	55.3	68.3	3.1	1.9
United Kingdom	16.3	23.4	28.0	3.7	1.7
Finland	27.5	32.4	35.4	1.6	0.8
Norway	31.1	30.0	36.0	-0.3	1.7
Sweden	29.6	38.0	45.0	2.5	1.6
Australia <sup>1</sup>	11.4	16.1	13.5	3.5	-1.6

<sup>1</sup> 1990 data used instead of 1991

Source: OECD (1997), *Globalisation of Industry*, Paris, 24.

**Tab. 2: International sourcing compared with domestic sourcing**International Linkage Index<sup>1</sup>, mid-1980s

	Canada	France	Germany <sup>2</sup>	United Kingdom	Japan	United States
Motor vehicles	0.92	0.34	0.23	0.39	0.06	0.17
Aerospace	0.40	0.28	0.24	0.50	0.57	0.09
Communications/ semiconductors	0.46	0.20	0.22	0.37	0.08	0.13
Computers	0.68	0.43	0.28	0.42	0.10	0.13
Textiles	0.33	0.36	0.35	0.51	0.16	0.11
Petroleum refining	0.22	1.10	0.72	0.35	0.75	0.13

<sup>1</sup>Calculated taking into account both direct and indirect (upstream) inputs. For methodology, see OECD (1993)

<sup>2</sup>Electrical machinery includes communications and semiconductors.

Source: OECD (1997), *Globalisation of Industry*, 29.

**Tab. 3: Intra-industry trade indices, all products<sup>1</sup>, OECD-Countries 1970-90**

	1970	1980	1990
United Kingdom	53.2	74.4	84.6
France	67.3	70.1	77.2
Austria	60.4	73.2	75.2
Spain	41.7	48.9	74.2
Belgium/Luxembourg	61.4	67.5	72.8
Germany	55.8	56.6	72.2
United States	44.4	46.5	71.8
Netherlands	63.4	60.5	69.8
Sweden	52.3	58.2	64.2
Denmark	55.0	54.8	62.2
Switzerland	52.5	59.8	60.2
Canada	52.1	51.5	60.0
Italy	48.7	54.8	57.4
Ireland	48.2	55.1	56.9
Greece	32.4	28.3	50.5
Portugal	39.8	39.5	49.2
Finland	29.4	37.8	45.7
Norway	52.3	42.5	41.9
Turkey	6.7	12.5	34.6
Japan	21.4	17.1	32.4
Australia	20.7	21.6	30.5
New Zealand	10.6	16.3	25.9

<sup>1</sup>Grubel-Lloyd indices calculated on SITC Rev. 2 3-digit level, adjusted for overall trade imbalances.

Source: OECD (1997), *Globalisation of industry*, Paris, 30.

one cannot overlook that within eastern Europe trade diversion or only modest trade creation is occurring, so that overall trade growth rates for eastern Europe could indeed fall short of those in foreign investment flows. Given the high growth in global FDI flows, roughly amounting to \$ 300 bill. p.a. in the late 1990s, one may expect a fast increase in the stock of FDI, which reached some \$ 2700 bill. in the mid-1990s (UNCTAD, 1996).

Foreign investment by multinational companies represented in the late 1980s an investment output ratio of about 1% (Tab. 4), which is more than 1/10 of all investment in machinery and equipment in OECD countries. Compared to the 1970s this meant a doubling in the MNC's share of gross fixed capital formation (OECD, 1996) Moreover, multinational companies are among the top users of advanced software, which represents non-physical investment from an economic perspective. As regards productivity growth expenditures on software – together with purchases of computer equipment – are quite important for economic growth.

**Tab. 4: International portfolio investment<sup>1</sup>**

	1980	1985	1990	1991	1992	1993	1994	1995
	as a percentage of GDP							
United States	9,0	35,1	89,0	95,6	106,6	128,8	131,1	135,5
Japan	7,7	63,0	120,0	91,9	71,8	77,8	60,0	65,7
Germany	7,5	33,4	57,3	55,6	85,2	170,8	159,3	168,3
France	–	21,4	53,6	78,7	121,8	186,8	201,4	178,2
Italy	1,1	4,0	26,6	60,3	92,1	191,9	206,8	250,9
Canada	9,6	26,7	64,4	81,3	113,2	152,9	209,7	192,0

<sup>1</sup> Gross purchases and sales of securities between residents and non-residents.

