CORPORATE DIPLOMACY AND EUROPEAN COMMUNITY INFORMATION TECHNOLOGY POLICIES:

THE INFLUENCE OF MULTI-NATIONALS AND INTEREST GROUPS, 1980-1993

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In loving memory of

Aagje Dunnebier-Hoogendijk
and
Jacoba Margaretha van Walsum-Quispel

ABSTRACT

While the European-owned information technology multinationals, as represented in the IT Roundtable, exerted a preponderant influence on the development, approval and implementation of ESPRIT in the early and mid-1980s; by the early 1990s, they appeared unable to translate their policy preferences into policy outcomes.

This thesis seeks to establish whether or not these companies lost some of their influence over the European Community and, if so, why. It argues that the IT Roundtable members' corporate diplomacy was less effective in the late 1980s and early 1990s than it was in the early and mid-1980s, for the following three reasons.

First, the effectiveness of the IT Roundtable as a channel of political activity was undermined by its declining representativeness, following the structural changes taking place in the industry; by its lack of internal coherence caused by the diverging interests of its members; and by the perception that the Roundtable was suitable for articulating preferences in the area of R&TD but inappropriate for voicing broader preferences on industrial policy.

Second, doubts about the necessity of an indigenous IT capability depreciated the perceived value of the asset which conferred political weight on the Roundtable companies: their capability to supply economically and militarily strategic technologies and products. While the realization of short-term economic objectives became more important - even amongst those governments paying lip-service to the necessity of an indigenous IT capability -, public investments into the Roundtable companies, ridden by crisis, were not perceived as yielding "value for money", particularly in terms of employment and social and economic cohesion.

Third, the EC's ability to realize the IT Roundtable's policy preferences was hampered by the lack of consensus amongst the national governments; the latter's insistence on subsidiarity, national solutions and juste retour; their resistance to spending money, and the fragmentation of the EC's decision-making structure. The EC's ability to supply the policies requested was further hampered by the increasingly globalized nature of the IT industry, and the EC's limited economic leverage over Japan and the US in international negotiations on IT.

TABLE OF CONTENTS

FIGURES

TABLES

LIST OF APPENDICES

GLOSSARY

Acquisition	Action by which one company obtains a stake in another company.
Alliances	Inter-firm cooperative agreements, governing, for example, the relations between a company and its suppliers, and the relations between companies seeking to share their R&D, production, marketing or distribution operations.
Application Specific IC	Semi-customized integrated circuit; although certain parts of the IC are mass produced, options are left open to tailor the device to a specific application.
Architecture	Design plan defining the inter-connection and control of the various parts of a computer.
Bipolar IC	IC classified on the basis of the process technology used in its fabrication. The technology used in the production of bipolar ICs is relatively mature in comparison to the technology used in the fabrication of MOS ICs.
Brownfield Investment	Investment in an existing operations.
Clones	Computers or semiconductors that are functionally equivalent to brandname computers or semiconductors, but undercut the price of the brandname products.
CN	An EC coding system based on the nomenclature agreed upon at the Harmonised System Convention. In place from 1988 onwards.
Customized Software	Computer software programmes designed and written to meet the specific needs of the client.
Diffusion	Etching of electronic circuits on the surface of wafers, i.e. slices of silicon crystal, using photolithographic processing techniques.
Digital IC	Integrated circuit which can switch on or off the flow of electrical signals.
Discrete Devices	Semiconductors which, in contrast to integrated circuits, consist of only one element. Examples: diodes, transistors.
Dispersion	Spread.
Dynamic Random Access	Specific type of (short-term) memory IC. In contrast to

Memory	SRAMs, the data stored in DRAMs has to be refreshed.
EC Treaty (93)	Treaty establishing the European Community, as amended by the Treaty amending Certain Financial Provisions, the Single European Act, the Merger Treaty, the Greenland Treaty, the Acts of Accession and the Treaty on European Union. The EC Treaty (93) constitutes Title II of the Treaty on European Union. Entered into force on 1 November 1993.
Economies of Learning	Cost advantages generated by accumulating experience and knowledge concerning the production processes.
Economies of Scale	Cost advantages generated by spreading the fixed costs of production over a larger number of units, thus reducing the per unit cost.
EEC Treaty (58)	Treaty establishing the European Economic Community, as amended by the Treaty amending Certain Financial Provisions, the Merger Treaty, the Greenland Treaty, and the Acts of Accession. Entered into force on 1 January 1958.
EEC Treaty (87)	Treaty establishing the European Economic Community, as amended by the Treaty amending Certain Financial Provisions, the Single European Act, the Merger Treaty, the Greenland Treaty, and the Acts of Accession. Entered into force on 1 July 1987.
EEPROM	Specific type of (permanent) memory IC, of which selected parts of the contents can be erased.
Electronics Foodchain	Materials -> Semiconductor manufacturing equipment -> Semiconductors -> Applications (computers, et cetera).
Engrenage	Bureaucratic interpenetration, resulting from the mutual interaction between M/S officials and EC officials and from the mutual interaction amongst M/S officials from different nationalities. Engrenage leads to the formation of a network amongst EC and national government officials.
EPROM	Specific type of (permanent) memory IC, of which the contents can be erased and new information can be entered.
Externalities	Effects that have not been taken into account as benefits or costs in the production decision.
Greenfield Investment	Investment in operations yet to be established.

Hardware (Computer)	Dataprocessing equipment, including both peripherals as well as processing units.
Information Technology	Technology concerning components, computer hardware, software, services, datacommunications and applications.
Integrated Circuit	Semiconductor, which combines two or more elements, i.e. transistors or diodes.
Internationalization	The geographical spread of economic activities across national borders.
Juste Retour	Principle for allocating funding, stating that an EC Member State should be entitled to a just return on its contributions: the Member State's share in EC expenditures should be equivalent to its share in EC contributions.
Linear IC	Integrated circuit which can amplify the flow of electrical signals.
Linkages	Market relations existing between economic activities, such as the relations between production units and their input suppliers.
Logic Digital MOS IC	Digital MOS IC which processes information.
Maastricht Treaty	Treaty on European Union. Entered into force on 1 November 1993.
Mainframe Computer	Comparatively large, expensive, and relatively high performance computer (processing hardware).
Memory Digital MOS IC	Digital MOS IC which stores information.
Merger	Fusion of two or more companies into one new entity.
Microcomputer	Comparatively small, cheap, and relatively low performance computer (processing hardware).
Microprocessor	Logic digital IC which includes most or all of the central processing functions of a computer.
Minicomputer	Mid-range computer, which is less costly but also less powerful than mainframe computers.
MOS IC	IC classified on the basis of the process technology used in its fabrication. The technology used in the production of MOS ICs is relatively new in comparison to the technology used in the fabrication of bipolar ICs.

Multiplier effects	Impacts of increased spending, via new wages, on local businesses.
Mutual Recognition	Principle outlining that the EC Member States should accept the products, diplomas, etc. originating from any other Member State, provided that (1) these products, diplomas, etc. are in compliance with the national legislations of the Member State of origin, and (2) these national legislations meet the minimum standards set out in European Directives.
NACE	EC industry classification, classifying economic activity either by the nature of goods and services produced or by the nature of the production processes employed.
National Treatment	Principle outlining that the EC Member States are not allowed to discriminate between their indigenous firms, on the one hand, and the companies from other EC Member States on the other.
Network	System of interlinked computers.
NIMEXE	Nomenclature used prior to 1988 to classify EC tariff headings. In 1988, NIMEXE was replaced by the Combined Nomenclature (CN).
Open Systems Interconnection (OSI)	Manages the interaction between computers at seven different levels, from the physical connection of the hardware cables to the interaction of applications.
Operating System	Type of systems software, i.e. software that controls the computer's internal operations.
Packaged Software	Standardized computer software programmes.
Pentium Processor	Latest generation CISC microprocessor developed by Intel in response to the rise of RISC processors.
Peripheral Hardware	All equipment used for entering, storing and outputting information. Examples: printers, terminals (peripherals).
Personal Computer	Type of microcomputer, which is less powerful than a workstation but also less expensive.
Photomasks	Patterns containing the design of an electronic circuits.
PowerPC	RISC processor, jointly developed by IBM, Apple and Motorola using IBM RISC technology.
Processing Hardware	All equipment used for performing operations on data. Examples: mainframe computers, minicomputers and

	microcomputers (PCs and workstations).
Reduced Instruction Set Computing Processor	New type of microprocessor which contains less instructions than its predecessor, the Complex Instruction Set Computing (CISC) processor, and yet is able to perform the same or more functions.
Repli sur Soi	Tendency of EC Member State governments to prefer national solutions to economic and other problems over European (supra-national) ones, resulting in each Member State devising its own answer to the problems outstanding rather than solving these problems through a common effort.
Semiconductor	Component controlling the flow of current: it can act alternatively as a conductor or as an insulator.
Services (Computer)	Computer-related tertiary activities, such as consultancy on the selection of hardware and software, instalment support, maintenance, facilities management, systems integration, et cetera.
Single European Act	Act, signed in February 1986, amending the EEC Treaty (58).
SITC	Product-based international trade classification formulated by the World Bank.
Software (Computer)	Programmes managing the input, processing, output and storage of information. Some types of software are embedded in the computer hardware itself, while other types could be traded independently.
Static Random Access Memory	Specific type of (short-term) memory integrated circuit. In contrast to DRAMs, SRAMs retain information even if switched off; the data stored in SRAMs does not have to be reprogrammed.
Subsidiarity	Guiding principle for allocating competencies to the layers of government: a competency should be allocated to the level of government which can execute it best.
Synergies	Inter-dependencies existing between the technological progress made by a company and the technological advances made by its users or suppliers.
Systems Integration	Design/creation of a combination of computer hardware and software, linked in such a way as to meet the customers' specific requirements, i.e. to provide "solutions" to its information needs.

Treaties of Rome	Treaty establishing the European Communities (ECSC, EEC, EAEC). Includes the Treaty establishing the European Economic Community (EEC Treaty (58)). Entered into force on 1 January 1958.
Treaty on European Union	Maastricht Treaty. Entered into force on 1 November 1993.
UNIX	Operating software programme which would enable consumers to run the same software programme on any producer's hardware.
Workstation	Type of microcomputer, which offers more computing power than a PC but is also more expensive.

ACRONYMS

A/R	Annual Report
ASIC	Application Specific Integrated Circuit
ATP	Advanced Technology Programme
BMFT	Federal Ministry for Research and Technology (G) [Bundesministerium für Forschung und Technologie]
BOS	Bull/Olivetti/Siemens Nixdorf
BRITE	Basic Research in Industrial Technology for Europe
CAM	Computer Aided Manufacturing
CCT	Common Customs Tariff
CEC	Commission of the European Communities
CEN	European Committee for Standardization [Comité Européen de Normalisation Electrotechnique]
CENELEC	European Committee for Electrotechnical Standardization [Comité Européen de Normalisation Electrotechnique]
CEO	Chief Executive Officer
CFSP	Common Foreign and Security Policy
CII	Compagnie International pour l'Informatique
CISC	Complex Instruction Set Computing
CIDST	Committee for Scientific and Technical Information and Documentation
CIM	Computer Integrated Manufacturing
CN	Combined Nomenclature
COCOM	Coordinating Committee for Multilateral Export Controls
CoM	Council of Ministers
COREPER	Committee of Permanent Representatives
CREST	Scientific and Technical Research Committee
DC	Datacommunications
DD	Discrete Device
DG	Directorate General
DM	German Mark [Deutsche Mark]
DP	Dataprocessing
DRAM	Dynamic Random Access Memory
DTI	Department of Trade and Industry (UK)
EAB	ESPRIT Advisory Board
EAEC	European Atomic Energy Community
EC	European Community
ECMA	European Computer Manufacturers Association
ECRC	European Computer Research Centre
ECSC	European Coal and Steel Community
ECU	European Currency Unit
EDC	European Defence Community
EEC	European Economic Community
EECA	European Electronic Component Manufacturers Association
EEPROM	Electrical Erasable Programmable Read-Only Memory
EFTA	European Free Trade Area
EITIRT	European Information Technology Industry Roundtable (IT Roundtable)

EMC	ESPRIT Management Committee
EMU	Economic and Monetary Union
ENS	European Nervous System
ESC	Economic and Social Committee
EP	European Parliament
EPROM	Erasable Programmable Read-Only Memory
ERM	European Exchange Rate Mechanism
ERT	European Round Table of Industrialists
ESPRIT	European Strategic Programme for Research and Development in Information Technology
ETSI	European Telecommunications Standards Institute
EUR	Europe
EUREKA	European Research Coordination Agency
EUROBIT	European Association of Manufacturers of Business Machines and Information Technology Industry
EWOS	European Workshop for Open Systems
EZ	Ministry of Economic Affairs (NL) [Ministerie van Economische Zaken]
F	France
FF	French Franc
FRA	France
FTC	Federal Trade Commission (US)
G	Germany
GAO	General Accounting Office (US)
GDP	Gross Domestic Product
GEC	General Electric Corporation
GER	Germany
GNP	Gross National Product
HB	Honeywell Bull
HDTV	High Definition Television
HPC	High Performance Computing/Networking
HT	High Technology
HW	Hardware
I	Italy
IC	Integrated Circuit
ICL	International Computers Limited
IDC	International Data Corporation
IEC	International Electrotechnical Committee
ITA	Italy
ITC	Information Technology and Communications
IPE	International Political Economy
IRDAC	Industrial Research and Development Advisory Committee
ISO	International Standards Organization
IT	Information Technology
J	Japan
JAP	Japan
JESSI	Joint European Submicron Silicon Initiative
JFIT	Joint Framework for Information Technology
(1)K	Kilobit
L	Labour

(1)L	Italian Lira
LCD	Liquid Crystal Display
(1)M	Megabit
MEP	Member of European Parliament
MF	Mainframe
MFN	Most Favoured Nation
MI	Microcomputer
MICE	Ministry of Industry and Foreign Trade (F) [Ministère de l'Industrie et du Commerce Extérieur]
MIPS	Million Instructions per Second
MISP	Microelectronics Industrial Support Programme
MNE	Multinational Enterprise
MoD	Ministry of Defence (UK)
MOS	Metal Oxide Semiconductor
M/S	Member States
M&A	Mergers and Acquisitions
N/A	Not Available
NACE	General Industrial Classification of Economic Activities within the EC
NATO	North Atlantic Treaty Organization
NIMEXE	Nomenclature for Statistical Purposes
NL	The Netherlands
NTPI	New Trade Policy Instrument
OEM	Original Equipment Manufacturer
OJ	Official Journal
ORGALIME	Liaison Organization for the European Mechanical, Electrical, Electronic Engineering and Metalworking Industries [Organisme de Liaison des Industries Métalliques Européennes]
OSI	Open Systems Interconnection
OTA	Office of Technology Assessment (US)
OTH	Other
PBTS	Business-Oriented Technology Promotion Programme (NL)
PC	Personal Computer
PCB	Printer Circuit Board
PE	Peripheral
PHW	Processing Hardware
POS	Point of Sale
PR	Public Relations
QMV	Qualified Majority Voting
RAM	Random Access Memory
RISC	Reduced Instruction Set Computing
ROM	Read-Only Memory
RoW	Rest of World
RTA	Revealed Technology Advantage Index
R&D	Research and Development
R&TD	Research and Technological Development
SCI	Strategic Computing Initiative
SDI	Strategic Defence Initiative
SEA	Single European Act

SEASIA	South East Asia
SEM	Single European Market
SERICS	Department of Communication and Services Industries [Service des Industries de Communication et de Service]
SK	South Korea
SITC	Standard International Trade Classification
SME	Small to Medium-Sized Enterprise
SMV	Simple Majority Voting
SNI	Siemens Nixdorf Informationssysteme AG
Sp	Spain
SPAG	Standard Promotion and Application Group
SPIN	Stimulation Project Team for IT Research (NL)
SRAM	Static Random Access Memory
STA	Semiconductor Trade Agreement
STC	Standard Telephone and Cables Plc
STP	Strategic Trade Policies
SV	Services
SW	Software
S&T	Science and Technology
TEN	Trans-European Networks
TEU	Treaty on European Union (Maastricht Treaty)
UK	The United Kingdom
UNCTC	United Nations Centre for Transnational Corporations
UNICE	Union of Industrial and Employers' Confederations of Europe [Union des Confédération de l'Industrie et des Employeurs d'Europe]
US	United States of America
USA	United States of America
USSR	Soviet Union
VA	Value Added
VCR	Video Cassette Recorder
VHSIC	Very High Speed Integrated Circuit
VLSI	Very Large Scale Integration
WEU	Western European Union
WG	Working Group
WS	Work Station
£	Pound Sterling
f	Dutch Guilder
$	US Dollar

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PART 1

Chapter 1

INTRODUCTION

1.1 THE ISSUE

In the early 1980s, the competitive position of the European Information Technology (IT) industry, comprising the suppliers of semiconductors and other components, computers and other dataprocessing products, as well as applications, was relatively weak. At the start of the decade, Europe accounted for only 10 per cent of world production in two key segments within the IT industry: the semiconductor and computer industries. Europe's trade balance in IT was negative and deteriorating. Import penetration alone amounted to approximately 50 per cent of European semiconductor consumption and nearly 30 per cent of European computer consumption.

This relatively weak position of the European IT industry was of concern to the European Community (EC) and its Member State (M/S) governments. The IT industry, which affects nearly every function in almost any sector of the modern economy, was seen as the foundation of the third industrial revolution - just as coal, steel and oil had been of the previous two. Considering its strategic importance, the EC Commission felt the Community could not afford to lose its production capability in this industry.

Over the 1980s, the European Community sought to strengthen its IT industry through one policy instrument in particular: a subsidized, collaborative research and technological development (R&TD) programme. The European Strategic Programme for Research and Development in Information Technology (ESPRIT) went into force in 1984 to give a technology-push to the IT industry, and thus to close the technology gap with the United States and Japan. The introduction of ESPRIT signalled a move away from the 1970s, when the M/S governments promoted their national champions through a policy of consolidation, firm-specific subsidies, and preferential government procurement. The European governments had adopted, for the first time, a European rather than a national solution to the competitiveness problems of a sunrise industry. The launch of a Community R&TD programme, however, did not replace national programmes; nor did it substitute for cross-national efforts. In addition to ESPRIT, the EC also supported its IT industry through EC trade policies, including tariff protection and anti-dumping proceedings, and a market liberalization programme, leading to the completion of the Single European Market.

The introduction of ESPRIT, the heart of the Community's policy response to the plight of its IT industry in the 1980s, was the result of an EC policy-making procedure in which both the national governments, as represented in the Council of Ministers, and the Commission played an important role. However, the M/S governments and the Commission were not considered to be the only actors affecting the Community's policy response. It has been argued that, in the case of ESPRIT, the IT Roundtable, consisting of the largest, European-owned IT and telecommunications (equipment) producers, had a preponderant influence on the programme's development, its approval and, particularly in the first phase, its implementation (Langlois et al., 1988:137-138;143; Mytelka, 1990:14; Peterson, 1992:232-233; Robinson in Business Europe, 15 February 1991; Sandholtz and Zysman, 1989:113-114; and van Tulder and Junne, 1988:177,196,213-216).

Although standard policy-practice ensures that private sector interests are heard in the EC's policy-making process, it is also known that European-level interest groups are generally relatively ineffective (see Chapter 7). Inherent weaknesses include a wide membership base, indirect participation, limited discretionary powers to represent the views of the members, unanimity requirements in voting procedures, and a lack of resources. Even if a European-level interest group provides direct membership for a selected group of multinational enterprises only, in order to overcome some of these weaknesses, differences amongst the member firms may continue to limit the association's effectiveness (McLaughlin and Jordan, 1993:122; Grant, 1993:34-36). Taking into account that European-level interest groups are often ineffective, one could question why the IT Roundtable, which comprises the largest, European-owned IT companies, was so influential during the early and mid-1980s?

The tentative explanations given for the preponderant influence of the Roundtable on ESPRIT can be summarized along three lines: (1) the companies' combined size; (2) internationalization; and (3) rapid technological change. The first line of argument claims that the Commission asked the largest European-owned IT companies to provide their input, as they, as a group, were perceived as representative for the industry; together, the companies accounted for the majority of Europe's indigenous IT R&TD and production capabilities. Not only did this ensure that the IT Roundtable companies could influence the Commission's drafting process, also it ensured that they would be heard by their national governments, and thus, would be able to mobilize national support for the Commission's programme (Langlois et al., 1988:139; van Tulder and Junne, 1988:179,181,213). The second line of argument points to the fact that internationalization in the IT sector has been shifting the control over wealth-creating operations increasingly into the hands of corporate management - thus further securing the IT companies' position as political actors (Sally, 1992:154-155; van Tulder and Junne, 1988:177). The third line of argument states that rapid technological change has moved high-tech policy-making beyond the capabilities and proficiency of the Commission officials, and made this public institution dependent on the IT companies to formulate their own innovation policies (van Tulder and Junne, 1988:177,196,213-214; Ostry, 1990:31; Peterson, 1992:228,243; Butt Philip, 1985:9,57).

By the end of the 1980s, however, the competitive position of the European IT industry had not improved. Although the Community had maintained its share of IT production, the persistently small shares of world semiconductor and computer production and deteriorating trade balances remained a far cry from the ambitious Commission target of "parity with if not superiority over American and Japanese competitors, within the next 10 years" (CEC, P-40:20 May 1983). Moreover, the computer and semiconductor operations of most European-owned IT producers were or became loss-making. In 1990, Nixdorf was on the verge of bankruptcy, Philips was forced to withdraw from a prestigious R&TD project, and ICL was taken over by Fujitsu. The crisis developing in the European IT industry made urgent political action imperative. ESPRIT, however, was considered inadequate to improve, or even sustain, the competitive position of Europe's IT producers. This situation prompted the European Community to develop a new IT policy approach, in addition to its ongoing efforts to complete the Single European Market and its continued use of trade policy instruments.

In April 1991, the Commission presented its proposed policy response to the continued plight of its IT and electronics industry: the 1991 White Paper. This communication identified five areas of policy action: (1) the improvement of the business environment, including standardization, (2) the advancement of training, (3) the strengthening of technological mastery and dissemination, including the development of a second generation of R&TD projects, (4) the establishment of equitable conditions of competition and market access in an open, multilateral trade system, and (5) the stimulation of demand through pan-European infrastructural projects called Trans European Networks (TENs).

In contrast to the early and mid-1980s, when the shape of the Community's policy approach towards the IT sector had been strongly influenced by the IT

Roundtable, the 1991 White Paper fell far short of the expressed preferences of the Roundtable, notably in terms of its support for the European-owned IT producers and its implications for foreign-owned competitors. Not fully satisfied with the Commission's response to the problems of the IT sector, the IT Roundtable companies pressed both the Commission as well as their respective national governments for a more far-reaching implementation of the areas of action identified in the White Paper, and for specific support measures beyond the scope of the White Paper.

Initially, the IT Roundtable's efforts appeared to have some success. The Council of Ministers, which had endorsed the Commission's White Paper in April 1991 and had called upon the Commission to propose concrete measures, decided that the urgency of the matter justified the Council taking the initiative. In November 1991, it signed a Resolution which not only called for a swift implementation of the five action areas identified in the White Paper, but also provided for a more aggressive implementation of the White Paper's market access, R&TD and demand stimulation provisions. Additionally, the IT Roundtable companies had started discussions on a Semiconductor Initiative, which was to provide for specific support measures beyond the White Paper's scope. The Initiative, however, collapsed due to lack of funding and diverging corporate strategies. The Council Resolution, meanwhile, remained "a sleeping beauty", largely due to controversies amongst the Member States (EP sources, Interview 1;1993).

Despite the Council Resolution's call for immediate action, subsequent implementation of the White Paper proved to be a time-consuming process, particularly in the areas of R&TD, market access, and TENs. By December 1993, when structural changes had altered the industrial IT landscape substantially, the Fourth Framework Programme, providing for a second generation of IT research projects albeit with less funds then envisaged, had yet to be adopted. Market access agreements in the area of

IT had yet to be materialized. Moreover, the TENs, hampered by controversies over funding, had yet to be realized.

As the discrepancies between the IT Roundtable's policy preferences and the 1991 White Paper seem to indicate, in the early 1990s, the IT Roundtable, as an association comprising the largest European-owned IT companies, appears to have been unable to exert a determining influence on the development the Commission's new policy approach towards the IT industry. Moreover, the IT Roundtable seems to have been unable to mobilize adequate support for a more aggressive implementation of the areas identified in the White Paper or for the adoption of more specific support measures beyond the scope of the White Paper. Finally, the IT Roundtable appeared unable to mobilize sufficient support for a swift implementation of the 1991 White Paper and to secure the preferred levels of funding.

In the early 1990s, the IT Roundtable seems to have been less successful in translating its policy preferences into policy outcomes than in the early and mid-1980s; it appeared less influential than it used to be. Yet, in the early 1990s, the companies continued to account for the majority of Europe's indigenous IT production capability (Communication 36;1994); the trend towards internationalization continued to shift control over national wealth increasingly into the hands of corporate management; and rapid technological change continued to move high-tech policy-making beyond the proficiency of the Commission officials. If one takes into account that the factors that allegedly explained the IT Roundtable's preponderant influence on ESPRIT continued to be applicable, how can the Roundtable's apparent loss in political influence be explained?

1.2 LOCATING THE ISSUE IN THE THEORETICAL REALM

1.2.1 THE STUDY OF INTERNATIONAL POLITICAL ECONOMY

By addressing this question, this thesis focuses on an issue in international political economy (IPE). Along the lines of Gilpin (1987:9) and Frieden and Lake (1991:1), IPE has been defined in this thesis as the area of study focusing on the mutual interaction between states and markets in the global arena.

In IPE, three forms of "diplomacy" matter (Stopford and Strange, 1991): (1) the interaction between states and their respective governments; (2) the interaction between firms and, in particular, multinational enterprises (MNEs) in the global markets[1]; and (3) the interaction between states (governments) and firms (MNEs). By focusing on the interaction between the IT Roundtable companies, both individually and as a group, as the "firms", and the EC and its Member States as the "home government", this thesis addresses these three forms of diplomacy.

Inter-state relationships are highlighted when discussing the position of the EC in the international system of states (see Chapters 6 and 9). In particular, the EC's relationships with its Triad partners are stressed, as exemplified by the discussion of the EC's leverage over Japan and the US in international negotiations on IT-related issues (see Chapter 9). Moreover, diplomacy between governments plays an important role within the EC; interaction and bargaining between the EC's national governments constitute central elements in EC policy-making.

Inter-firm relationships are addressed when discussing the IT Roundtable companies and their economic and political alliances. Not only do the individual IT Roundtable companies cooperate with their European and foreign counterparts on R&D, production, marketing and distribution (see Chapter 5), also the companies cooperate to gain political advantage - as their participation in the IT Roundtable and other industry lobby groups has illustrated (see Chapters 3,4 and 7).

Central to this thesis is, however, the third form of diplomacy, namely the relationships between states and firms. In IPE literature, most readings dealing with state-firm relationships focus on the interaction between Western MNEs, on the one hand, and the governments of developing countries, the so-called host governments, on the other[2]. However, as Eden (1991:215) argues, a logical extension of the prevailing IPE literature would be to discuss the interaction between MNEs and their home governments, as has been done in international business literature[3]. Like host governments, home governments would prefer their multinationals to invest in their country, create employment, and generate value-added. Like host governments, home governments are pressured by their multinationals to supply favourable policies aimed at improving both the operating conditions for business. It is this interaction that warrants further description and analysis.

1.2.2 EUROPEAN COMMUNITY STUDIES

As a case-study on the EC, its IT industry, and their mutual interaction, this thesis can be located in the area of European Community studies. In particular, three aspects of this case-study should be emphasized. First, in the early 1980s, the European Community became an active player in the area of information technology policies - a move well-documented by authors like Sandholtz (1992), Sharp (1987,1991) and Mytelka (1991). While this thesis touches upon ESPRIT, its main emphasis is on the new IT policy developments in the early 1990s. As such, this thesis seeks to update the existing literature on EC IT policies.

Second, as outlined above, one of the driving forces behind the introduction of common IT policies was the deteriorating performance of the European IT industry. Albeit far less the focus of academic attention than the performance of the US and Japanese IT industries, the development of the European IT industry until the 1990s has been described and analyzed by, amongst others, Malerba (1985, 1991), Flamm (1988), and Brady and Quintas (1991). Since the late 1980s, however, the IT industry, and notably the computer segments, have been subject to substantive structural changes. Analysis of the dynamics taking place in the European IT industry in the early 1990s, however, has remained predominantly the domain of economic reporters, particularly Alan Cane of the Financial Times. By focusing on the development of the Community's IT industry over the late 1980s and early 1990s, this thesis includes coverage of a crucial period in the Community's IT industry.

Third, to the extent that the European-owned IT companies and the EC Commission cooperated in establishing *EC-level* policies, this case-study links in with the literature on the dynamics of European integration, and the roles played by European institutions, national governments and societal actors in this process[4]. In particular, this thesis will focus on the role played by multinational enterprises in the process of integration. The issues addressed include: whether or not the IT Roundtable members shifted the focus of their lobbying activities towards the Community, indicative for some form of political spillover (Haas, 1958:9,10,16; Lindberg, 1963:6,94-103; Tranholm-Mikkelsen, 1991:14); and whether or not the European Commission used this high-profile group of companies to strengthen its information base, assert its identity and legitimize its policy proposals in its attempt to "cultivate" spill-over (Butt Philip, 1985:9,46; Tranholm-Mikkelsen, 1991:15).

1.3 METHODOLOGY

At the heart of the question about the IT Roundtable's ability to shape the Community's IT policies, mobilize support for these policies, and affect their implementation, is the question of its political influence over the European Community, i.e. its ability to affect public policy formulation, decision-making and implementation in such a way that the policy outcomes reflect the Roundtable's policy preferences (see Chapter 2). Did this association of the largest, European-owned IT and telecommunications companies indeed exert a preponderant influence over the Community in the case of ESPRIT, as various authors have suggested? Did the IT Roundtable subsequently lose some of its political influence on EC IT policies in the early 1990s and, if so, why did this happen?

1.3.1 ASSESSING CORPORATE POLITICAL INFLUENCE

The first area of research, which will be addressed in Chapters 3 and 4, centres around the question whether or not the IT Roundtable, as a group of companies, was able to exercise political influence over the Community over two time periods: (1) the early and mid-1980s (1980-87); and (2) the late 1980s and early 1990s (1987-1993). Although the changes in political influence became only apparent in the early 1990s in the context of the 1991 White Paper, the year 1987 has been chosen to mark the approximate start of the second period, as many of the structural changes affecting the companies' influence started to accelerate and intensify from the late 1980s onwards (see Chapters 5,6). As two interviewees commented: "the influence [of the IT Roundtable firms] disappeared after 1987" and the companies had lost their "credibility by the late 1980s" (CEC and IT company sources, Interviews 11,15;1993). From the outset, one should note that these time periods, delineating two phases in the effectiveness of the IT Roundtable's corporate diplomacy, are not synchronized with the duration of the Community's policies; for example, this thesis argues that the companies started losing influence while the ESPRIT programme was still in operation.

In order to be able to verify any change in corporate political influence over the two time periods, it is important that the basic assumption, i.e. the assertion that the IT Roundtable was influential in the case of ESPRIT in the early and mid-1980s, will have to be tested on the same basis as the hypothesis that the IT Roundtable lost some of its influence in the case of the Community's IT policy response in the late 1980s and early 1990s. The key question that thus arises is: how can one measure corporate political influence, both relative to other explaining variables as well as over time?

Establishing Correlations. Milner (1987a:258) justifies her assumption that industry preferences influence public policy outcomes on the basis of a correlation between the preferences and the policies:

> In none of the [..] cases were industries accorded protection when they, or substantial parts of them, did *not* desire it. [..] in many cases when industries demanded changes in barriers, they were able to obtain them.

Beyond the fact that arguments based on identifying a high association between corporate policy preferences and policy outcomes easily give in to circularity, as Gourevitch (1986:58) points out[5], such arguments do not provide sufficient proof of any causal links. As Causer (1978:47) argues: "just because a policy serves the interests of a group, it is not necessarily a result of the pressure of that group". Other policy-conditioning variables, beyond the pressures exerted by societal interest groups like companies, could include ideological influences[6]; the specific pressures exerted and roles played by state structures and actors, including bureaucrats and politicians[7]; and the constraints imposed and the opportunities generated by the broader structure of international economic and political relations[8] (Cohen, 1990:268-269; van Walsum, 1990:7-13;126-152). In order to strengthen such arguments, more should be known about the importance of companies in shaping policy outcomes relative to other explaining variables.

Abstract Model Building. Cohen (1990:270) argues that only abstract model building and empirical tests can allow for a more systematic specification of the relative roles of various variables, including companies, in explaining public policies. However, aside from the advantages and disadvantages of the various statistical techniques used, such an exercise would have to overcome a number of obstacles: (1) the measurement of political influence; (2) the gathering of empirical evidence; and (3) the complications posed by both the nature of the policy-making and implementation processes and the nature of lobbying.

First, political "pressure cannot be measured directly" (Lavergne, 1983:6). Indicators have to be found to proxy both the results of political influence (dependent variables) as well as the determinants of corporate political influence (independent variables). As the explanatory power of a model is only as good as the proxies are, selecting, defining and interpreting these indicators thus constitutes the first major hurdle to overcome in building "formal structures to the interactions between market and politics" (Cohen, 1990:281)[9].

Second, once the indicators have been established, empirical evidence has to be gathered to give substance to these indicators. The required information may be neither available nor accessible or complete, posing an additional problem. As Salamon and Siegfried (1977:1035) noted:

> Measuring the actual exercise of political influence - lobbying, campaign contributions, informal contacts, and so forth - across numerous industries is highly sensitive to the gross imperfections in the information reporting requirements and the resulting glaring gaps in data.

Third, it is questionable whether establishing a statistical correlation between the indicators for corporate political power on the one hand, and public policies on the other, overcomes the methodological problems posed by establishing a correlation on the basis of argument. Establishing a statistical correlation negates the nature of the policy-making and implementation processes and that of corporate lobbying. Companies advocate their policy preferences at various points in the policy formulation and decision-making process and at various points in time. The results of a company's lobbying at one point in time may only crystallize after a number of years. In the process, the company's policy preferences may have become intertwined with, for example, a bureaucrat's own, independent ideas, making it difficult to separate corporate political influence from other explanatory variables. Moreover, the main outcomes may actually be the result of developments in other, non-related and non-targeted policy areas.

For the above mentioned reasons, the author agrees with Gourevitch (1986:66) that "the testing of alternative explanations and specifying their relative weights" through modelling, "cannot be used here, because satisfying the conditions of experimentation is impossible".

Measuring Perceived Influence

Rather, this thesis argues that corporate political influence is only measurable in terms of "perceived" influence, i.e. the political influence of companies on public policy outcomes as perceived by selected government officials, corporate executives and representatives, and industry/government observers. This method, which will be applied to the EC IT policy case in Chapters 3 and 4, is comparable to what Dahl (1963:52) calls "judgements of well-placed observers". Although this method "puts us at the mercy of the judges", Dahl (1963:52) also considers it to be "relatively simple, quick and economical" and potentially "highly useful". The potential benefits of this method lie, in particular, with its ability to be applied to comparisons. First, by asking well-placed observers about a wider range of explaining variables (see above), some general assessment can be obtained about the importance of the companies' influence relative to the influence of other factors. Second, by asking these observers to give their perception of the change in corporate political influence over time, this method helps to overcome the problem of comparing influence over two time periods.

A crucial element of this approach to measuring influence is the selection of the so-called "well-placed observers". Three complementary and partially overlapping methods were used to select the interviewees in this thesis. First, through analysis of documents on EC IT decisions, a list was compiled of which actors (institutions, organizations, companies, departments, divisions, persons) participated in the decision-making on IT policy issues in general, and ESPRIT, the 1991 White Paper, the Fourth Framework Programme, the TENs and the EC's trade policies in particular. Second, within the relevant institutions, a list was compiled of the responsible officers and executives, partly on the basis of directories, partly with the help of public relations and personnel officers and other primary sources. In order to contact the persons that were actually involved in the 1991 White Paper policy-making and implementation process, many of the interviewees were interviewed not in relation to their current jobs, but in relation to their former positions; by 1993, most of the EC officers dealing with the 1991 White Paper and its implementation, for example, had moved to new posts. Due to the time-lapse involved, selecting figures that were involved in the policy-making and implementation of ESPRIT in the early and mid-1980s proved to be more difficult. Only a few of the interviewees were able to give first-hand accounts; the others, albeit showing a detailed knowledge of the situation in that time period, gave evidence on the basis of secondary accounts - which constitutes a potential weakness in the approach adopted in this thesis. Third, a snow-ball approach was used; the selected interviewees either were asked to name additional key figures or spontaneously mentioned other relevant officers and executives.

Over the course of 1993, semi-structured, in-depth interviews and shorter, follow-up discussions (communications) were conducted with 47 interviewees from the EC, the national governments, the European IT companies, and their industry federations.

At the EC level, the Commission and the European Parliament were contacted. Issues related to the Council of Ministers were addressed mainly via the national governments. Within the Commission, officers of DG 3 (Internal Market and Industrial Affairs), DG 13 (Telecommunications, Information Industries and Innovation) and DG 12 (Science, Research and Development) were interviewed. As DG 3 has been involved in the coordination of IT industrial policies since 1990/1991, this directorate has also been a focal point for the formulation and analysis of the external trade and competitive aspects of IT policies, even though these formally fall under the responsibilities of respectively DG 1 and 4. Additional information about the position of these DGs was obtained through secondary sources. Within the European Parliament, representatives of the two committees that deal with IT issues, were contacted: the Committee on Energy, Research and Technology and the Committee on Economic and Monetary Affairs and Industrial Policy.

At the M/S level, efforts were focused on the five countries with an indigenous IT production capability, namely the Netherlands, France, Germany, Italy and the UK (see below). Amongst the interviewees were the national representatives to ESPRIT. The policy stances of the remaining EC Member States was covered mainly through secondary sources, such as government documents and reports, news coverage, and other publications.

At the corporate level, interviews were conducted with executives of the largest, European-grown IT companies Bull, Philips, Siemens, Olivetti, Thomson and ICL (see below). Information about the telecommunications core within the IT Roundtable and other IT consumers, foreign IT companies, and European-owned IT SMEs was obtained through secondary sources.

Contacts with the companies' interest groups were largely confined to the European-level industry federations, industry associations, and standardization bodies: UNICE, ORGALIME, EECA, EUROBIT, CEN, CENELEC, ETSI, the ERT, the IT Roundtable, BOS, ECMA, SPAG and EWOS. Although various national organizations, and notably ANIE and the EEA, were contacted to give insight into specific questions (see, for instance, Chapter 7), it was beyond of the scope of this thesis to contact all national industry associations and standardization bodies involved. This move, however, can be justified in the light of the relatively small role played by the national associations and standardization bodies in IT policy-making at the EC level. First, although the national industry associations and standardization bodies may have directly contacted the Commission on IT-related policies, little evidence was found thereto in the interviews with EC officials. Most national associations and standardization bodies appeared to operate via their European-level counterparts. Second, although the national industry associations and standardization bodies are expected to have influenced the policy stances of their respective home governments on IT policy issues, so have the individual IT Roundtable companies. As Chapter 7 will show, the national governments have not only been open to the lobbying of their former "national champions", also they have been susceptible to their arguments - with the possible exception of the UK government.

1.3.2 EXPLAINING CORPORATE POLITICAL INFLUENCE

Assuming that the IT Roundtable has lost some of its political influence on the Community's IT policies over the late 1980s and early 1990s, the second area of research, which will be the focus of Chapters 5 to 9, concentrates on the question why the IT Roundtable has become less influential. In order to answer this question, two issues have to be addressed: (1) what determines corporate political influence over governments in general, and the EC, a non-monolithic regional public authority in particular, and (2) what causes any changes therein. To what extent can the existing literature help us understand corporate political influence better?

International Political Economy Literature. In IPE, an extensive literature exists on explaining economic (trade) policy outcomes, as evidenced by the works of Baldwin (1989), Bhagwati (1988), Conybeare (1987), Gourevitch (1986), Lake (1988), Lavergne (1983), and Milner (1987a). Although most of these studies do acknowledge that economic, non-governmental interests in general, and companies in particular, have a role to play in the explanation of economic policy outcomes, most research has not gone much beyond this recognition. Even Milner (1987b), who argues that her case studies "do lend credence to the idea that industries' access to the state provided them with influence", pays little emphasis to how and why companies, individually or as a group, exercise an influence over government, and the extent to which they do relative to the other influences mentioned above; her main emphasis is on the factors determining corporate policy preferences. More thus needs to be known about the conversion of corporate policy preferences into public policy outcomes.

Yet, these IPE studies are valuable in the sense that they stress that the influence of companies is not the only factor shaping policy outcomes; as outlined above, other domestic-level variables and system-level variables may play a role.

Although this thesis emphasizes the role of companies, it is thus clear that any approach focusing on analyzing corporate political influence should integrate other explaining variables as well. Readings focusing on governments, their competencies, instruments and resources[10], and readings discussing the success and failures of government intervention in industries[11], for example, give valuable insights into the impact of the "state" and the "international system" on economic policy outcomes.

Interest Group Literature. Important concepts regarding the conversion of corporate policy preferences into policy outcomes can be derived from interest group literature. European-based interest group literature, including the works of Butt Philip (1985, 1987), Kirchner and Schwaiger (1981), and Sidjanski (1972), has yielded important insights into the political activity undertaken by companies. Deriving their strength from their descriptive, classifying nature, these studies have focused on the various forms of interest representation at the Community level and their respective membership, organization, objectives, lobbying resources, and activities. Additionally, they have focused on the public institutions targeted and the latter's institutional and procedural arrangements.

Recent studies have started to place more emphasis on the structural economic variables underlying political activity; as McLaughlin and Jordan (in Mazey and Richardson, 1993a:123-157) illustrate, economic factors affect not only the forms of interest representations prevailing in a particular industry, but also the answer to question why companies participate in collective actions at the Community level in the first place.

At the heart of this question is Olson's argument on collective action. Olson (1965:5-52) argues that the ability of political actors to organize themselves depends upon the size of the benefits that the participants are likely to derive from joint political action, the costs of participation, and the opportunities for free-riding. By recognizing that the opportunity for free-riding is smaller and the likelihood of greater individual gains is larger in *small*, elitist groups, like the IT Roundtable, Olson accords an explicit role to the number of players in explaining collective action. Moreover, Olson accords a role to the degree of concentration in an industry; despite the greater opportunity for free-riding, a few large actors operating in a *larger* group, such as the top European-owned semiconductor producers in the European Electronic Component Manufacturers Association (EECA) or the top computer companies in the European Association of Manufacturers of Business Machines and Information Technology Industry (EUROBIT), may be willing to incur the costs of collective action if they would stand to gain disproportionally from joint action.

Olson's assertions have been tested empirically by various interest group studies that are rooted in the tradition of economics. Quantitative studies by authors, like Caves (1976), Esty and Caves (1983), Salamon and Siegfried (1977) and Lavergne (1983), have sought to correlate structural economic variables that are supposed "to describe an industry's potential for exerting political influence" (Esty and Caves, 1983:29), such as industry concentration, geographic dispersion and company size, with some indicator for political activity.

However, as Esty and Caves (1983) argue, there is a difference between political activity and political success. This raises the question as to what transforms an industry's potential for exerting political influence into a reality. Lindblom (1977) and other authors, like Finer (1955) and Causer (1978), have sought to address this issue by focusing on the structural influence of business, which finds its source in the economic functions performed and controlled by companies. According to Lindblom (1977:174), the dependency of governments on these economic functions has made it imperative for governments to accommodate corporate policy preferences.

Lindblom, however, focuses on the disproportionate influence of business relative to other societal interests, while this thesis seeks to address the disproportionate influence of a specific segment within business, namely the indigenous European IT companies, relative to other interest groups. Lindblom's basic concept, namely that companies perform and control certain functions that are in demand by government, thus has to be altered and finetuned for our purposes. As the demands of governments and the control of companies over economic functions may change, corporate political influence is not static. This thesis recognizes, in line with Finer (1955:292), that corporate political influence may change over time.

International Business Literature. Research on the economic, political and social impact of multinationals on home and host countries[12] and studies researching the bargaining between companies and host countries[13] provide additional insights into the structural influence of business in general, and companies in particular. These international business studies show that governments are interested in the benefits that companies may provide to their respective countries, that multinationals are interested in the resources countries have to offer, why this is the case, and why this gives both the governments as well as the companies more or less bargaining power in their interaction with each other.