Source: BIS (1996), 66<sup>th</sup> Annual Report, Basle, 122.

MNCs will benefit from falling international telecommunication costs, which are expected as a result of early liberalization in the UK and the Scandinavian countries as well as due to the general post-1998 liberalization in EU member countries (WELFENS/GRAACK, 1996; GRAACK, 1997). The international dissemination of technological know-how will be facilitated and accelerate innovation cycles. Rising foreign direct investment in combination with cheaper advanced telecommunication networks will intensify the global technology race and intensify locational competition among EU countries. Few observers consider the rapid rise in global FDI as only a minor problem for leading EU countries (HÄRTEL et al., 1996).

Foreign direct investment inflows only occur if attractive locational conditions (in economic terms) and political stability exist in host countries.

Under such circumstances, FDI inflows can make an important contribution to the restructuring of the economy, structural change and employment growth (WELFENS/JASINSKI, 1994). As regions of high medium term growth, Eastern Europe and Asia can be expected to attract high FDI at the turn of the century, while the US and the EU will continue to be the main source and host countries of foreign investment. Japan still is mainly a source for foreign investment. But the need to overcome slow growth might require Japan to reconsider its policy stance vis-à-vis foreign investors, who sometimes complain about an unreceptive host country environment. Indeed, in the era of globalization of the economy – with a higher technological specialization of countries – it can be to the disadvantage of a country if it cannot attract sufficient foreign investment inflows from a diversified source basis.

From a source country perspective it is important that firms have ownership specific advantages, which are mainly rooted in advanced technology, and that the firms' internal international exchange of services is superior to arms-length transactions via the market which is associated with higher transaction costs. The case of telecoms operators provides an example of a sector in which high technological dynamics are observed and where ownership specific advantages are naturally important. Moreover, the recent wave of privatizations in western Europe has removed the political restrictions on EU telecoms operators' ability to invest abroad. Furthermore, the rapid emergence of international alliances in telecoms operation is leading to a high degree of international oligopolistic interdependence and in turn is stimulating waves of foreign direct investment outflows (KLEIN/WELFENS, 1992; WELFENS/WOLF, 1997). New forms of international cooperation which do not involve full foreign ownership are particularly interesting in this context. Subcontracting and joint R&D projects are among the important developments, which will affect growth and employment (ADDISON/WELFENS, 1998).

The enormous importance of MNCs for economic development is due to the firms' large size and high technology intensities – except in some sectors (e.g. food industry, furniture, agriculture). Furthermore, international trade in the case of leading OECD countries consists largely of intra-industry trade – roughly up to 1/3. In the period 1983-92, 43 % of EU-US trade was intra-company trade (OECD, 1996, p. 30). For all these reasons MNCs are crucial for economic growth. Moreover, MNCs have extended networks of supplier firms which depend on the survival and expansion of MNCs. This is not to deny the important role of small and medium-size enterprises which dominate employment in all EU countries. As regards R&D policies the international presence of MNCs allows such companies to critically compare alternative policy approaches and to shift investment and innovation projects to those countries which are receptive to the requirements of technology-intensive firms. Comparing alternative locations will become even more important after the introduction of the Euro since this will create unprecedented transparency with respect to costs and prices in Europe. The marginal investment decisions of MNCs will certainly be influenced by economic

policies in alternative location countries. This could lead to some problems for the smaller innovative firms in Europe insofar as the rising pressure from large companies might bring about a decline in the share of public R&D funds allocated to small and medium-sized firms.