Additionally, these studies illustrate that and analyze why bargaining power may change over time. In these studies, a shift in bargaining power away from the government and in favour of high-tech companies is often explained by pointing at internationalization and rapid technological change (see, for instance, Kobrin, 1987). However, although valid, these explanations neglect the fact that internationalization and rapid technological change may make "firms at once more and less dependent on their governments" (Milner, 1987a:296). Even internationalized high-tech firms depend on their governments to create and maintain the conditions necessary for a stable and open international market, favourable to large and long-term resource commitments.

Any approach on analyzing changes in corporate political influence should thus re-evaluate the impact of internationalization and technological change, and take into account other imperatives, both structural as well as short-term, that may contribute to an explanation of the changing ability of companies to transform their policy preferences into policy outcomes at any given point in time.

A New Approach

Although the concepts and notions outlined above provide us with interesting insights, none of the individual strands of literature appears to present a coherent and comprehensive approach for analyzing corporate political influence. For that reason, this thesis develops in Chapter 2, on the basis of the theoretical foundations outlined above, an interdisciplinary approach for analyzing what determines corporate political influence and what causes it to change over time. As most of the theoretical works apply to national governments rather than public authorities operating at a regional level, some theoretical concepts have had to be adjusted to enable their application to the European Community (see Chapter 2).

Defining Corporate Political Influence. Companies are only politically influential if they succeed in converting their (professed) policy preferences[14] into actual public policy outcomes. In order to address the conversion process in an analytical manner, this thesis defines corporate political influence as a product of three determinants, namely political activity, political weight and political realization.

Corporate political activity, which is a precondition for political influence, comprises all the activities that companies undertake to make their preferences heard. These activities vary according to the effort involved, the channels used, the institutions and officials targeted, and the timing of the events. However, despite the fact that companies are in control of decisions regarding their political activity, companies can only partially "create" the opportunities for articulating their policy preferences. The opportunities for voicing their policy stances are also affected by the "openness" of the political systems in which they operate. The openness depends on a number of factors, including the degree of fragmentation of policy-making and implementation, the extent of insulation of the policy-formulating bureaucracy, the legitimacy of the public authority, the public authority's need for information, and the attitude towards corporate demands, based on ideology and past experiences.

Political activity alone, however, is not sufficient to influence the government. Rather, a government's susceptibility to the preferences brought forward depends on the weight that the companies' policy preferences carry. The political weight of corporate policy preferences can be perceived as a function of two variables: the real and perceived value of "corporate assets". Corporate assets are those firm-specific resources that are in demand by a government as they could further the government's objectives of greater wealth, political sovereignty, security, and social stability. Corporate assets, which may be allocated unevenly across a country or region, include, for instance, employment, value-added and exports. The real value of these assets depends on their absolute size; their perceived value depends on the ranking of the government's objectives and the available alternative sources of assets. Since companies, as sources of these assets, can offer or withhold the assets at their discretion, the government cannot be indifferent to their policy preferences.

Even if the companies' preferences carry sufficient political weight, these companies will only exert political influence if the government is able to deliver upon its promises and can provide the policies or actions requested. A government, however, may be hampered in the political realization of corporate policy preferences if it is constrained in its actions by shortcomings in its competencies, its array of policy instruments, its resources, and its speed of policy-making and implementation, or by external constraints.

Dynamics. If corporate political influence can be perceived as a product of three determinants, namely political activity, political weight and political realization, what then causes these determinants of corporate political influence to change over time? What determines whether or not corporate diplomacy pays off? This thesis argues that changes in the determinants of corporate political influence may be caused by structural and short-term changes in the industrial production and public policy-supply arrangements which govern what products are produced or what policies are supplied, how, on what terms, by which companies and where, or by what government at which level.

1.4 THE PLAYERS

Prior to discussing this approach in detail, it is important to discuss the key actors that play a role in this thesis, namely (1) the European-owned IT multinationals, together constituting the information technology core of the IT Roundtable, and (2) the European Community.

1.4.1 THE EUROPEAN-OWNED IT MULTINATIONALS AND THE IT ROUNDTABLE

The thesis focuses on the largest, European-owned IT multinationals, constituting the information technology core of the European Information Technology Industry Roundtable (IT Roundtable). The IT Roundtable, which brings together representatives from Europe's largest indigenous IT and telecommunications (equipment) producers into a private and comparatively little institutionalized association, was formed over the course of 1979/80 when Industry Commissioner Etienne Davignon invited these companies to give the Commission policy input on R&TD-related issues. Davignon, which regarded the IT and telecommunications industries as strategic for Europe's economic future, sought to set up an EC R&TD policy aimed at improving the competitive position of Europe's indigenous producers vis-à-vis their American and Japanese counterparts. Over the period 1987-89, however, the IT Roundtable companies decided that the time had come to cooperate in a more formal manner both in the area of R&TD as well as in areas beyond this field. Since 1989, when the companies formally presented the Roundtable's new set-up to the Commission, the IT Roundtable has been preparing joint recommendations on all issues concerning the IT industry, including external trade and internal barriers (Communication 36;1994).

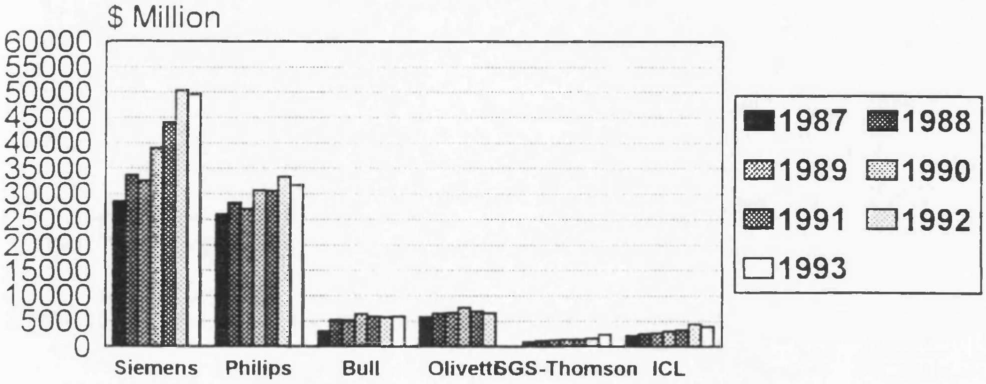
At its inception, the IT Roundtable constituted of the representatives of the 12 largest European-owned electronics companies. In the early 1980s, the main IT producers within the IT Roundtable included the large, diversified electronics companies Siemens (G), Philips (NL) and Thomson (F), and the smaller undiversified computer and semiconductor producers Bull (F), Nixdorf (G), Olivetti (I), ICL (UK), and Plessey (UK). Since the late 1980s, however, the number of computer and semiconductor producers within the IT Roundtable has been reduced. Following the take-overs of Plessey and Nixdorf and the expulsion of ICL from the IT Roundtable, the remaining computer and semiconductor producing IT Roundtable members have been Siemens (including SNI), Philips, Olivetti, Bull and Thomson (including SGS-Thomson).

Since the European Commission has continued to seek improvement of the IT industry's competitive performance over the subsequent years, and the IT Roundtable has been a partner of the Commission in the formulation of the EC's policy response, this thesis will focus on this "interest group" and, within this group, on the largest, European-owned *information technology* multinationals that have been members, i.e. SGS-Thomson (via Thomson), Olivetti, Bull, and the IT operations of Philips and Siemens. Nixdorf will be discussed in the context of Siemens, as Nixdorf merged with Siemens' dataprocessing operations in 1990. To the extent that Plessey will be discussed, it will be done so in the context of Siemens, as the latter acquired Plessey in a joint bid with GEC in 1989. ICL will be discussed as a separate and special case; the company was expelled from the Roundtable in 1991, following its take-over by Fujitsu. Despite its current status as a foreign-owned firm, attention is warranted as the friendly take-over of the only large, British-grown computer producer by a Japanese company has had serious implications for the political balances in IT policy-making at the European Community level. Figure 1.1 outlines the key characteristics of the five European-owned IT companies and ICL. For a fuller understanding of the companies and their performance, the reader should refer to Appendix 1.1, which gives a profile of the companies in question. Throughout the course of this thesis, these profiles may serve as useful background reading.

The focus on the largest, European-owned IT multinationals within the IT Roundtable imposes three limitations to the scope of the thesis that need to be specified in further detail. The first limitation is the thesis' focus on European-owned companies. The "Europeanness" of a company can be defined by numerous criteria, varying from the location of headquarters and incorporation, to the citizenship of the company's managers in a European country (Kline, 1989:26). The most commonly used criterion is that of ownership. In this thesis, a company is called European-owned if European shareholders own more than fifty per cent of its stock (see Table 1.1). Although a 10 per cent share is generally assumed to yield an "effective voice" in corporate management (IMF and OECD in Robock and Simmonds, 1989:22), only a

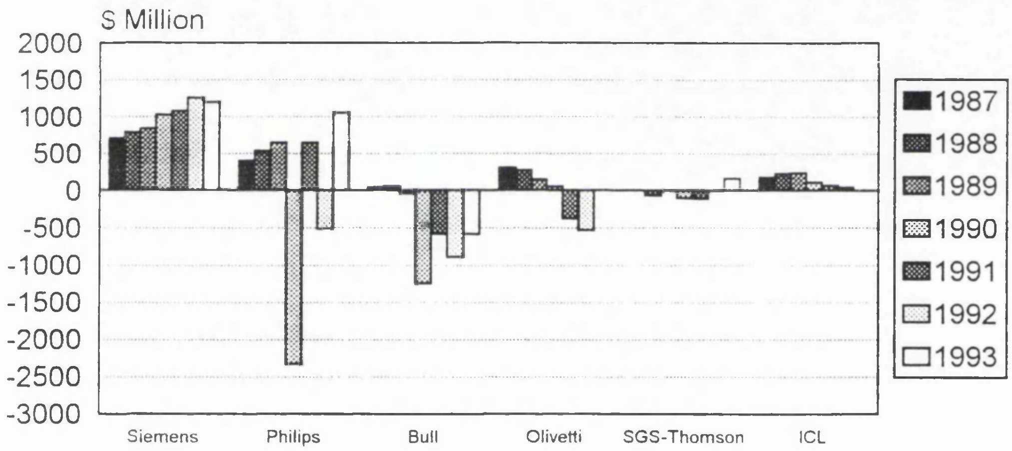
Figure 1.1 European-Grown IT MNEs: Profiles, 1987-1993

Sales



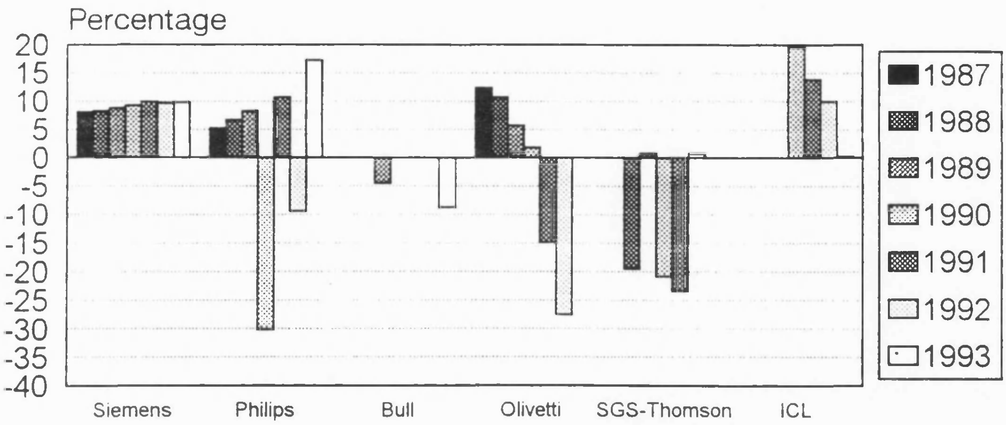
Source: Appendix 1.1 Olivetti Data 1993: N/A

Net Income



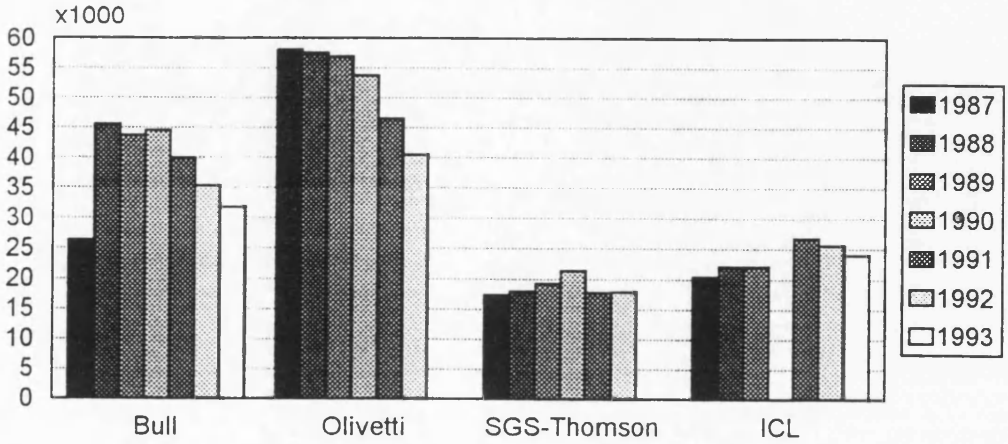
Source: Appendix 1.1 Olivetti Data 1993: N/A

Net Income as % of Equity



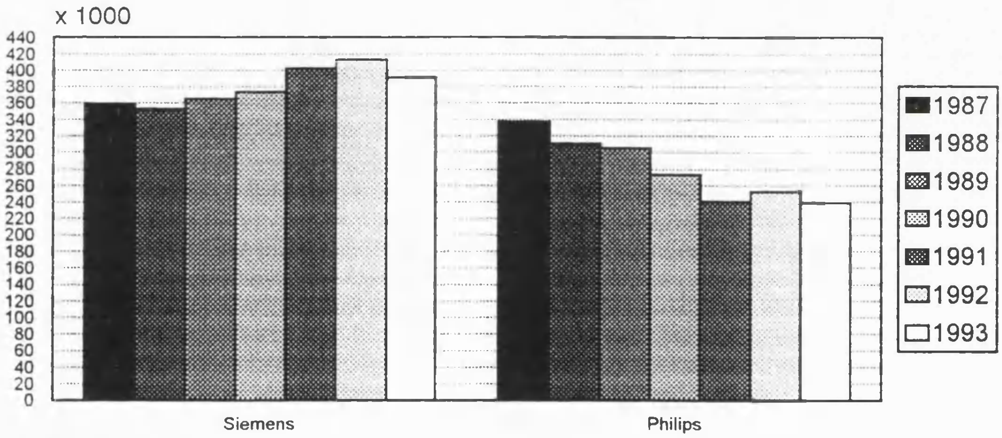
Appendix 1.1 Olivetti and SGS Data 1993: N/A; Bull Data 1990-1992: N/A

Employees



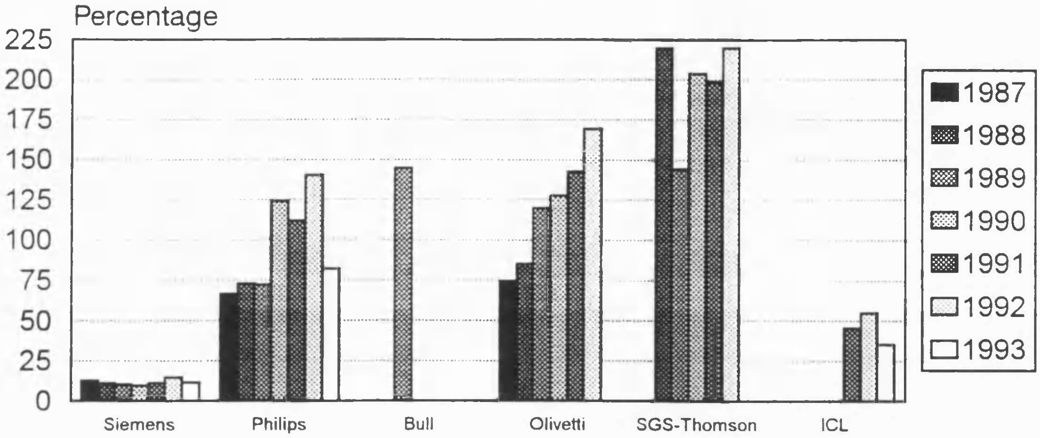
Source: Appendix 1.1 Olivetti and SGS Data 1993: N/A; ICL Data 1990: N/A

Employees



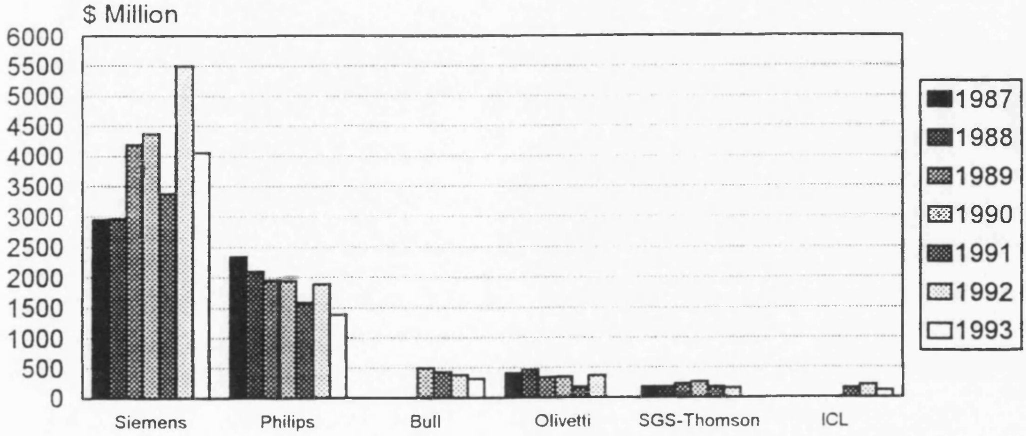
Source: Appendix 1.1

Long-Term Debt as % of Equity



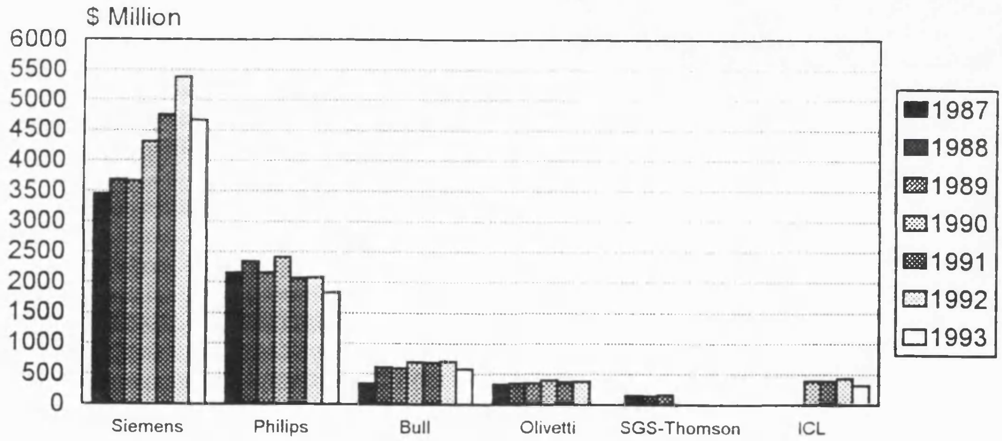
Appendix 1.1 Olivetti and SGS Data 1993: N/A; ICL Data 1987-1990: N/A; Bull 1990-1993: N/A

Capital Expenditure



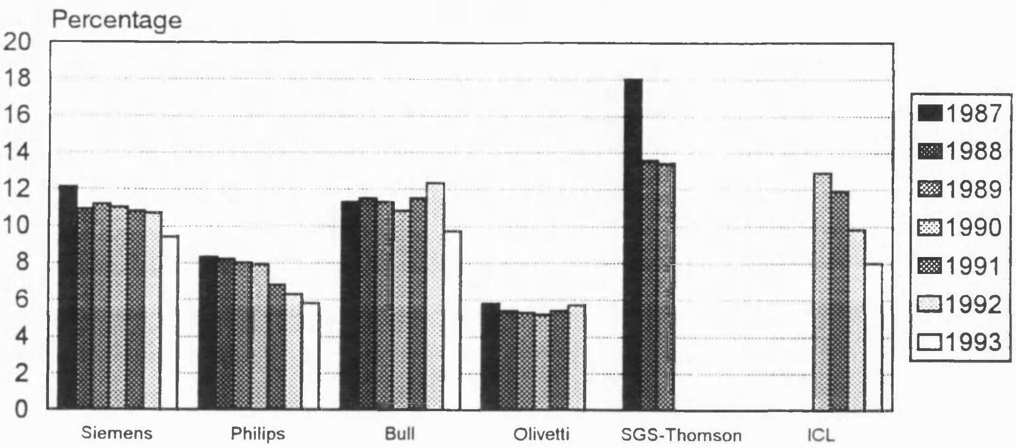
Source: Appendix 1.1 Olivetti and SGS Data 1993: N/A; ICL Data 1987-1990: N/A; Bull 1987-1989: N/A

R&D



Source: Appendix 1.1 Olivetti Data 1993: N/A; SGS Data 1990-1993: N/A; ICL Data 1987-1989: N/A

R&D as % of Sales



Source: Appendix 1.1 Olivetti Data 1993: N/A; SGS Data 1990-1993: N/A; ICL Data 1987-1989: N/A

Table 1.1

MEETING THE CRITERIA

Top 20 Suppliers to the European Semiconductor Market, 1990

Top 20	ITRT	OWN	C1	RANK	C3
Philips	**YES**	**NED**	√	1	√
Siemens	**YES**	**GER**	√	2	√
SGS-Thomson	**YES**	**FRA/ITA**	√	3	√
Motorola		USA			
Texas Inst		USA			
Intel		USA			
Toshiba		JAP			
NEC		JAP			
Nat.Semicon		USA			
AMD		USA			
Hitachi		JAP			
ITT		USA			
GEC Plessey	YES	UK	√	13	
Telefunken	YES *a*	GER	√	14	
Samsung		KOR			
Fujitsu		JAP			
Harris		USA			
Mitsubishi		JAP			
Analog		USA			
LSI Logic		USA			

Source: EC Panorama 1991:12-11.

Criteria

Criterion 1 (C1) Ownership: A company is considered to be European-owned if European shareholders own more than fifty per cent of its stock.

Criterion 2 (C2) IT Focus: In the case of computer companies, this thesis focuses on those companies that obtained at least 40 per cent of their dataprocessing revenues out of computer hardware prior to 1991.

Criterion 3 (C3) Size: A company is considered to be amongst the largest companies if it has a position in the Top 10 of suppliers to the European market.

Notes

OWN	Ownership
ZHW	Percentage hardware in total dataprocessing revenues
RANK	Position in Top 10 of Suppliers to the European Market
ITRT	IT Roundtable Membership

Table 1.1

Top 25 Suppliers to the European Computer Market, 1990

Top 25	ITRT	OWN C1		% HW C2		RK C3	
IBM		USA					
Siemens	**YES**	**GER**	√	**61.5**	√	**2**	√
DEC		USA					
Olivetti	**YES**	**ITA**	√	**55.4**	√	**4**	√
Bull	**YES**	**FRA**	√	**57.0**	√	**5**	√
HP		USA					
Unisys		USA					
Philips	**YES**	**NL**	√	**63.2**	√	**8**	√
ICL *b*	**Y/N**	**UK/J**	(√)	**44.2**	√	**9**	√
NCR		USA					
Compaq		USA					
Apple		USA					
CGS		FRA	√	0.0			
Canon		JAP					
Alcatel		FRA					
Nokia		FIN	√	54.0	√		
Xerox		USA					
Finsiel		ITA	√	0.0			
Sun		USA					
Memorex		NL	√	67.9	√		
Amdahl		USA					
Wang		USA					
Commodore		USA					
Comparex		GER	√	83.9	√		
Tandem		USA					

Source: Datamation, 15 June 1991:62.

a AEG's Telefunken Electronic is currently owned by Daimler

b Until 1990, ICL was British-owned. After the take-over by Fujitsu, ICL was ousted from the IT Roundtable

Choice of Year

The year 1990 is representative for the period 1987-1993, with the following exceptions: (1) with respect to the criteria of ownership in the computer industry, one should note that ICL (which was incorporated in STC prior to 1990) became Japanese-owned in 1990; (2) with respect to the criteria of size in the computer industry, one should note that Nixdorf had a position in the Top 10 of computer suppliers prior Siemens' takeover in 1990.

share of more than 50 per cent, i.e. an absolute majority, ensures that European shareholders have a decisive influence on management decisions. According to this definition, the British-based computer producer ICL used to be a European-*owned* company; only since Fujitsu's acquisition of an 80 per cent stake in the company has it been Japanese-owned. ICL, nevertheless, remains European by origin and development; it is a European-*grown* company.

The emphasis on European-owned companies, however, does not mean that foreign-owned firms will or can be excluded from the analysis. Economically, they cannot be neglected. A large share of the European IT market is supplied by foreign corporations, which either export to the Community and/or have established themselves in the EC through foreign direct investment (see Chapter 5). Politically, the "national" treatment of foreign-owned companies has proven to be a sensitive issue at the EC level, with some Member State encouraging their investments and others taking a far more cautious approach (see Chapter 4).

The second limitation in the thesis' scope is formed by its emphasis on information technology. Defining IT has proven to be an arduous task (see Appendix 1.2). This thesis defines the IT industry as the industry comprising the suppliers of components (including semiconductors), dataprocessing products and applications. Although this definition covers a wider range of products, the main emphasis in this thesis will be on two high-profile segments within the IT industry, namely the semiconductor and dataprocessing (computer) segments. These segments have not only been politically sensitive but also subject to major economic changes. In this thesis, the data on the semiconductor industry comprises both information on discrete devices as well as integrated circuits, unless otherwise stated. Data on the computer or dataprocessing industry refers not only to processing and peripheral hardware, such as mainframe, mini and microcomputers and printers, but also to computer software and services, datacommunications, and other dataprocessing products. The main emphasis of this thesis, however, will be on those companies that concentrated on computer hardware. Companies that obtained more than 60 per cent of their dataprocessing revenues out of computer software, services, datacommunications and other dataprocessing products prior to 1991 will be discussed only marginally (see Table 1.1).

The third limitation in the thesis' scope is the emphasis on the largest multinational enterprises (MNEs). Multinational enterprises can be defined for working purposes as companies that own and manage operations in two or more countries (Gilpin, 1987:231). Whether or not a multinational is one of the "largest" is a relative concept, entirely depending on the industry in which the multinational operates. Some companies that are ranked in the Top 3 of their own industry, may be considered SMEs in another. For working purposes, this thesis will focus on those firms that have a position in the Top 10 of suppliers to the European market (see Table 1.1).

The emphasis on the largest multinationals, however, does not mean that small to medium-sized enterprises (SMEs) will or can be excluded from the analysis. From an economic point of view, the relative importance of SMEs in the IT industry remains minimal although their ranking within the indigenous IT industry improved substantially after some larger European-owned producers, such as Philips (NL), sold their computer divisions to foreign manufacturers (see Chapter 5). Politically, the European Community has been attaching a substantive weight to SMEs, since they are seen as sources of employment (see Chapter 8).

1.4.2 THE EUROPEAN COMMUNITY

Central to this thesis is the political influence of the largest European-owned

IT companies over the European Community, i.e. the network of EC institutions involved in the policy-formulation, decision-making and implementation of Community policies, namely the EC Commission (CEC), the Council of Ministers (CoM) and its subordinate bodies, the European Parliament (EP), the Economic and Social Committee (ESC), other advisory bodies and their inter-linkages. Within the EC policy-making process, the Commission, representing the "European" interest, has been responsible for drafting proposals for Community legislations, while the Council of Ministers, platform for M/S interests, has been responsible for the final approval of legislative proposals. In accordance with EC decision-making rules, the Council has to request the input of the European Parliament, and, in many cases, the input of the Economic and Social Committee, prior to taking any decisions on legislative proposals. The EP has been directly elected by the citizens of the European Community, while the ESC represents employers, employees and other societal actors (see Chapter 7).

Companies that seek to influence the Community, however, should not confine their efforts to lobbying the EC institutions. This thesis argues that companies need to mobilize not only the support of the Community institutions but also that of the national governments, in order to get their policy preferences translated into EC policy outcomes. Although the policy-making takes place at the EC level, the role of the national governments in EC policy-making should not be underestimated for the following five reasons.

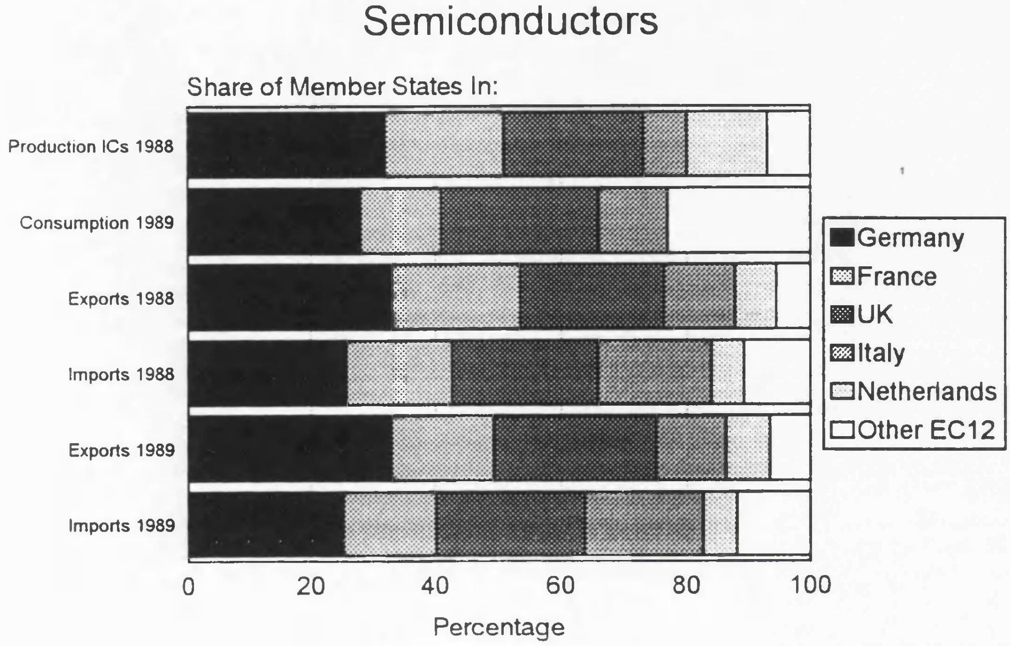
First, representatives of the national governments, sitting on expert committees and/or addressing the Commission informally, cooperate with the Commission when it is drafting the proposals for EC policies. Second, together with Commission officials, national representatives serve on the preparatory Council working groups that conduct the technical negotiations on these policy proposals. Third, the ambassadors of the Member States to the EC and their deputies sit on the Committee of Permanent

Representatives (COREPER) that perform the lower-profile political negotiations on the proposals. Fourth, the ministers of the Member States, constituting the Council of Ministers, have the authority to adopt final decisions on the policy proposals, or, alternatively, to amend them, stall their progress or reject them. The final decisions are, consequently, often the result of a lowest common denominator bargaining process between the Member States. Finally, M/S governments are either responsible for the implementation of EC decisions or send their national representatives to serve on committees cooperating with the Commission when the latter is responsible for implementation (see Chapter 7).

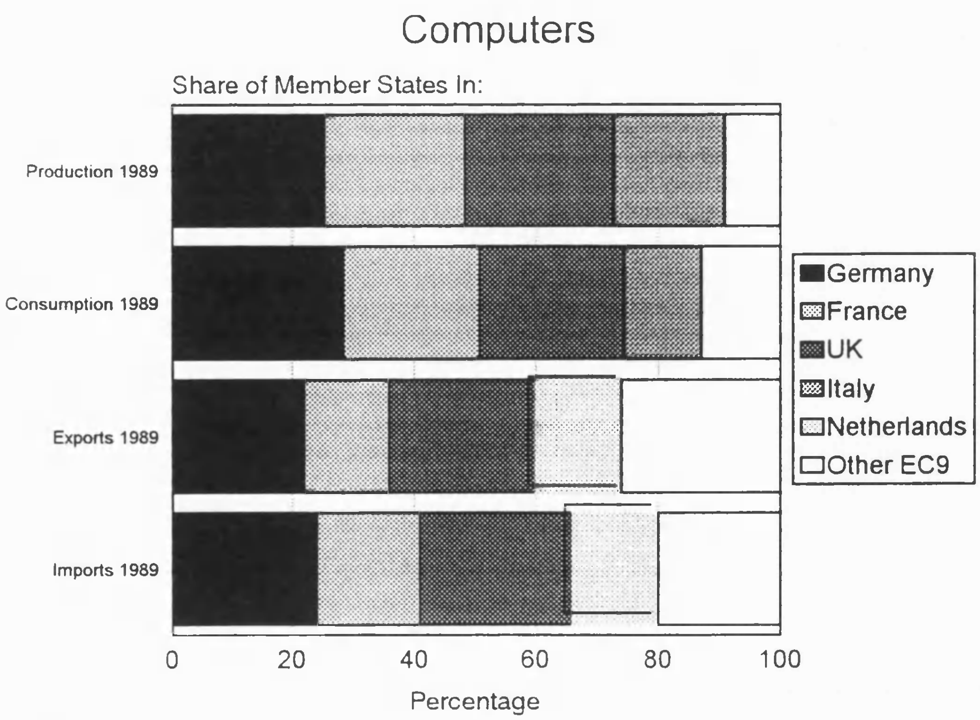
According to this account of the Community's policy-formulation and decision-making processes, it is unlikely that the European-owned IT companies can ever successfully press their case at the EC level without the support of the Member States, notably the three largest. Gaining the backing of the national governments and their representatives at the EC level is therefore seen as a crucial step in influencing the Community.

The Member States can be divided into two groups, namely those that are "home" to a European-owned IT company and those that are not. The main emphasis in this thesis will be on the first group of Member States, which comprises France, the UK, Germany, Italy and the Netherlands. Figure 1.2 outlines the position of these countries as producers, consumers, exporters and importers of information technology. One should note that data on national IT production is not confined to national producers, but also includes production by other European producers and non European-owned firms, notably American, manufacturing in the country in question. This applies particularly to the UK; allegedly, 49% of the total number of UK-based IT companies is foreign-owned, representing approximately 80% of the value yielded by the UK IT industry (DTI sources, Interview 40;1993).

Figure 1.2 EC Member States: Country Profiles, 1988-1989



Source: Appendix 1.3



Source: Appendix 1.3

The four large countries have been accounting for the majority of European IT production, consumption and trade. At the end of the 1980s, France, the United Kingdom, Italy and Germany accounted for 80 to 90 per cent of European production, consumption and trade in semiconductors. Similarly, the four large countries,accounted for the majority of European production, consumption and trade in computers (see Figure 1.2). The importance of France, Germany, the United Kingdom and Italy has been further illustrated by the fact that in 1990, for example, these countries accounted for 88.3 per cent of EC turnover in dataprocessing, 89.4 per cent of EC value-added in dataprocessing and approximately 90 per cent of EC investment in this segment. Moreover, they accounted for 92.1 per cent of EC employment in this area (EC Panorama, 3/93).

The Dutch share in total IT production and consumption has been quite small. Yet, with a share of 13 per cent in European integrated circuit (IC) production in the late 1980s, the Netherlands has been constituting a significant semiconductor manufacturing base[15]. Moreover, it accounted for nearly 7 per cent of EC exports of microcircuits. In contrast, the Netherlands' significance in terms of European computer production has been minimal; in 1989, the Dutch share must have been below 2 per cent of total European computer production. Its computer consumption, however, amounted to approximately 6 to 7 per cent (EC Panorama 1991:12-34; UNCTC, 1986:25,48; IDC in EITO, 1993:210).

The second group, of which the vote matters as well at the EC level, comprises Ireland, Denmark, Belgium, Luxembourg, Spain, Portugal and Greece. This group of countries will be discussed only marginally. However, the positions of Ireland and Spain are worth emphasizing in the context of the computer industry. Over the 1980s, Ireland has developed a significant computer hardware production base on the basis of mostly non-European inward investment in manufacturing[16]; in 1992, it accounted for

7 per cent of EC computer hardware production. In that year, however, Irish consumption amounted to less than 1 per cent of EC hardware consumption - indicative for its export platform status. Ireland's experience appears to be repeated to a certain extent in the case of Spain. Like Ireland, Spain has experienced a rapid growth in computer production over the 1980s, mainly through inward investment. Spain's market for computers has been growing as well. In 1992, Spain accounted for 6 per cent of EC computer hardware production and 8.1 per cent of EC hardware consumption (IDC in EITO, 1993:247,210,211).

1.5 THE PLAN

This thesis consists of four parts. The first part (Chapters 1 and 2) outlines the central question and the approach developed to address this issue. The second section (Chapters 3 and 4) discusses whether or not the largest European-owned IT multinationals have lost some of their influence over the European Community. The third part of the thesis addresses the question why corporate political influence has changed over time. Chapters 5 and 6 outline the independent variables, while Chapters 7 to 9 show how these variables affect the three determinants of political influence, namely political activity, weight and realization. The final part (Chapter 10) concludes this thesis.

1.6 NOTES

1. See also Eden, 1991:197,218.
2. See, for instance, Kobrin (1987) and Stopford and Strange (1991).
3. See, for instance, Hood and Young (1979); Rugman, Lecraw and Booth (1985).

4. See, for example, Butt Philip (1985); El-Agraa (1990); Greenwood, Grote and Ronit (1992); Haas (1958); Harrop (1989); Lindberg (1963); Lodge (1993); Keohane and Hoffmann (1991); Kirchner (1992); Mazey and Richardson (1993b); Nicoll and Salmon (1994); Nugent (1991, 1992); Sandholtz and Zysman (1989); Taylor (1983, 1991); Tranholm-Mikkelsen (1991); Tsoukalis (1990); Wallace (1990); Wallace, Wallace and Webb (1983); Urwin (1991).

5. Gourevitch (1986:58): "Advocates of the successful policy had the power because they won, and we know that because if they had not had the power, they would not have won".

6. See, for instance, Goldstein (1989), Bhagwati (1988) and Gourevitch (1986).

7. See, for instance, Hall (1986), Bhagwati (1988), Boadway and Wildasin (1984:158), Causer (1978:47) and Gourevitch (1986).

8. See, for instance, Lake (1988), Conybeare (1987) and Gourevitch (1986).

9. For examples of empirical studies on the political influence of industries, see: Caves (1976); Esty and Caves (1983); Lavergne (1986); Salamon and Siegfried (1977).

10. See, for instance, Katzenstein (1977), Milner (1987), Skocpol (1985:17-19), and Zysman (1983:300-301). See also readings on interest groups in the Community.

11. See, for instance, Dixit (1986), Grossman (1986), Krugman (1987), and Yarbrough and Yarbrough (1988).

12. See, for instance, Borrus (1988); Chapman and Walker (1991); Cohen and Zysman (1987); Daniels and Radebaugh (1992); Dicken (1992); Fayerweather (1982); Haggett (1982); Hood and Young (1979); Martinelli (1982); Nye (1974); Reich (1991); Robock and Simmonds (1989); Safarian (1993); and United Nations (1988).

13. See, for instance, Behrman and Grosse (1990); Daniels and Radebaugh (1992); Dicken (1992); Doz and Prahalad (1980); Eden (1991); Gladwin and Walter (1980); Jenkins (1986); Kobrin (1987); Poynter (1985); Rugman, Lecraw and Booth (1985); and Safarian (1993).

14. There may be a difference between what firms profess as being in their interest and their real interests. For examples, see the Economist, 6 October 1990:19 and De Jonquières, 11 March 1991:VII.

15. Over the early 1980s, the Netherlands produced approximately the same amount of semiconductors as Italy. The latter accounted for roughly 7 to 8 per cent of European semiconductor production. In terms of semiconductor consumption, the Dutch share was slightly less than the Italian share. The Benelux countries as a whole accounted for 6 per cent of European consumption (UNCTC, 1986:25,48).

16. In 1986, 21 per cent of Ireland's net output by foreign investors, mostly non-EC, was in the area of office and dataprocessing equipment (EC Panorama, 1991:59).

Chapter 2

APPROACH AND HYPOTHESES

This chapter seeks to outline a framework for the analysis of corporate influence on public policy outcomes. Through applying this framework to the EC IT policy case, insight may be obtained into the influence of the IT Roundtable and its members on the EC's IT policies in the 1980s and early 1990s. The chapter has been divided into four sections. The first part defines corporate political influence. The second part discusses the determinants of political influence, while the third part describes the variables that bring about changes in these determinants. Assuming that the IT Roundtable lost some of its influence, the fourth part outlines a number of hypotheses regarding the causes of the IT Roundtable's declining political influence, on the basis of the theoretical framework developed in the first three sections.

2.1 DEFINING CORPORATE POLITICAL INFLUENCE

Corporate political influence can be defined as the ability of companies to affect public policy formulation, decision-making and implementation in such a way that the policy outcomes reflect the companies' policy preferences. This definition comprises three basic elements: (1) the policy preferences of a company or a group of companies, (2) the conversion or translation of the preferences into policy outcomes and (3) the public policy outcomes.

2.1.1 CORPORATE POLICY PREFERENCES: THE EUROPEAN-OWNED IT MNEs

A company's or group of companies' policy preferences can be defined as the package of policies that the company or group of companies would like to see implemented. This definition raises the question as to what policies companies would prefer, and why. This thesis makes the following assumptions concerning the policy preferences of the IT Roundtable members, which will be outlined and analyzed in Chapters 3 and 4: (1) companies are assumed to formulate their policy preferences, whether articulated individually or within a group context, in line with their interests; (2) the corporate interests are assumed to constitute of a mixture of the inter-related objectives of profitability, growth and longevity, which may alter over time; and (3) the companies' policy preferences are treated as if they were unitary stances.

Assumption 1: Bounded Rationality

The self-interest assumption, as has been postulated in different forms by Baldwin (1989:2), Gilpin (1981:20), Ham and Hill (1984), McKeown (1984:221-223, 229), Milner (1987a:241-245) and Simon (1955), argues that given the information that companies have access to and given their computational capabilities, corporate management may display "a kind of rational behaviour" (Simon 1955:99), in the sense that corporate managers will consider a number of alternative policies, attempt to evaluate the associated costs and benefits, and favour any one alternative that satisfices, not maximizes, their interests. Limits to the corporate management's computational capabilities and access to information render unattainable an interest-maximizing strategy, i.e. a strategy which searches for the optimum policy alternative (Ham and Hill, 1984:77-78).

Interviews with the European-owned IT companies and their representative organizations seem to support the assumption of satisficing rational behaviour, both when operating individually and as a group. Although contextual and ideological factors, such as the traditional ways of doing things, standard operating procedures, and prevailing economic preconceptions (Milner, 1987a:245), have had their impact on the companies' operations and actions, as illustrated in the case of Philips (see Appendix 1.1), in the longer term such factors do not appear to have obstructed a rational formulation of policy preferences. The companies seemed aware of the costs and benefits of alternative policy options, and preferred those policy options that, in their perception, met their interests.

Assumption 2: Profit-Maximizing and Empire-Building

Assuming that companies indeed act in accordance with their interests, what then are their respective interests? Thurow (1992:125) argues that a company can be placed on the basis of its overall objectives along a spectrum, with profit-maximizing firms at one end and empire-building firms at another. In contrast to the profit-maximizing firms, empire-builders regard profitability of secondary importance. Maximizing market share is seen as the key to their main objectives of growth and longevity. Their longer-term horizon allows them to continue producing and investing, even if, in the short term, the rates of return on an existing or future investment are zero or negative.

From the outset, however, one should note that most companies are likely to have opted for some form of trade-off between profit-maximizing and empire-building, as the pursuit for growing profitability and larger market shares are mutually dependent. As will be illustrated in Chapter 5, large market shares facilitate profit-maximizing as it allows companies to exploit cost advantages and pricing strategies.

At the same time, profitability constitutes the only long-term means towards greater corporate longevity and growth, as retained profits constitute both an internal source of capital and a key to external sources of capital; if quoted on the stock exchange, a high profitability may boost the value of a company's own "currency", namely its shares, and thus increase the amount of capital that a new rights issue might yield.