### **1.3 Global Telecoms Networks and New Communication Technologies**

Rising trade in goods and services as well as intensified foreign direct investment imply that the global innovation race is intensifying in the economic field. Product innovations typically are relatively expensive and first introduced in high income countries where only a minority of affluent households often will be the pioneer users. Such households are trendsetters for innovative products which gradually will be adopted by broader strata of society. However, as the production process becomes more standardized and logistical demand patterns bring about a wider use of the product innovation in leading OECD countries, prices start falling. The novel product is exported to countries with medium per capital income, and often production is also relocated towards such countries in later stages of the innovation cycle when the home market increasingly will be served by imports from abroad. This pattern of the product cycle trade is likely to intensify as modern telecommunication technologies and improved education and training in NICs facilitate the worldwide relocation of production.

With privatization and deregulation of telecommunications in the EU – the starting date for the latter being 1998 for voice telephony and network operation – and the further liberalization of telecommunications in the US and Japan in 1997 there are favorable prospects for the telecoms sector to quickly become a global industry with high technological dynamics. System integration in combination with internationalization on the one hand, incorporating latest computer technology on the other hand are the main challenges here. Multinational companies have offered „one-stop shopping solutions“ by large international telecom operators or consortia and increasingly use the telecom network to learn about market and technology developments worldwide (WELFENS/GRAACK, 1996; WELFENS/YARROW, 1997; GRAACK, 1997).

The main global alliances are Global One (headquarters in Brussels) which consists of Deutsche Telekom, France Telecom, and Sprint of the US; Concert, which is composed of BT, MCI of the US and Telefónica (plus the dominant Portuguese operator); and WorldPartners, whose stakeholders are AT&T (40%), the Japanese KDD (24%), Singapore Telecom (16%), and Unisource NV (20%). Unisource NV in turn represents Swiss Telecom, the Dutch KPN and the Swedish Telia. It seems that alliances are not very stable. Cable & Wireless Communications (formed in 1996 by the merger of MCI and three cable TV companies) and NTT constitute two major companies that are still non

aligned, and there are new firms ready to challenge established alliances, such as Equant and WorldCom from the US. WorldCom launched a successful bid to acquire MCI which had already been envisaged for full takeover by BT having a 20% stake in the US company. The development of Concert thus is uncertain but there is little doubt that besides niche players in the telecommunication market large multinational companies with a global strategy will dominate international markets.

Competition in telephony is developing worldwide via alliances and foreign investment. Foreign investors take advantage of liberalization and privatization. Restrictions in technology trade have been lifted after the end of the Cold War and higher investment in telecommunications is undertaken in eastern Europe as well as in NICs and LDCs. This will lead to improved international communication opportunities for firms from low income countries, which will also have easier access to foreign know-how and knowledge – mainly via internet and new virtual partners. Privatization introduces pressure from capital markets and hence stimulates competition. Market entry by newcomers has a similar effect. In a more internationalized and competitive environment telecom operators have a strong incentive to increase R&D and become more active in patenting.

The telecoms network is a crucial part of the overall infrastructure and a powerful basis for linking firms and households in a way that allows fast communication and data transmission. Telework and telelearning are interesting options for increasing flexibility and productivity in the information society. Indeed, empirical evidence shows that telecommunications currently account for a considerable part of economic growth in Germany (JUNGMITTAG/WELFENS, 1996).

While traditional telephone networks establish a dedicated connection between the two parties of a telephone conversation, the internet uses flexible routing for digitalized packages of communication data (voice gateways and service providers which use leased-line capacities are required for internet telephony.). The US newcomer Global Link will offer internet-based telephony already in 1997, Sweden's Telia will follow after 2000, and many dominant operators are likely to follow suit as the quality of transmission improves and internet telephony becomes cheaper.

International alliances mainly offer their service to multinational companies that require one-stop billing and a seamless network. It is even conceivable that global virtual networks will emerge where the operator does not own a network but combines leased-line capacities worldwide in order to provide services for major customers. The global telecoms market reached about \$ 700 billion in 1996 and could reach almost \$ 1,000 billion by the turn of the century. Since about 90% of global revenues still come from national telephony, one may anticipate that even global alliances will have to establish a firm foothold in national markets and their corresponding customer bases. Eastern Europe's markets will become fully open for foreign investors only after 2002.