Until recently, Philips, Siemens, Thomson and Bull could be placed more towards the empire-building end of the spectrum, in the sense that the companies were willing to incur large losses to establish and maintain a position in markets that were considered to be of strategic importance, such as DRAMs and computers. Recent economic developments, however, have led to shifts along the spectrum. As Philips' emphasis on profitability rather than on a continued presence in strategic areas has shown (see Appendix 1.1; Chapter 5), poor corporate performance may stimulate a company to alter its specific mix of empire-building and profit-seeking.

Olivetti and ICL, however, have been located more towards the profit-maximizing end of the spectrum. In contrast to the large, diversified IT producers, neither Olivetti nor ICL have had the ability to compensate for potential losses in computers through profits on other operations (see Appendix 1.1), or to benefit from extensive public financial support, like Bull.

Assumption 3: Unitary Stances

Companies are not monolithic. Although corporate divisions have the same basic interests, namely that they have to be profitable in either the short-term (profit-maximizer) or long-term (empire-builder), they may differ on how these interests could best be served. In centralized firms, the hierarchical organization may ensure that the policy preferences of the various divisions will be translated into a unified policy stance. In less hierarchical firms, it is, as Hancher and Moran (1989:289) argue, "perfectly possible for separate divisions to operate independently of, and indeed in competition with, each other in the struggle for regulatory advantage".

For purposes of this analysis, however, it is assumed that policy differences between divisions within firms will be discussed and solved internally. Evidence from this study appears to support the assumption that a company's policy preferences can be treated as if they were unitary stances - semiconductor anti-dumping duties being a particularly good case in point. Despite internal divergencies between the semiconductor and computer divisions about the desirability of these duties, Philips and Siemens advocated one policy stance at the EC level (see Chapter 3) - reflecting the priority attached by management to semiconductors over computers.

2.1.2 CONVERSION OF CORPORATE POLICY PREFERENCES INTO PUBLIC POLICY OUTCOMES

A company or group of companies, which has formulated its policy preferences, is only politically influential if it succeeds in translating or converting its policy preferences into actual *policy outcomes.* As Esty and Caves (1983:27-28) stress, there is a difference between political activity and success. Making one's policy preferences heard is not sufficient; an actor or group of actors has to be able to make itself heard *effectively* (Dahl, 1956:145-146). That is, political activity should prompt a satisfactory response on the side of the policy-makers. Obtaining a satisfactory response, however, raises the question of transformation, i.e. how preference through power becomes policy (Gourevitch, 1986:58). How are the policy goals of companies translated into the reality of government policy? Section 2.2 outlines the framework used in this thesis for analyzing this conversion process.

2.1.3 PUBLIC POLICY OUTCOMES: THE EUROPEAN COMMUNITY AND ITS MEMBER STATES

A company or group of companies seeks to convert its policy preferences into decisions that are not only taken but also implemented by regulatory bodies. As outlined in Chapter 1, this thesis confines itself to the European Community and its Member States as the authorities responsible for policy-making and implementation. In order to understand the Community's IT policy outcomes which will be outlined in Chapters 3 and 4, and to understand why or why not the IT Roundtable companies could exercise an influence on these policies (see Chapters 7 to 9), it is important to outline this thesis' assumptions regarding public policy outcomes.

This thesis makes the following assumptions: (1) the policy outcomes are perceived to be a product of rational behaviour but only to the extent that the government has given consideration to the costs and benefits involved, and has chosen the policy action which would satisfy its perceived interests; (2) rationality remains difficult to determine as the government is perceived as pursuing a mix of mutually dependent, potentially incompatible economic and political objectives, which may change over time; and (3) the policy inputs of lower-level governments into a higher-level government are treated as if they were unitary stances.

Assumption 1: Bounded Rationality

One could assume that governments, like companies, display rational behaviour. In that case, a government would formulate, decide upon and implement the policy choices that would satisfice its interests. This thesis found indications of rationality; the interviewed public officials at both the EC and national levels appeared to have considered the costs and benefits of alternative policy options, and given preference to those routes of action that were in their perception meeting their objectives.

Assumption 2: Economic and Political Interests

This assumption of rationality, however, poses one major question, namely: what are the government's interests? Some authors argue that the government's interests are synonymous to some long-term, general interests, which transcends the specific interests of groups within state and society, and maintain "the same transitive ordering over time" (Krasner, 1978:53). Others argue that governments have been captured by specific interests, i.e. the interests of bureaucrats and politicians or those of non-governmental societal actors, such as voters, ruling elites, or dominant classes[1].

This thesis assumes that any democratic government, irrespective of whether or not it has been captured by specific interests, has a number of basic economic and political objectives on its agenda, which it pursues to secure the continuing support of the electorate, and thus to ensure its stay in power. These objectives include the protection and promotion of the jurisdiction's wealth, political sovereignty and security, and social stability (Strange, 1985:237; Stopford and Strange, 1991:135; Causer, 1978:41). Evidence from this study appears to support this assumption not only for the Member State governments, but also for the European Community.

These policy objectives, however, have not been ordered in a persistent, transitive and fixed order. Rather, these objectives have been mutually dependent and often conflicting, complicating any determination of rationality in governmental behaviour (Stopford and Strange, 1991:134-135). Moreover, as will be shown in this thesis, the government's prime objectives may change over a short period of time.

Assumption 3: Unitary Stances

Like companies, governments are non-monolithic. The various departments or groups within a government do not necessarily pursue the same combination of objectives. Even if they would, they may not agree on how their interests could best be served. It will, therefore, depend on the various departments' bargaining power whether or not a policy decision will be in their respective interests.

Evidence from this research seems to suggest that the assumption of a non-monolithic government is valid in the case of both the European Community as well as the national governments (Mazey and Richardson, 1993b:6). At the EC level, for example, policy stances differed substantially within the Commission on the 1991 White Paper and within the Council on the proposed budget for the Fourth Framework Programme (see Chapter 4). Within the national governments, similar divergencies have been existing between departments. Within the German government, for example, the finance ministry opposed the Fourth Framework Programme's budget while the ministry responsible for research and technology, the BMFT, advocated it (BMFT sources, Interview 33;1993). Judging by the German opposition to the budget at the EC level, the finance ministry's influence on the final German position was clearly higher than the leverage of the BMFT.

This example, however, does show that when the national governments prepare their position on EC policy proposals, they seek to overcome internal divergencies. For purposes of analysis, it is thus assumed that policy differences within any *national* government will be discussed and solved internally so that the national policy stance as voiced at the EC level can be considered as if it were unitary.

2.2 DETERMINANTS OF CORPORATE POLITICAL INFLUENCE

Once corporate political influence has been defined, the key question that arises is: what determines the influence of companies on public policy outcomes? As

Gourevitch (1986:114) argues, "we need to have some notion of the connection between economic actors and political process, of the mechanisms whereby preferences acquire [political] power". How, when and why are corporate policy preferences converted into policy outcomes? On the basis of the theoretical foundations outlined in Chapter 1, this thesis argues that corporate political influence can be defined as a product of three determinants, namely political activity, political weight and political realization. This section will turn to each of these three determinants.

2.2.1 POLITICAL ACTIVITY

Once a company or group of companies has formulated its policy preferences, it has to articulate these preferences if it wants decision-makers to act in accordance (Olson, 1965:10). Decision-makers can only take corporate preferences into account if they are aware of their existence, and governments will only be aware of their existence if the company or group of companies has articulated its preferences. Making one's preferences heard thus constitutes a necessary precondition for converting policy preferences into policy outcomes.

All the activities that a company or group of companies undertakes to make its preferences heard can be summarized as corporate lobbying or corporate political activity. When describing the political activity of companies, undertaken both individually and in a group context, as will be done with respect to the IT Roundtable members in Chapter 7, the following aspects should be stressed: (1) the effort put into lobbying; (2) the channels of lobbying activities; (3) the lobbying targets; and (4) the timing of lobbying activities.

Effort Put into Political Activity

The effort put into lobbying by companies, both individually and as a group, facilitates a successful conversion of their policy preferences into policy outcomes (Esty and Caves, 1983:37)[2]. The type of activities undertaken, their frequency and magnitude, and the resources spent on them affect the intensity with which corporate policy preferences are conveyed to the targeted policy-makers. A visit by the chairman of a company to a high-level public official, for example, is bound to attract more attention than a simple letter.

The effort put into lobbying reflects to a certain degree the companies' perception of the importance of a certain policy issue; the type of activities chosen, their frequency and magnitude and the resources spent on them are likely to be higher if companies feel strongly about an issue, and lower if the companies are impartial (Dunleavy and O'Leary, 1987:35).

However, even if companies feel very strong about an issue, the efforts devoted to corporate political activity may be constrained by the resources available to the companies in question. Multinational enterprises, which have more resources available, are in a better position to carry the costs of political activity than small to medium-sized firms (Salamon and Siegfried, 1977:1029,1031). Similarly, profitable companies are in a better position than unprofitable ones.

Channels of Political Activity

One should also determine which channels companies have been using to articulate their policy preferences. Figure 2.1 outlines four categories of channels of political activity on the basis of their membership base (individual, collective) and line of representation (direct, indirect). This classification focuses on those channels that represent corporate interests on a wide range of policy issues, such as trade and R&D.

Figure 2.1 Channels of Corporate Political Activity

	Individual	Collective
Indirect	Indirect Corporate Representations on an Individual Basis	National Industry Associations/ European Industry Federations
Direct	Direct Corporate Representations on an Individual Basis	Associations of Companies

For the more specific standardization issues, the national and European standardization bodies and associations constitute the appropriate channel.

Direct, Individual. The main advantage of the direct, individual approach is that the companies can present their views in an unaltered version to the relevant decision-makers. This advantage, however, has to be traded off against the disadvantages: unless an individual company commands a monopoly position, it cannot be seen as representative for the industry by public officials; a single company commands less political clout than if the company were to join forces with other companies; and a single company has the disposal over less resources than a collective of companies would have.

Indirect, Individual. Individual representations via lawyers, consultants, public relations companies, professional lobbyists, et cetera, face similar problems as direct representations. In fact, the situation could be worse; an intermediary's lack of inside knowledge into the issue presented, may thwart and misrepresent the companies' respective cases (Hull, 1993:86). Even if the intermediaries are qualitatively good, they remain third parties; government officials prefer to talk to those that are actually responsible (IT company sources, Interview 15;1993). These disadvantages, however, may be counterbalanced by the intermediaries' comprehensive and up-to-date knowledge about issues concerning them, and their experience in targeting public officials. Moreover, developing such knowledge in-house may be considered as too expensive.

Indirect, Collective. A third channel of political activity is formed by the interest groups which represent an industry or group of industries on a wide range of issues: the European-level federations of national associations and the nationally organized industry associations. As the following will show, the advantages and shortcomings of the European industry federations do not so much differ in nature from those of the national associations; rather, they differ in scale.

Companies may derive three main advantages from participating in these associations and federations. First, when the industry associations and federations represent the majority of the country's or region's industry, the government may perceive these groups as representative for the industry/industries they embody, and thus grant these groups a privileged position in interacting with the government. Like the national industry associations, which have been established partners to the M/S governments in policy-making, the European industry federations are the Commission's preferred partners (Hull, 1993:86; Mazey and Richardson, 1993a:11; Butt Philip, 1987:282; 1985:45; Streeck and Schmitter, 1991:135-137). Second, companies that succeed in unifying their policy stances, whether this is at the national or European level, command more political clout (Causer, 1978:32; Hall, 1986:232-233; Butt Philip, 1985:41; Robock and Simmonds, 1989:369). Third, by acting collectively, either at the national or European level, companies may share the costs of their political activity, mobilize more funds for their activities and for a longer period of time (Finer, 1955:282; Butt Philip, 1985:41).

Industry associations and federations, however, may face difficulties in building a consensus out of the diverging positions of their broad membership base, which may cross sectoral and, in the case of the European industry federations, national boundaries. Notably the European industry federations have, as a result, often failed to undertake unified actions or to upgrade their common positions beyond the lowest common denominator. This disadvantage may have been aggravated by requirements of unanimity in the federations' voting procedures and limits to the discretionary powers of the groups in representing the views of their members (Grant, 1987:13, 1993:31; Hull, 1993:86,88; Kirchner and Schwaiger, 1981:10; Mazey and Richardson, 1993b:7).

Additionally, in the time-consuming process of consensus-building, the industry associations and federations may combine and ultimately alter the preferences of their members (Hall, 1986:33). This applies, in particular, to the European federations, which are characterized by a larger membership base and a longer line of representation (Grant, 1987:111; Butt Philip, 1985:34-35,39).

Moreover, European industry federations may be constrained by lack of resources and expertise, since they are financially dependent on the national industry associations (Grant, 1993:30; Mazey and Richardson, 1993b:7; Butt Philip, 1985:36). The lack of resources may reflect both free-rider problems as well as limited expectations on the side of the individual members as to the size of the gains to be derived from collective action in comparison to the costs (Olson, 1965).

Direct, Collective. Due to these limitations, companies may prefer to opt for a fourth channel of political activity, namely associations of companies, which offer direct membership to a small and select group of companies. By virtue of their size and organization, associations of companies combine the advantages of both individual corporate representations as well as collective representations through industry associations or federations. In comparison to the European industry federations, for example, associations of companies operate on the basis of shorter lines of representation, reducing the extent to which any individual company's interests are compromised in the process of aggregation. Additionally, the small membership base diminishes the chances of free-rider problems; deviant behaviour of individual participants is more likely to be noticed and easier to be corrected, while the individual responsibility of each company in the success of the lobbying attempt make such behaviour less likely (Olson, 1965). Moreover, the size of the gains that a successful lobbying attempt could yield to an individual company may imply that the participating companies are willing to contribute more resources to the political activity of their association. Finally, an association's political activity as a collective of companies may confer semi-representativeness on the association and increase the companies' political clout.

However, even though an association's membership base may be more homogeneous than those of the broad-based, industry federations, diverging interests amongst the member firms may continue to limit the association's effectiveness, blocking the development of common positions or leading to the formulation of relatively superficial platforms (Grant, 1993:36).

Lobbying Targets

A third point related to the political activity of companies is the issue of the companies' lobbying targets; whom or what has been the subject of the corporate political activity? Companies seek to target those bodies that are responsible for regulations and their implementation, such as the national governments and the European Community. As the loci of policy-formulation, decision-making and implementation vary per policy case, the companies' lobby targets shift as well; each stage in the policy-making process and implementation involve different individuals, departments and committees.

The companies' opportunities to articulate their policy preferences, however, are not unlimited; they are constrained by the political system in which the companies operate. Political systems differ in their "openness"; they differ in the extent to which companies can be involved in the policy-formulation, decision-making and implementation processes. These divergencies in openness are likely to affect both the lobbying strategies of companies, as well as the cost of lobbying incurred by these companies.

The "openness" of a political system to corporate political activity depends on a number of factors, including (1) the degree of fragmentation of policy-making and implementation, (2) the extent of insulation of the policy-making and implementing bureaucracy, (3) the legitimacy of the public authority, (4) the public authority's need for information, notably on technical issues; and (5) the attitude towards political activity, based on ideology and past experiences.

First, the more fragmented the policy-formulation, decision-making and implementation processes are, the more opportunities exist for companies to articulate their preferences (Milner, 1987a:275-278; Salamon and Siegfried, 1977:1029). The European Community, for example, is far more fragmented than its national counterparts, with the possible exception of the federally-organized Germany and Belgium.

Second, the opportunities for corporate political activity will be further increased if the public authority's bureaucracy is not insulated from, but exposed to external influences. This occurs, for example, when the bureaucracy hires employees from the private sector or employs them on secondment; when the bureaucracy uses the private sector to inform it on specific issues or supply it with expertise; or when long-standing relationships between the bureaucracy and business have been left intact (Causer, 1978:36; Finer, 1955:283; van Tulder and Junne, 1988:185-185; Milner, 1987a:278-280). In comparison to the national governments, the European Community, for example, has been far less insular. Interested societal parties have been facing a relatively easy entry into the EC policy network (Mazey and Richardson, 1993b:12; Chapter 6).

Third, the opportunities for companies to articulate preferences are likely to be greater if the public authority is in need for legitimation. In contrast to the national governments, the European Community, for example, has been a relatively new institution. The power relations between the EC institutions and the national governments, and between the key institutions at the EC level have not yet fully crystallized. Consequently, the EC has been attempting to assert its identity and secure its legitimacy by drawing interested parties into its policy-network (Butt Philip, 1985:45; Mazey and Richardson, 1993b:10,11; Chapter 6).

Fourth, the public authority's need for information may also increase the opportunities for companies to express their policy preferences. Most bureaucracies lack an in-house expertise, notably on technical issues. Even if public officials did have an adequate expertise upon entering the government, this knowledge has often dated rapidly. In contrast, companies have the resources to analyze their needs in the wake of rapidly changing technology and to design the policies necessary to address these needs. Companies, in this respect, have been displaying what Cohen and Bauer (1985:60-65) call a "monopoly of legitimate expertise"[3]. Both national governments and the EC, for example, have been using companies and other societal interest groups as important sources of analytical expertise and factual information (Butt Philip, 1985:9,10,42,57; Kirchner and Schwaiger, 1981:10,146; van Tulder and Junne, 1988:177; Chapter 6).

Finally, the opportunities for corporate political activity may increase if the government adheres to an ideology proposing a significant role for government intervention in the economy. The Commission's information technology directorate, DG 13, for example, has been relatively open to corporate political activity by virtue of its mandate to support the IT industry and its ideological inclination to do so through intervention (see Chapter 7). A favourable attitude towards corporate political activity may be further strengthened if the interaction between the public authority and the companies has been mutually beneficial and relatively free of controversies in the past.

Timing of Political Activity

A final issue concerns the timing of political activity, as this may affect the success of the lobbying efforts of a company or group of companies (Hull, 1993:87). According to one industry representative, "companies have to get through to the right man at the right time" (Interview 37;1993). Whether or not the timing of corporate political activity has been appropriate is determined, in part, by the political and economic conditions prevailing at the time of the companies' efforts. Companies which have been lobbying in vain for a certain policy for a longer period of time, may suddenly find that changing political or economic conditions have made the government more receptive to their preferences than previously. The appropriateness of the timing of political activity is also determined by the state of advance of a policy proposal in the policy-making process at the time of the company's lobbying efforts. Companies, targeting government officials responsible for drafting policies, may find that their opinions were articulated too late to be of any use if, at that point in time, the proposal in question had already been finalized.

Lobbying is thus not a one-time, one-off activity. Rather, "corporate lobbying is a long-term process. Ideas get produced and reproduced. It is a process of constant talks and presentation of ideas" (ORGALIME, Interview 23;1993). One main problem that companies thus face in their lobbying strategy is the "need to keep up constant pressure until their goals have been reached" (ERT, Interview 37;1993).

2.2.2 POLITICAL WEIGHT

The fact that a government is made aware of the policy preferences of a company or group of companies through corporate political activity, however, does not necessarily mean that the government will seek to act in accordance with these preferences. Whether or not a government decides to satisfy the policy preferences brought forward, appears to be determined by factors that attach a certain importance to the corporate policy preferences in the policy-making processes.

When addressing the issue of political weight, as will be done concerning the European-owned IT companies in Chapter 8, this thesis argues that the political weight that corporate policy preferences carry, can be perceived as a function of two variables: the real and perceived value of the "assets" that companies control.

Any company commands certain assets, such as capital, technology, and employment, that are in demand by a government as they could further the government's objectives of greater wealth, political sovereignty, security, and social stability (see 2.1.3). The dependency of the government on corporate assets for the realization of its agenda implies that the government cannot be indifferent to the policy preferences of companies; the corporate assets can be offered or withheld by corporate management at their discretion. Consequently, if a company or group of companies would express their preference for certain policies on the basis that these would be essential for performing and acting in a manner that would benefit the country or region, government officials will be inclined to satisfy these corporate demands. Failure to oblige could lead to a deterioration of the companies' performance or to a withdrawal of investments, employment and other assets through divestments and relocations (Lindblom, 1977:170-188; Bowler, 1987:157,170; Causer, 1978:39,46; Eden, 1991:215; Finer, 1955:285; Hancher and Moran, 1989:275). The fact that companies control certain assets, that are in demand by the government, attaches a certain weight to the companies' policy preferences, and enables companies to wield political influence.

It has been argued that the government may increase its control over the realization of its own agenda by increasing government employment (Bowler, 1987:170)[4]. To the extent that these jobs would be created through the nationalization of private sector companies, one should note that the publicly-owned companies' limited profitability and/or large investment requirements have imposed financial constraints on any further expansion of the publicly-owned segments within society. Moreover, as Chapter 7 will illustrate in the case of France, government ownership does not necessarily imply a dirigiste relationship between government and state-owned companies, allowing the latter to influence their government as well.

The Determinants of Political Weight: Real and Perceived Value of Corporate Assets

Research on the political influence of companies[5], the relative bargaining power of firms[6], and the economic, political and social impact of multinationals on home and host countries[7] give an insight into the determinants of political weight. These studies focus, first of all, on the real value of the assets that companies have to offer: the number of people they employ, the size of value-added, the percentage of sales exported, the R&D spending in terms of sales, et cetera.

If the size of the assets offered by a company or group of companies is large, the policy preferences of the company or group of companies will carry more political weight than if the company or group of companies provide only assets of limited size. Caroline Walcot, Assistant Secretary General of the European Round Table (ERT), for example, explains that the political clout of the ERT follows from the combined size of its members; the 40-odd members have a combined annual turnover of ECU 500 bn and employ about 3 mn people (Interview, 1993; ERT, September 1991:2).

Yet, it is important to stress that the real value of the assets as such may not be sufficient to give the policy preferences of a company or group of companies the necessary political weight. The perception by the government of the value of these assets in furthering its objectives matters as well. If a government perceives a company's assets as highly important for the realization of its goals, the policy preferences of the firm in question will carry political weight, irrespective of the real value of its assets.

The government's perception of the value of corporate assets depends on two factors. First of all, it depends on the ranking of the objectives on the government's agenda. For example, if sovereignty and security are ranked highly on a government's agenda, the government may attach a greater value to the policy preferences of companies producing strategic products than to those of companies producing non-strategic goods. Second, the government's perception of the value of corporate assets depends on the available alternatives. If a company or group of companies, constitutes the only supplier of certain assets that the public authority needs to realize its objectives, the assets of this company or group of companies will be highly valued by the authority in question.

The most realistic alternative sources of corporate assets are likely to be companies of a similar size (1) and origin (2) that operate in the same or in buying, supplying or otherwise related industries (3). First, corporate size is likely to be a factor determining whether or not other sources of corporate assets are realistic alternatives. The size of the resources that small to medium-sized enterprises (SMEs) may yield are insignificant in comparison to those of a large multinational.

A second factor may be "origin" or ownership. Although foreign-owned multinationals may be, in terms of size, an alternative to the home country's (region's) counterparts, in terms of origin, they may only constitute a realistic alternative if autonomy and security objectives rank relatively low on the agenda of the home government. As soon as autonomy and security become more important, however, concerns may arise regarding the security of supply and the transfer of sensitive technologies that limit the foreign companies' suitability as alternative sources of corporate assets (Kline, 1990:27; Moran 1990:5-14; Nye, 1974:157,168).

A third factor determining whether or not other sources of corporate assets are realistic alternatives could be the type of industry, such as an up or downstream-industry or a high or low-tech industry, in particular when the government is looking for industry-specific assets, such as the production of strategic goods or the supply of high-skilled jobs.

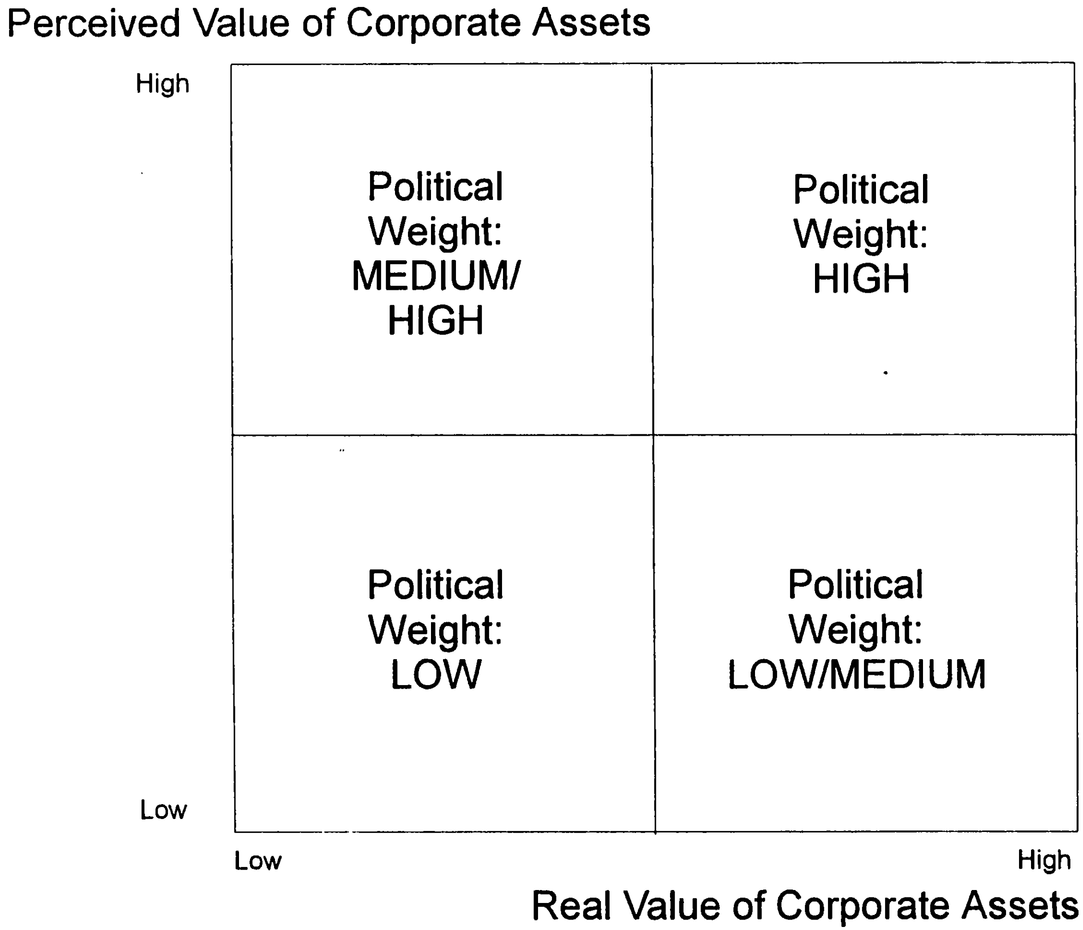
In sum, the political weight of a company's or group of companies' policy preferences is determined by the coordinates of the company or group of companies in a matrix delineated by the real and perceived value of the company's or group of companies' assets (see Figure 2.2).

Defining Corporate Assets

As outlined above, corporate assets are those firm-specific resources that are in demand by a government as they could further the government's objectives of greater wealth, political sovereignty, security, and social stability. On the basis of Hood and Young's analysis of the impact of multinational enterprises on economies (1979), interviews with M/S officials (18,19,33,39,40;1993) and other studies mentioned above[8], the following (non-exhaustive nor mutually exclusive) listing of corporate assets can be made up: (1) value-added; (2) investment; (3) employment; (4) product and process technology and managerial skills; (5) exports and FDI; and (6) economically and militarily strategic products and/or technologies. As these assets may not be spread evenly across a country or region, the allocation of these assets may play a role as well.

Value-Added. Companies constitute sources of value-added and, thus, sources of wealth. National or regional wealth (income)[9], as proxied by either the gross national product (GNP) or the gross domestic product (GDP)[10], can be defined as the

Figure 2.2 Political Weight



sum of value-added[11] of all economic activities at factor cost (Bannock et al., 1987:288). Companies contribute to the wealth of a country or region through: (1) deploying factors of production (capital and labour) in a productive use, thus contributing to value-added, and (2) increasing these factors' productivity[12], generating growth in value-added (Porter, 1990b:84; Munnell, 1990:4,6; Maital, 1980).

Investment. Corporate expenditures on existing and new machinery, equipment, plants and property, for example, contribute to the total value-added in the economy and, thus, to the national or regional income. In addition, these investments may mobilize further capital injections by both indigenous as well as foreign companies.

Employment. Through sustaining and generating employment, either directly or indirectly via linkages[13] and multiplier effects[14], companies contribute as well to the total value-added in the economy and, thus, to the national or regional income. Moreover, the employees' productivity may increase through learning on the job (Reich 1990:58,59). The interest of a government in corporate employment may also follow from the often decisive impact of employment on the electoral success of the government.

Technology and Managerial Skills. Companies constitute sources of technology and management skills. Human capital, in the form of new or improved product and process technologies and management skills, is considered to be a key factor behind productivity increases (Porter, 1990b:84; Reich, 1991). Companies, as sources of these new technologies and skills, could improve the GDP through locating high value-added activities, such as R&D, within the government's jurisdiction or through improving productivity by applying their new or improved technologies and skills to their operations. In this context, one should also note that companies may generate positive externalities, such as the creation of a highly skilled labour pool benefitting other employers.

Exports and FDI. Companies may constitute sources of exports and FDI. In general terms, trade allows a country or region to specialize in those industries or segments of industries in which its companies are more competitive, and thus to deploy its factors of production in more a productive manner. Similarly, international investment allows a country or region to deploy its factors of production across the world in a more productive, and thus higher value-added yielding manner (Reich, 1990:59; Porter, 1990b:85)[15]. Additionally, by exporting more goods, services, capital and other items (technology, skills) than importing, companies may improve the country's or region's balance of payments.

Strategic Products and Technologies. Companies may be sources of economically and militarily strategic products and/or technologies - a much sought after asset that serves a government's economic and political sovereignty and security objectives. What exactly makes a product or technology "strategic" is politically defined: it depends on the threat perception of the government at a certain point in time. The government's threat perception, in turn, appears to be determined to a large extent by security of supply concerns; how accessible are the relevant products and technologies at any given point in time?

Two main types of technologies and products are generally considered to be "strategic" by a government. The first type comprises those technologies and products that have military applications. The use of Japanese semiconductors in the American Stealth fighter and the latter's crucial role in the Gulf War, for example, has raised security of supply concerns; a delay or halt on the delivery of these Japanese semiconductors could thwart America's military capability.

A second category of strategic products and technologies includes those products and technologies that constitute a necessary input into almost any sector of the economy (such as semiconductors, computers and oil). Not only may the production of such goods and technologies yield positive externalities, also the application of these products and technologies may yield synergies, i.e. interdependencies between the technological progress of the producing companies and the technological development of their users and/or suppliers. For example, technological progress in the semiconductor industry may not only improve the industry's own competitiveness, it may also improve the competitiveness of the sectors of application.

Strategic trade economists, such as Brander and Spencer[16], discern a third type of strategic products and technologies. They argue that "high rent yielding" industries are also strategic. However, this argument negates that (1) the firms in these industries are only generating excess profits if they are at the cutting edge of technology, and (2) the rents dissipate when new firms enter the industry and increase competition. Betting the odds on an industry, which is *only* strategic on the basis of its substantial profits, may proof to be a short-lived benefit for any government that cares to support it.

This thesis argues that the security of supply concerns, which affect the threat perception of the EC and its M/S governments and thus the definition of strategic products, are related to the characteristics of the industries in question, notably: (a) the availability of the industry's product on the world markets (customized good or commodity product); (b) the structure of the industry (concentrated or not); (c) the nationality of the main suppliers (one nationality involved or more; Japanese or American); (d) the availability of alternative suppliers; and (e) the height of the entry barriers in terms of capital, technology and accumulated experience (high or low)[17].

Security of supply concerns are likely to be small if the product is a standardized commodity good, supplied by many alternative producers of various nationalities, in a dispersed industry with low entry barriers. However, security of supply concerns are likely to be larger, if the product in question is a customized good, supplied by only a few producers of the same nationality, notably Japanese, in an oligopolist industry with high entry barriers. One should note that, the economically strategic technologies and products, by virtue of their generic application, have to be, or will be in due course, commodity goods characterized by ample supply and low prices.

If a government's security of supply concerns are considerable, it is likely to pursue a domestically owned, controlled, and/or located capability in developing and producing strategic products. Rightly or wrongly, such an indigenous capability is perceived as ensuring the country's or region's economic and political sovereignty and security.

2.2.3 POLITICAL REALIZATION

Once a company or group of companies has articulated its preferences and these preferences carry sufficient political weight, it will exert political influence on policy formulation and decision-making. However, a decision to adopt a certain policy does not necessarily mean that the policy will actually be implemented. Companies will be able to realize their goal of influencing policy *outcomes* only if the public authority is able to deliver upon its promises.

One can make a distinction between internal and external factors constraining a government's ability to act, as will be done regarding the IT Roundtable's policy preferences in Chapter 9. Internal constraints on a government's ability to deliver include: shortcoming in the government's competencies, its array of policy instruments, its resources, and its speed of policy-making and implementation[18]. External constraints on a government's actions include those limitations set by the internationalized nature of the industry in which the government has been intervening, including: the difficulties to discriminate between foreign and European industries, companies and products; the cost of intervention; and, in particular, the threat of retaliation[19].

Moreover, one of the problems caused by the globalization of industries is that the realization of some corporate policy preferences may go beyond the government's jurisdiction; obtaining market access, for example, requires the cooperation of third country governments. The realization of policies, of which the implementation reaches beyond the jurisdiction of the public authority, thus depends on the economic and political leverage of the government over third country governments, convincing the latter to cooperate.

The size of a government's leverage is, basically, a question of asymmetry in economic and political inter-dependency; how dependent is the government's jurisdiction on certain economic and political assets from other countries, in comparison to the dependency of other countries on the economic and political assets that the government's jurisdiction could offer? The power of a public authority can be translated into a number of indicators, such as: (1) the share of its producers in supplying products, particularly strategic ones, to third country markets; (2) the share of its consumers in buying third country produce; (3) the share of third country debt held by actors within the public authority's jurisdiction; and (4) the contribution of the public authority to third country defence. The latter two factors, however, appear to be predominantly applicable to US-Japan negotiations. Japan's economic leverage in its trade relations with the United States, for example, has allegedly been boosted recently by the end of the Cold War, reducing Japan's dependency on America's nuclear umbrella, and by Japan's majority holdings of American debt (EEA sources, Interview 32;1993).

2.3 CHANGES IN CORPORATE POLITICAL INFLUENCE

If corporate political influence can be perceived as a product of three determinants, namely political activity, political weight and political realization, what then causes these determinants of corporate political influence to change over time? What determines whether or not corporate diplomacy pays off? This thesis argues that the determinants of political influence are affected by structural and short-term changes in the industrial production and public policy-supply arrangements, which govern what products are produced or what policies are supplied, how, on what terms, by which companies and where or by what government at which level. As Chapters 7 to 9 will show in the case of the IT Roundtable companies, these changes contribute to an explanation of shifts in corporate political influence.

Changes in the production and policy-supply arrangements may have prompted companies to undertake or defer political activity, step up or reduce their lobbying efforts within the constraints set by the available resources, alter their choice of channels of political activity, shift their lobbying targets, alter their timing of lobbying, and modify their policy preferences. Changes in such arrangements may also have affected the political weight of the companies' policy preferences, by appreciating or depreciating the real or perceived value of the assets that the companies have to offer. Moreover, such changes may have affected the ability of governments to realize corporate policy preferences by affecting their policy competencies, instruments, resources and speed of decision-making, by influencing the practical implementation of policies, and by altering the costs of intervention.

The following two sections will discuss the main changes taking place within prevailing production and policy-supply arrangements. The specific changes taking place in respectively the IT industry and the European Community will be discussed in Chapters 5 and 6.

2.3.1 CHANGING ECONOMICS

The following structural and short-term changes have been identified in the arrangements governing the supply of products. From the outset, one should note that these changes are closely inter-twined, and that the causal direction in their relationship is not always clear-cut. The changing nature of competition, for example, is both a consequence of as well as a driving force behind rapid technological change.

Globalization and Intensification of Competition

Over the past decade, companies in both high-tech as well as traditional industries have come to face growing and, increasingly, globalized competitive pressures. The globalization and intensification of competition has been driven and/or facilitated by technological change, standardization and deregulation, and changes in the size and nature of demand (Porter, 1986; Stopford and Strange, 1991; Turner and Hodges, 1992).

Technological Change

Companies have also been facing rapid changes in technology. Rapid technological change, which has resulted in new product and process technologies and shorter product and process lives, has been driven by regulatory imperatives and competitive pressures, and pulled by demand incentives (Freeman, 1991; Freeman, Sharp and Walter, 1991; Stopford and Strange, 1991:34; van Tulder and Junne, 1988).

Size and Nature of Demand

Additionally, companies have been facing changes in the size and nature of demand. Changes in the size of demand refer to cyclical developments within product markets (i.e. sequences of shortages and gluts) and to conjunctural developments within economies (sequences of recessions and recoveries). Albeit not discussed separately in the following section, the latter have also been affecting the prevailing policy-supply arrangements.

Changes in the nature of demand comprise developments like the homogenization of demand or the shift from a quality towards a price-based demand. These changes in the nature of demand have been caused and/or facilitated by developments in product technologies, corporate marketing and advertising, and communications and regulations (Bartlett and Ghoshal, 1989; Levitt, 1983; Turner and Hodges, 1992).

Internationalization of Operations, Cross-Border M&A and Alliances

Over the last decade, an increasing number of companies has opted for the internationalization of their operations and the conclusion of cross-border mergers, acquisitions and alliances in a bid to improve their corporate competitiveness. Internationalization can be defined as the increasing geographical spread of economic activities across national boundaries (Dicken, 1992:1), brought about by greenfield and brownfield (acquisitions) foreign direct investment and other vehicles. These trends have been facilitated and/or prompted by deregulation, the intensification of competition, and rapid technological change (Contractor and Lorange, 1988; Dicken, 1992; Mytelka, 1991; Ohmae, 1990; Stopford and Strange, 1991; Strange, 1992; van Tulder and Junne, 1988).

2.3.2 CHANGING POLITICS

The following structural and short-term changes have been identified in the arrangements governing the supply of public policies.

Transformation of the International System

Stopford and Strange (1991:50) point to the transformation of the international system from a bipolar system based on the United States and the USSR and their respective allies, to a multipolar system - following the collapse of communism in the former USSR and Eastern Bloc countries. Associated with this transformation has been an increasing emphasis on economic rather than military capabilities (Stewart, 1993).

Deepening and Widening of Regional Trading Areas

Following the collapse of the bipolar international system, regional trading areas have become increasingly prominent. Examples of regional trading areas range from the European Community to the North American Free Trade Agreement. Over time, regional integration schemes may have experienced both a widening, i.e. a broadening of the membership base, as well as a deepening, i.e. a transfer of national competencies to the regional institutions - altering the prevailing policy supply arrangements.

2.4 HYPOTHESES

This chapter has sought to provide a framework for analyzing corporate political influence and the changes therein. In Chapters 5 to 9, this framework will be applied to the EC IT policy case with the objective of determining why any change in the IT Roundtable's political influence has occurred. Assuming that the IT Roundtable has lost some of its political influence, what hypotheses can be drawn on the basis of this theoretical framework, with respect to the political activity undertaken by the IT Roundtable companies, the political weight attached to their policy preferences, and the realization of these preferences in the late 1980s and early 1990s in comparison to the early and mid-1980s?

Political Activity

- It is expected that, in the early 1990s, as in the previous decade, the IT Roundtable did undertake political activity to make its preferences heard, thus meeting the necessary precondition for influencing the Community.
- Although the crisis developing in the IT industry may have prompted the IT Roundtable's members to intensify their political activity at the EC-level, it is more likely that the reduced profit margins, symptomatic for the structural changes in the IT industry and the recession, have drained the companies' resources, and led to cut-backs in their lobbying efforts.
- Despite the advantages of lobbying as an association of companies over lobbying through an industry federation or individually, the IT Roundtable's effectiveness as a vehicle for voicing corporate policy preferences may have been undermined by the structural changes taking place in the IT industry and the changing policy agenda of both the companies and the EC. Doubts concerning the effectiveness of the IT Roundtable may have prompted member companies to opt for alternative channels of political activity.
- The European Community institutions are expected to have become increasingly important as lobbying targets, following the institutional changes of the mid-1980s and early 1990s. The fact that the EC has become

increasingly part of European political life may have implied that the EC has become so established that it currently does not need the inputs and support of business any more. Even if that is not the case, the EC may have obtained access to so many alternative sources of information and legitimation that it does not necessarily need the inputs and support of the IT Roundtable companies any more.

- Although further research may prove that the IT Roundtable's reduced influence was linked to the timing of its lobbying activities, preliminary evidence suggests that, in the early 1990s, the IT Roundtable's political activity was timed rightly to affect the Commission's drafting processes. However, as will be outlined below, the policy preferences voiced may have had no chance of realization considering the economic and political conditions at that time.

Political Weight

- It is expected that the political weight of the IT Roundtable's policy preferences has declined in the early 1990s in comparison to the early and mid-1980s, following a depreciation of the Roundtable members' main corporate asset: its ability to produce strategic technologies and products. The end of the Cold War and the commoditization of IT products may have altered the Community's perception that IT constitutes an economically and militarily strategic technology, and that an indigenous IT production capability is consequently a necessity. Even if the technology as such is still considered to be strategic, the recognition that it is the application of IT that yields value and not its production, combined with the alleviation of security of supply concerns, may have reduced the perceived and real need for an indigenous IT production capability.

- Due to the recession of the early 1990s and the problems associated with the widening and deepening of the Community, short-term economic objectives, such as cutting budget deficits and reducing unemployment, may have become more important to the EC and its M/S governments than the longer term strategic objective of maintaining an indigenous production capability in IT. As a consequence of the crisis in the IT industry, however, the IT Roundtable companies may not have been able to meet the EC's and Member States' demand for corporate assets. This may have prompted the EC and its national governments to shift their support to industries and industry segments that would contribute to a larger extent to the realization of their short-term, economic objectives.

Political Realization

- Although, in theory, the EC should have been able to convert the IT Roundtable's policy preferences into policy outcomes, particulary considering the institutional changes brought about by the Single European Act and the Maastricht Treaty, in practice, the EC's competencies, its instruments and its resources may not have been sufficient. The Member States' ideological differences; their insistence on subsidiarity, national solutions and juste retour; their need to reduce public spending; and their emphasis on cohesion may have impeded the EC in the actual use of its competencies, in its development of more interventionist policy instruments, and in its ability to raise the necessary resources. The EC's decision-making structure, moreover, may have unduly delayed the formulation, approval and implementation of the EC's IT policy in the early 1990s. Shortcomings in the EC's ability to realize corporate policy preferences may have increased the pressure on the national governments to support their former national champions.

- Additionally, structural economic changes, notably the increasingly internationalized nature of the IT industry, may have limited the Community's practical possibilities of intervention. This, in turn, may have prompted the Community to reconsider its prevailing policy approaches and instruments.

2.5 NOTES

1. For various examples, see, for instance, Bartlett (1973:22,26); Downs and Romer-Rosenthal in Boadway and Wildasin (1984:154-160); Poulantzas in Knutilla (1987:109-115); Frieden and Lake (1987:14-15); and Milliband in Knutilla (1987:107-109).

2. In their study on the political influence of manufacturing industries, Esty and Caves (1983:37) found that corporate political expenditures facilitated political success. In addition, they found some indications that the level of these expenditures could also explain, rather than merely facilitate, political success.

3. See also Jenkins (1986:164); Kobrin (1987:619-20;634); Poynter (1985:95); and Robock and Simmonds (1989:363).

4. A similar argument has been made by Rueschemeyer and Evans (1985:68), who state that "by augmenting the resources under the state's control, intervention diminishes the state's reliance on privately generated resources".

5. See, for instance, Causer (1978); Esty and Caves (1983); Gourevitch (1986:59); Lavergne (1983), Milner (1987a); and Salamon and Siegfried (1977).

6. Behrman and Grosse (1990); Daniels and Radebaugh (1992); Doz and Prahalad (1980); Eden (1991); Gladwin and Walter (1980); Jenkins (1986); Kobrin (1987); Moran (1985); Poynter (1985); Rugman, Lecraw and Booth (1985); Strange (1992); and Stopford and Strange (1991).

7. See, for instance, Borrus (1988); Chapman and Walker (1991); Cohen and Zysman (1987); Daniels and Radebaugh (1992); Dicken (1992); Fayerweather (1982); Haggett (1982); Hood and Young (1979); Martinelli (1982); Nye (1974); Reich (1991); Robock and Simmonds (1989); Safarian (1993); and United Nations (1988).

8. See endnotes 5 to 7.

9. In this thesis, national (regional) wealth and income are used interchangeably.

10. The national (regional) income equals the *net national* (regional) product at *factor cost*. The gross national product (GNP) constitutes a proxy of the national (regional) income as (1) it is a gross rather than a net figure (it includes capital

consumption), and (2) it is measured at market prices rather than at factor cost. The gross domestic product constitutes a proxy as (1) it is a gross rather than a net figure, (2) it is measured at market prices rather than at factor cost, and (3) it comprises the value of the output produced by both indigenous as well as foreign companies within a country's (region's) geographical boundaries, rather than comprising the value of the output produced by a country's (region's) indigenous companies irrespective of the location of production (Bannock et al., 1987; Yarbrough and Yarbrough, 1988).

11. Corporate value-added can be calculated by subtracting the cost of bought-in raw materials, services and components from the total corporate revenues (Bannock et al., 1987:415).

12. Productivity, which can be defined as the value of the output produced by a unit of labour or capital, will increase if the same units of labour and capital at constant factor prices yield a higher output value than before.

13. For example, an expansion of a company's operations in a country or region may increase the company's demand for local inputs and services and, thus, indirectly create jobs at the supplying firms.

14. For instance, if a company invests in a new production facility and creates a number of jobs, the resulting increase in income of the formerly unemployed may stimulate the demand for consumer-oriented products and services. This demand may, in its turn, increase output and generate new employment throughout the economy.

15. The link between trade and investment and national (regional) income is probably better illustrated by alternative, non value-added based definitions of national or regional income. The national (regional) income can also be defined as the sum of all expenditure on final consumption (C) and investments (I) plus net exports (X-M). Alternatively, one could define national (regional) income as all payments for the use of the factors of production, i.e. wages, rents, profits, and net income from abroad, excluding transfer payments (Bannock et al., 1987:288).

16. See, for instance, Brander (1986, 1987); Borrus, Tyson and Zysman (1986), and Krugman (1987).

17. See, for instance, Moran (1990), Murdock (1977) and other readings on corporate bargaining power.

18. See, for instance, Katzenstein (1977:303-306); Milner (1987:280-284); Skocpol (1985:17-19); and Zysman (1983:300-301).

19. See, for instance, Dixit (1986:290); Economist, 24 February 1990:71; Grossman (1986:50-65); Krugman (1987); Yarbrough and Yarbrough (1988:249); Zysman (1983:300-301).

PART 2

Chapter 3

CORPORATE DIPLOMACY AND EC IT POLICIES:
THE IT ROUNDTABLE'S PREPONDERANT POLITICAL INFLUENCE IN THE EARLY AND MID-1980s

Chapters 3 and 4 seek to answer the first research question, namely whether or not the IT Roundtable, as a group of companies, was able to exercise political influence on the Community's IT policies over two time periods: (1) the early and mid-1980s and (2) the late 1980s and early 1990s. Chapter 3, which will focus on the first time period, seeks to discuss the IT Roundtable's role in the Community's IT policy-formulation, decision-making and implementation processes and to establish, on the basis of the perceptions of government officials, corporate executives and representatives, and industry/government observers, whether or not the IT Roundtable exerted a preponderant influence on the policy outcomes in the early and mid-1980s.

This chapter starts with a short history of IT policies in the European Community. In particular, it focuses on the question why "common" European IT policies only came about in the early 1980s. The second section outlines the Community's policy responses to the plight of its IT industry in the 1980s. The third section focuses particularly on ESPRIT, the only policy specifically aimed at improving the IT industry's competitiveness in the longer-term. It seeks to answer the question whether or not the European-owned IT companies, as represented in the IT Roundtable, exercised a preponderant influence on ESPRIT's development, approval and implementation.

3.1 THE ROAD TOWARDS A COMMON IT POLICY

In the first decades after the Second World War, the national governments within Europe adopted an attitude of "benign neglect" towards their indigenous computer and semiconductor industries (Lauber, 1986). Although tariff barriers were in place, the governments provided only limited funds for government procurement and R&D support over the 1950s and early 1960s - in contrast to the United States, where substantial public funding for military procurement and R&D had pushed technological progress in both the computer as well as semiconductor industries (Malerba, 1985:77; Flamm, 1988:143,154,162,169).

By the mid-1960s, however, the European national governments had become aware of the fact that their semiconductor and computer companies had fallen behind those of the United States; American companies, and not European ones, benefitted from the rise in European IT demand. The American penetration of the European market (see Chapter 5), was perceived as threatening the survival of the European computer and semiconductor industries - industries which were considered vital by their national governments for both national wealth and security reasons.

Recognizing the need to catch up with the Americans, the European national governments adopted over the late 1960s and the 1970s a tripartite approach to strengthening the position of their respective IT industries, consisting of: industrial restructuring, preferential government procurement, and R&D programmes (see Table 3.1). The main beneficiaries of these policies were the "national champions", which were either created by the government or already prevailing in the market[1].

In Germany, Siemens was the main beneficiary of the government's IT policies. Over the period 1974-1983, Siemens received the single largest share (25 to 30 per cent) of the government's semiconductor R&D support, with AEG-Telefunken's semiconductor operations receiving approximately 10 to 15 per cent (Sandholtz, 1992:83). Similarly, Siemens was the main beneficiary of the government's computer R&D funding - particularly in the late 1960s and early 1970s, when AEG-Telefunken's

Table 3.1

MAIN NATIONAL IT PROGRAMMES, 1960s-1970s

France

First Plan Calcul, 1967-70
Budget: FF 450 mn

Second Plan Calcul, 1971-75
Budget: FF 1030 mn

Third Plan Calcul, 1976-80
Budget: FF 1438 mn

VI Plan, 1971-75
Budget: FF 1290 mn

VII Plan, 1976-81
Budget: FF 1850 mn

Plan Informatisation de la Société, 1977-80. Budget: FF 400 mn

Plan Circuits Intégrés, 1978-81
Budget: FF 600 mn

UK

Advanced Computer Technology Project, initiated in 1964.
Budget: ca. £ 6 mn

Microelectronics Support Scheme, early and mid-1970s. Budget: £ 12 m

Electronic Component Industry Scheme, 1977-80. Budget: £ 20 mn

Microelectronics Industrial Support Programme (MISP), 1978-83. Budget: £ 70 mn. Later reduced to £ 55 mn

Microprocessor Applications Project (MAP), 1978-81. Budget: £ 55 mn. Refunded in 1982 with £ 30 mn

Germany

First Electronic Dataprocessing Programme, 1967-70.
Budget: DM 387 mn

Second Electronic Dataprocessing Programme, 1971-75
Budget: DM 2.41 bn

Third Electronic Dataprocessing Programme, 1976-79
Budget: DM 1.58 bn

Electronics Components Programme, 1974-78. Budget: DM 388 mn

Italy

Applied Research Fund, 1968 onwards.
Budget 1968-89: L 4179 bn

Electronics Fund, established in 1968.

Special Electronics Fund, established in 1975. Budget: L 60 bn

Netherlands

Prior to 1984, no comprehensive IT policy; some projects organized by individual ministries

Sources: BMFT (1992;1993b); Brandin and Harrison (1987); Brickman (1986:71-87); CEC/CREST (1989a,b,c;1990;1991;1992); De Jonquières, 9 May 1991; Dosi (1983:227-229); DTI sources; Financial Times, 1 July 1982; EZ (1989,1990,1993; Communication 19;1994); JFIT (1988); Langlois et al. (1988:14 - 151); Malerba (1985:193-200); Nelson (1993); Sandholtz (1992:59-91; 146-159).

troubled computer operations did not constitute a real contender to Siemens' national champion status[2]. In the mid-1970s, however, the German government shifted its funding priorities; in the computer sector, it adopted a "dual championship" strategy, promoting not only Siemens but also the highly successful minicomputer producer Nixdorf (Flamm, 1988:165).

The French government, meanwhile, faced the problem that there was no *de facto* national champion present in the French computer and semiconductor markets. In the light of the absence of a clear champion, the French government fostered the creation of Compagnie International pour l'Informatique (CII) in 1967 through the merger of the computer operations of Société d'Electronique et d'Automatique (SEA) and Compagnie Européenne d'Automatique (CEA). However, despite substantial financial government support, CII's market share and profitability did not improve. In 1975, the French government therefore encouraged the creation of a new "national champion", CII-HB, made up from CII and the then partly French, partly American-owned Honeywell-Bull. In order to acquire Honeywell shares, absorb losses and finance research, HB received $ 440 mn in government funds over the period 1976-1980 (Brickman, 1986:74).

Similarly, the French government played an active role in creating a national semiconductor champion. In 1968, it fostered the creation of Sescosem, the product of a merger between Thomson's and CSF's semiconductor operations SECO and COSEM. Following the merger of CSF with Thomson, Sescosem came under the control of Thomson-CSF. Over the 1970s, Thomson-CSF was the main beneficiary of the government's semiconductor funding - particularly if one takes into account that EFCIS and Eurotechnique, which also benefitted from public funding, were controlled by Thomson-CSF (Malerba, 1985:193). From 1978 onwards, two other semiconductor producers also received public funding: Radiotechnique and the government-backed joint venture between Matra (F) and Harris (US) (Sandholtz, 1992:81-82).

In the United Kingdom, ICL constituted the British computer champion. ICL was formed in 1968 through a government-backed merger of the computer operations of Plessey with those of the two surviving British commercial computer companies English Electric Computers (EEC) and International Computers and Tabulators (ICT). In the semiconductor industry, however, no clear "national champion" was discernable. The government did not only support Inmos, the government-created mainstream memory ICs and microprocessor producer, but also the niche players Ferranti, Plessey, GEC and STC.

In contrast to France, Germany and the United Kingdom, Italy "acted more like a small country", as it "did not adopt a national champion policy" (Lauber, 1986:41). By the time the Italian government started to give some support to its high-tech industries in the late 1960s, Olivetti had already sold its computer operations to General Electric. In the mid-1970s, however, Olivetti re-entered the computer industry, and could subsequently be considered a "national champion" in computers; together with Fiat and IRI (including SGS), Olivetti was one of the main beneficiaries of Italy's Applied Research Fund over the period 1970-1987 (Malerba, 1993:253). In the semiconductor industry, the majority of the government's financial support was channelled to SGS-ATES. SGS-ATES was formed in 1972 when the government-owned STET merged its semiconductor operations (ATES) with those of SGS.

In the Netherlands, Philips constituted the *de facto* national champion, and benefitted from firm-specific IT projects sponsored by the Ministry of Economic Affairs (EZ sources; Communication 19;1994). Beyond some random activities organized independently by the various ministries, however, the Dutch government did not adopt a comprehensive IT policy until 1984 (EZ, 1993:4; Communication 19;1994).

During the late 1960s and the 1970s, the European national governments thus largely opted for national solutions - attempting to solidify and strengthen the positions of their respective national champions. To the extent that the national governments supported *European* actions, whether at the cross-national or the Community level, these were largely ineffective, as the following two examples illustrate (Sharp and Shearman, 1987:38; Swann, 1992:308-310).

In 1972, Unidata was formed, a joint venture between Philips, CII and Siemens[3]. Unidata, a cross-national initiative, sought to contest IBM's lead through the joint development and manufacture of a complete range of mainframe, mini and microcomputers. However, from its very conception, the venture proved to be troubled by widely diverging corporate interests, resulting in extremely slow decision-making, inefficiencies in management and organization, and increasing mutual distrust. These problems were aggravated when, in 1974, it transpired that, despite substantial government support, Unidata could only survive if the constituent partners would inject large funds into the venture. When the French government subsequently decided to merge CII with the partly American-owned Honeywell-Bull, the joint venture rapidly fell apart. According to Sandholtz (1992:97):

> Siemens and Philips declared that CII-HB was no longer welcome in Unidata. CII-HB would be a trojan horse, carrying an American company (Honeywell) straight into the centre of Europe's supposed champion. After all, Unidata was to be the European answer to American domination of the computer industry.

In 1974, when the hopes for the success of Unidata were still riding high, the Commission successfully managed to push through a Council Resolution advocating the establishment of a computer policy at the Community level (Sharp, 1993:203). While earlier Commission initiatives to promote high-technology industries had stranded on the lack of consensus amongst the EC Member States, this Resolution was adopted through a unanimous decision of the Council of Ministers, on the grounds that "the importance of dataprocessing for all aspects of modern society" and the "unbalanced" structure of the world computer industry justified an EC-wide approach to support this industry (OJ C86, 1974).

The Council Resolution, however, was never fully implemented. Although a number of small and isolated Commission projects resulted from it (OJ L223, 1976:11-15;16), the idea to prepare a medium-term, "systematic Community programme to promote research, industrial development and applications of dataprocessing", aimed at ensuring a "fully viable and competitive European-based industry" by 1980, never got off the ground (OJ C86, 1974). The Member States' diverging interests and squabbles about funding hampered a speedy policy-formulation and decision-making. Moreover, the companies' criticisms about their lack of involvement in the formulation of the programme and their unwillingness to cooperate in joint projects, especially after the failure of Unidata, rendered a common policy unviable (Lauber, 1986:38-40; Sandholtz, 1992:98; Sharp, 1993:203; Sharp and Shearman, 1987:46-47).

Only towards the end of the 1970s did the Member State governments and the national computer and semiconductor firms become more receptive to the idea of a common policy, as advocated by the European Commission. Four conditions have played a crucial role in altering the attitudes of both business as well as national governments: (1) the increasing competitive pressures on the European IT industry; (2) the perceived strategic importance of a European presence in IT; (3) the shortcomings of national solutions to the European IT industry's competitiveness problem; and (4) the prospects that a European solution offered.

3.1.1 THE PROBLEM: THE DECLINING COMPETITIVENESS OF A STRATEGIC INDUSTRY

By the late 1970s, the European-owned IT companies had come under increasing competitive pressure both in the world market as well as in their home market, the European market. Over the period 1964 to 1980, the European share in the world semiconductor market declined from approximately 17 to 10 per cent. Over the same period, the European share in the world computer market fell from approximately 24 to 10 per cent. In 1980, Europe's trade balance in semiconductors and computers was negative and declining. Import penetration alone amounted to approximately 50 per cent of European semiconductor consumption and nearly 30 per cent of European computer consumption (see Chapter 5).

The competitive pressures, moreover, did not only come from the established American companies but, increasingly, also from Japanese competitors - companies that in the early post-war period had been trailing the European companies. Supported by their government through, for example, the VLSI programme, the Japanese producers rapidly improved their position in the world semiconductor markets; their share increased from 19 per cent in 1975 to 28 per cent in 1983. In the world computer markets, the Japanese competitive threat was not as serious as often portrayed; by 1984, the Japanese companies still held less than 10 per cent of the market (see Chapter 5). European M/S politicians and corporate management, however, feared that the technological preeminence in semiconductors of the Japanese vertically integrated companies would confer competitive advantages on their downstream operations, such as telecommunications, consumer electronics and computers.

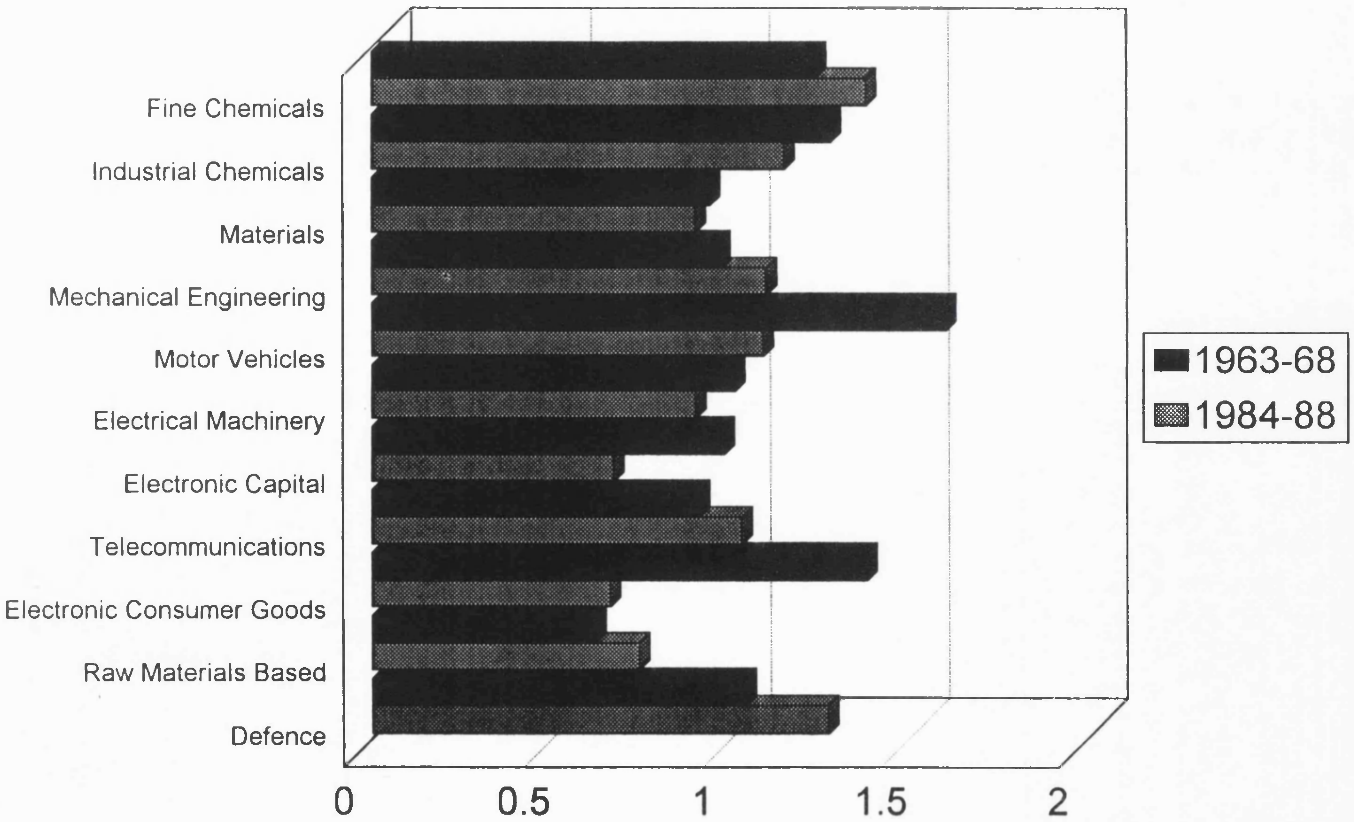
Although not a primary stimulus for Community action (House of Lords, 1985:xvii,35), the announcement of the Japanese Fifth Generation Computer Project in 1981 did set a credible threat; it was felt that the scope of this and other R&D programmes[4] and the scale of the funding involved would propel the Japanese forwards, and increase their technological and competitive advantage over European producers even further. Similarly, the American Very High Speed Integrated Circuit (VHSIC) Programme (1980), its Strategic Computing Initiative (SCI) (1983) and, at a later stage, the Strategic Defence Initiative (SDI) (1985), were perceived as further widening Europe's technological gap in electronics in general and IT in particular (see Figure 3.1)[5].

This increasing lack of international competitiveness of the European-owned IT companies was perceived as a major problem - not only by the companies in question, but also by their national governments, as IT was perceived as a *strategic technology*. Aside from the importance of information technology for military purposes, this technology was perceived as the key to future corporate competitiveness; as an input into almost any sector of the economy, information technology was perceived as extending "beyond its own particular industry and its relative weight within the economy" (CEC, 1986:15), affecting a wide range of industries (CEC, 1986:15; CEC, P-40:20 May 1983; Sharp, 1990:57). Staying at the cutting edge of information technology was thus not only vital for the competitiveness and profitability of the IT companies in question, but also for the competitiveness and wealth of the nation as a whole.

Consequently, the European-owned IT companies and their national governments felt that they could not afford to let their future be decided by foreign suppliers of information technology. It was believed that "whoever possesses [information technology] also dominates the other industries, because [IT], as component or ingredient, makes possible the development of new classes of products and processes that could not otherwise be developed" (CEC, 1986:15). An *indigenous*

Figure 3.1 Europe's Relative Technological Disadvantage in Electronics, 1960s-1980s

RTA > 1 Relative Strength
RTA < 1 Relative Weakness



Source: Patel and Pavitt, 1991:42

IT production capability was perceived a necessary prerequisite.

At the corporate level, the wish to control their profitability, growth and prosperity was translated into the need to develop and maintain an in-house capability in IT in general, and semiconductors in particular. The vertically integrated companies Philips, Siemens, and Thomson regarded the latter as vital "building blocks" for their downstream applications, such as computers. At the national level, the wish to control their economic future and, consequently, their political autonomy and security, made a nationally-controlled production capability in information technology imperative. Even the Thatcher government, with its anti-interventionist policy stance, continued supporting Inmos over the late 1970s and early 1980s (Sandholtz, 1992:83;146-159).

The government's arguments concerning the necessity of an indigenous IT production capability and the companies' arguments regarding an in-house capability of semiconductors, can be grouped into two categories: (1) the benefits derived from producing IT; and (2) the dangers of dependency on foreign suppliers.

The Benefits Intrinsic to Producing IT

In the early 1980s, it was believed that the mere production of IT products, and memory ICs in particular, would bring benefits; the manufacturing experience would yield certain skills and knowledge that would help the manufacturer gain a competitive advantage in other, more advanced semiconductor and IT segments. DRAMs, in particular, were perceived as technology drivers (see Chapter 5). As a French government official commented with respect to semiconductors:

> You cannot just import chips and use them. In order to be able to use chips properly, you have to have a [production] capability (Interview 18;1993).

The Dangers of Dependency on Foreign Suppliers

Additionally, an indigenous/in-house capability, particularly in semiconductors, could overcome the following disadvantages associated with a dependency on foreign suppliers, and ease security of supply concerns. First, a foreign supplier or group of suppliers might obtain a dominant position in the world market and exert their monopoly power - not an unfounded fear, as was illustrated by the Japanese DRAM chip producers' cartel-like behaviour in the mid-1980s (Flamm, 1990:257-260).

Second, the companies' supply lines might be cut off and/or their deliveries substantially delayed if either foreign commercial or national security interests would be at stake - the alleged delays in the supply of Japanese liquid crystal display (LCD) production equipment in the early 1990s or the American government's refusal to grant IT export licenses being a case in point (Government, EP and IT company sources, Interviews 15,18,19,21,31,33;1993).

Third, the competitiveness of the companies' downstream applications, and the improvements therein, could be thwarted by the quality/cost ratios of the IT inputs provided, notably if these IT inputs constitute an important part of the value of the downstream product[6]. Considering the extensive synergies existing between IT inputs, especially semiconductors, and their applications (Dosi, 1983:223; Government and IT company sources, Interviews 18,29;1993), it has been perceived as essential to get access to inputs at the cutting edge of technology. Dependency on foreign suppliers, however, would limit the companies' control over the quality/cost ratios of their inputs and any improvements therein. Moreover, the companies' specifications as to the type of IT input wanted might reveal their trading secrets and lead to an unwanted transfer of technology to the foreign producer. In particular, this has been seen as a problem if the foreign producer is vertically integrated and competes with the companies in question in downstream areas (Government and EP sources, Interviews 18,21;1993).

Fourth, the dependency on foreign IT products could undermine the companies' ability to obtain military contracts - a particularly important issue for firms that derive a substantial share of their turnover from supplying the military, such as Thomson-CSF (van Tulder and Junne, 1988:36).

3.1.2 THE FAILURE OF NATIONAL IT POLICIES AND THE PROSPECTS OF A EUROPEAN SOLUTION

The competitive pressures undermining the European IT industry alerted the national governments to the fact that further action should be taken to strengthen the industry's competitiveness. By then, however, the shortcomings of a national solution to the European IT industry's competitiveness problems had become apparent (Keohane and Hoffmann, 1990:285; Swann, 1992:310-11; van Tulder and Junne, 1988:210-212).

Not only had the national policies of preferential government procurement, R&D support and industrial restructuring failed to improve the international competitiveness of the home companies (see Chapter 5); they also had fragmented the European market. It was estimated that any company needed to have a share of 8 per cent of the world digital market in order to break even. However, even the largest national market within the Community, the German market, only accounted for 6 per cent of world consumption - too small to break even (IT company sources, Interview 16;1993).

Furthermore, the national governments' reluctance to fund cross-border projects had not created any real incentive for European, cross-border collaboration (House of Lords, 1985:169). Rather, as became apparent from projects like Unidata, the national policies appeared to have strengthened the animosity of the national champions vis-à-vis each other. Over the 1970s, the companies had been staunched competitors, which preferred non-European firms as their cooperative partners over European ones. Although alliances with non-European firms were perceived as holding benefits for those involved, it was clear, however, to both the national governments as well as the companies in question that the associated dependency on foreign companies rendered them inadequate as long-term solutions (Europe, 8/9 November 1982:12).

The need to improve the competitiveness of the European IT industry and the failure of the national policies to do so, made the national governments and the European-owned companies receptive to alternative solutions; "new ways had to be found to redress the balance" (IRDAC sources, Interview 13;1993). It was felt, albeit initially hesitantly, that a policy at the European level (whether at the EC or at the cross-national level) might provide a solution to the IT industry's competitiveness problems; only an unfragmented European market would allow companies to yield the economies of scale in production, R&D and distribution that the American and Japanese competitors enjoyed. Only a combined effort amongst the national companies would yield the necessary human and financial capital to regain international competitiveness. As Hans-Dietrich Genscher, Germany's former foreign minister, argued:

> No [European] country can on its own keep up with developments in high technology in the United States and Japan. Only the European democracies in their entirety have the researchers and the engineers, the wealth of companies both large and small, the capital and above all, the market to be competitive in the new technologies (in Smith, 1986:219).

3.2 A EUROPEAN SOLUTION

Over the 1980s, the European Community adopted a three-way approach to the competitiveness problems of the European IT industry. First, in the early 1980s, the Community and its Member States introduced government-supported, collaborative IT research and technological development (R&TD) programmes, at the national, cross-national and European Community level. These programmes would allow the IT companies to share the costs of R&D in a selected number of innovation areas. Second, in the mid-1980s, the EC adopted a programme to overcome the fragmentation of the European market. This liberalization programme was not specifically targeted at the European-owned IT companies, but would benefit these companies, as it sought to create a homogeneous European "home market" (Hayen, 1990:52). Third, over the 1980s, the EC intensified its trade policy, notably through the initiation of anti-dumping proceedings which would protect Community producers against unfair competition from foreign producers. Although most anti-dumping cases targeted consumer electronics products, in the late 1980s, the EC initiated two cases, later followed by a third, which affected the European-owned semiconductor producing and using companies.

The following section will shortly discuss these three approaches and outline, under the heading "corporate diplomacy", the policy preferences of the companies and the main channels through which they voiced these preferences.

3.2.1 COLLABORATIVE R&TD PROGRAMMES

In the early 1980s, the European Community adopted the European Strategic Programme for Research and Development in Information Technology (ESPRIT). This programme, which went into force in 1984 after a pilot phase (1983), sought to give a technology-push to the European-owned IT industry; through stimulating industrial cooperation in precompetitive research, ESPRIT sought to provide the European IT industry with the basic technologies and standards necessary to meet future competitive requirements[7].

The first phase of ESPRIT was adopted on the basis of Article 235 (EEC Treaty (58)), which allows the Council to take the appropriate measures in areas where the Treaty has not provided the necessary powers thereto[8] (OJ L67, 1984). In 1987, however, the Community's efforts in this area were given a legal basis. The Single European Act formalized the establishment of multiannual R&TD Framework Programmes at the EC level (EEC Treaty (87): Title VI; OJ C208 (1983); L302 (1987); L117 (1990); L126 (1994)), which define the Community's strategy in the field of research and development and form the basis for specific programmes, like the second and third phase of ESPRIT (OJ L118, 1988; OJ L218, 1991).

In the context of ESPRIT, the European Community financed 50 per cent of R&TD projects involving industrial partners, and, in exceptional circumstances, up to 100 per cent of R&TD projects involving academic institutions. The projects had to include participants from at least two different Member States. The participants, however, did not have to be European-owned; formally, ESPRIT was open to participation of foreign-owned firms, provided that these firms had been established in the Community for several years and had been carrying out R&D in information technology within the borders of the EC. The de facto number of foreign companies that participated in ESPRIT, however, remained limited. When admitted, these companies generally remained outside the "inner circle" of European-owned IT companies, which worked closely with the Commission on the programme's implementation (De Jonquières, 20 July 1990). Moreover, they remained at the periphery of ESPRIT networking (Mytelka, 1990:14-18; 1991:199-205).

While the actual projects were proposed by the participants upon invitation of the Commission, the EC was responsible for outlining the general areas of research, approving the projects, and allocating the funds. ESPRIT, in other words, could be seen as a top-down, Commission-administered programme. The first phase of ESPRIT

(1984-1988), worth ECU 1.5 bn in total, targeted mainly precompetitive research projects in advanced microelectronics, software technology, advanced data processing, office information, computer assisted manufacturing, and infrastructure actions. In the second phase (1989-1993), worth ECU 3.2 bn in total, ESPRIT targeted microelectronics, which included a shift in emphasis away from memory chips to ASICs; peripheral technologies; information processing systems; and IT application technologies. When ESPRIT II funds were exhausted by the end of 1990, the Council adopted a third phase, worth ECU 1.35 bn for the period 1990-1994. ESPRIT III targeted microelectronics, information processing systems and software, advanced business and home systems, computer integrated manufacturing and engineering, and basic research (see Figure 3.2).

Over the 1980s, ESPRIT's emphasis shifted away from precompetitive research towards more application-specific projects (see Figure 3.2), mainly in response to criticisms that ESPRIT 1 did not sufficiently contribute to increases in competitiveness of the participants - a move increasing the interventionist nature of the programme. In 1993, ESPRIT issued its last call for proposals.

Corporate Diplomacy

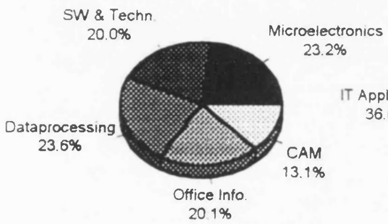
The adoption of ESPRIT was strongly supported by the European-owned IT multinationals and their forum, the European Information Technology Industry Roundtable (IT Roundtable) (see Chapter 1). The IT Roundtable was formed over the course of 1980, when Etienne Davignon, then Commissioner for industry, invited the twelve largest European electronics companies for roundtable discussions to provide the Commission with policy-input (Mytelka, 1990:10; 1991:185; Sharp, 1993:206; Davignon in House of Lords (1985:174; also:19,35,83).

Initially the companies found it difficult to harmonize their views on what

Figure 3.2 ESPRIT

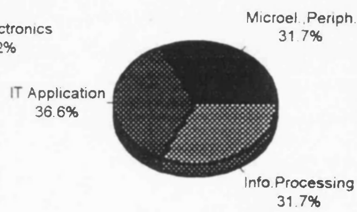
Allocation of Man Years/Funding

ESPRIT 1



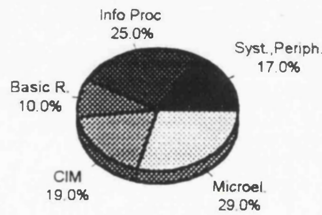
7199 Man Years

ESPRIT 2



ECU 1498 Mn

ESPRIT 3

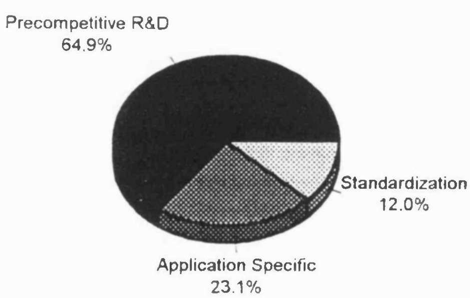


ECU 1338.48 Mn

Sources: OJ L118 (1988); OJ L67 (1984): OJ L218, 1991:30; Mytelka, 1991:185, 188, 191; Sandholtz, 1992:181

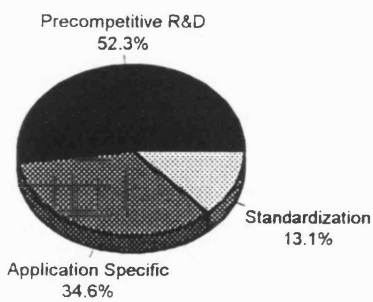
Type of Projects

ESPRIT 1



225 Projects

ESPRIT 2



153 Projects

Sources: see above

approach had to be adopted to improve the competitiveness of their industry (van Tulder and Junne, 1988:213). In contrast to what Sandholtz (1992:142) claims, this thesis argues that, initially, the European-owned companies were not very receptive to the idea of intra-European collaboration. Although Sandholtz is right in arguing that the technological changes taking place had motivated the companies to seek inter-firm alliances with foreign companies, collaborating with one's closest competitor was considered out of question. According to one account, Philips suggested in the early 1980s stronger cooperative links with its European counterparts, on the grounds that only inter-firm cooperation could help the European companies survive the impending shakeout which was looming over an industry characterized by too many small players. The response of other European IT companies, however, was negative. Allegedly, Philips was told:

> You are operating in a small home market, and even that market you share with Siemens and Ericsson, despite the fact that you are the national champion. If there will be a shakeout, you will go bust before we do. The Dutch market will then fall into our hands and we will be able to increase our economies of scale (Interview;1993).

By 1982, however, the companies had learned to act according to an informal code of conduct, which allowed them to lobby in unison for collaborative actions at the European Community level. Moreover, they had become willing to dispatch their own people, without compensation, to the Community for policy drafting purposes (Pannenborg, 1986:25; van Tulder and Junne, 1988:213; IT company sources, Interview 16;1993; J.M. Watson, Technical Director ICL in House of Lords, 1985:57,63,68). By that time, however, there was still no united view of the strategic priorities as signalled by the larger number of areas covered by ESPRIT 1 in comparison to ESPRIT 2. Neither did the companies wish to cooperate in areas that constituted an integral part of their business strategies - not surprisingly, as participation in ESPRIT required that, under certain conditions, the contractors share information and research results and grant patents and licenses to other participants (CEC/ERB:8; see also Chapter 9).

National and Cross-National IT R&TD Programmes

As an EC programme, ESPRIT signalled a move away from the national champion policies of the 1970s; for the first time, the EC Member States opted for a "common" rather than a national approach. However, the competitiveness of the European IT industry was obviously too important to be left to the Community alone; the actions at the EC level complemented, rather than replaced national policies. The Member States continued to promote their respective IT industries through preferential government procurement and IT research support (see Table 3.2). Furthermore, the ESPRIT did not replace cross-national collaborative projects. As Table 3.2 shows, the national governments financially participated in various cross-national efforts, of which the Joint European Submicron Silicon Initiative (JESSI) has been by far the most important.

JESSI was formally launched in 1989 within the framework of EUREKA. Launched as a response to Reagan's SDI, EUREKA, a cross-national initiative involving both EC and other European countries, has been seeking to promote advanced technologies[9]. JESSI has been seeking to strengthen Europe's technological capabilities across the electronics foodchain[10] over a period of 8 years. Initially, it was focused on mainstream memories - an orientation thwarted by Philips' withdrawal from a key JESSI mainstream memory project in 1990 and Siemens's DRAM alliances with Toshiba and IBM (see Chapters 4,5). Over the early 1990s, the programme has been refocused towards ASICs - an orientation which appears to work better (DG 3 sources, Interview 3;1993).

JESSI's founding members, i.e. those companies and institutions which signed the JESSI Frame Agreement include SGS-Thomson, Siemens, Philips, Olivetti and

Table 3.2

MAIN NATIONAL IT PROGRAMMES, 1980s

France

Filière Electronique, 1982-87
Budget: FF 70 bn

National Programme in Electronics, basic research, 1987 -

JESSI, 1989-96 (EUREKA project)

Germany

Microelectronics Program, 1979-early 1980s. VLSI: DM 125 mn, 1979-81

Megabit Project, 1984-89
Government contribution: DM 300 mn

Informationstechnik, 1984-88
Budget: DM 3 bn

BMFT support for IT R&D projects, late 1980s -. Budget 1992: DM 673 mn

BMFT institutional promotion of public research institutions, late 1980s -.
Budget 1992: DM 437 mn

JESSI, 1989-96 (EUREKA project)

The Netherlands

Megabit Project, 1984-89.
Government Contribution: *f* 200 mn

Informatica Stimulerings Plan, 1984-88.
Budget: *f* 1.7 bn (incl. Megabit)

IC Technology Innovation Oriented Programme, 1985-92. Budget: *f* 27 mn.

SPIN (Stimulation Project Team for IT Research) projects, completed in 1989.

UK

Support for Innovation Programme.
Budget 83-86: £ 304.1 mn

Alvey, 1983-89. Budget: £ 350 mn of which £ 200 mn by government

MISP II, 1984-90. Budget: £ 120 mn

JFIT National Programme, initiated in 1988. Budget for 1992: £ 85 mn

JESSI, 1989-96 (EUREKA project)

Italy

Electronics Plan, 1978-81
Budget: L 130 bn

Technological Innovation Fund, set up in 1982. Budget: L 2314 bn

Microelectronics R&D Programme, 1984-88. Budget: > $ 100 mn

Targeted Projects and National Research Programmes in IT. F.i.: Microelectronics National Programme, L 104.35 bn (1990)

JESSI, 1989-96 (EUREKA project)

The Netherlands

National Programme Information Technology, late 1980s. Budget 1989: *f* 105.5 mn/1990: *f* 81.5 mn. 1989-91: no R&D. 1992: reintroduction R&D (Micro-Electronica Stimulering, incl. JESSI, *f* 112 mn; PBTS-IT, *f* 17 mn)

JESSI, 1989-96 (EUREKA project)

Sources: see Table 3.1

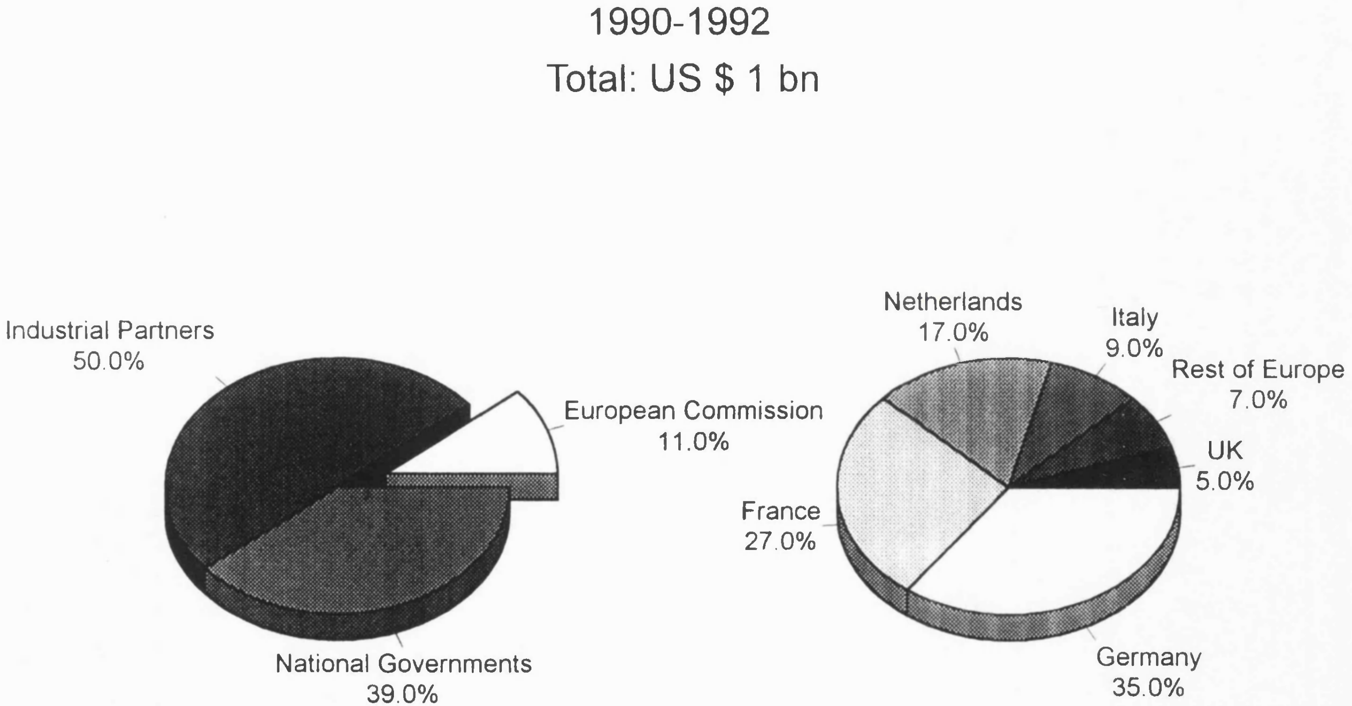
Bull. ICL, albeit not one of the founding members, has been participating in JESSI projects. The ECU 3.8 bn programme has been financed by the participating companies (50%), the national governments, and the EC. In 1989, the M/S governments and the EC had agreed to contribute 25 per cent of the costs each; over the period 1990-1992, however, the Commission only contributed 11 per cent, while the national governments accounted for 39 per cent (see Figure 3.3). Despite EC funding, however, it has remained a cross-national collaborative effort, which adheres to the rules of EUREKA rather than to those of the EC's collaborative R&TD programmes.

In contrast to ESPRIT, EUREKA is considered to be a decentralized, bottom-up programme. There is no central organization outlining the main research priorities or allocating the funding. Neither are there centrally-set regulations ruling the participation and cooperation. It is up to the participants to initiate the projects and to decide how, on what conditions, and with whom to cooperate - a principle which allowed the continental European IT firms to review ICL's participation in JESSI when it was taken over by Fujitsu and to readmit it to only two of the five projects in which it had been participating (DTI sources, Interview 12;1993; see Chapter 4). Moreover, EUREKA projects are not confined to precompetitive R&D. Finally, the national governments exercise a tighter direct control over EUREKA projects and only subsidize that share of the project accounted for by their own national companies[11].

3.2.2 SINGLE EUROPEAN MARKET PROGRAMME

At the Milan summit in 1985, the European Council endorsed the Cockfield Report on the completion of the Internal Market. This report identified nearly 300 measures aimed at eliminating the remaining non-tariff barriers to the free movement of goods, services, labour and capital within the Community. The elimination of these

Figure 3.3 JESSI Budget by Contributing Partners



Source: Electronics, 11 January 1993:12

barriers would create a level playing field for business across the Community. The EC's commitment to complete its common market by 31 December 1992 was formalized by the Single European Act, which went into force in 1987 (EEC Treaty (87): Art.8a).

Corporate Diplomacy

The completion of the Single European Market was strongly advocated by the largest European multinationals and their forum, the European Round Table of Industrialists (ERT) (Sandholtz and Zysman, 1990:116-117; van Tulder and Junne, 1988:214-215). The ERT's membership base included a core of IT producers, namely: Philips, Siemens, Olivetti, Plessey[12] and Thomson. Philips, in particular, was a driving force behind the European business community's "Euro-lobby" - not surprisingly considering the fact that Philips' operations were hampered to a far greater degree by the size of its home market than, for example, Siemens' and Thomson's operations.

According to Drs. G.J.J.M. Hayen, Deputy Director Corporate External Relations of Philips, the company developed its pro-European integration policy around 1980 (Hayen, 1990:53). In contrast to Moravcsik (1991:65) who argues that "transnational business lobbies got involved late" on the basis of the fact that "by the time Dekker delivered his oft-quoted speeches, nearly a year had passed since the beginning of the path-breaking French presidency [1984]", Philips communicated its views to national and European politicians and competitors far *before* Wisse Dekker, then President of Philips, presented Philips' "Europe 1990" plan (1985). Philips' initial ideas were presented through various channels, including: the "Europa"-working group set up in the context of the 1981 Dutch Presidency; meetings with Dutch and European MPs; and speeches and lectures. Philips only prepared its action plan "Europe 1990:

An Agenda for Action", when the plans for European market integration did not progress as smoothly as was hoped for (Hayen, 1990:55).

From Hayen's account, one could draw the conclusion that it was Philips' initial lobbying activity that helped mobilizing transnational support for the completion of the Single European Market;

> Our public call for European integration and cooperation did not only draw a response from the European Movement, the Groupe de Talloires and the like, but also from EEC-Commissioner Davignon and other captains of industry in Europe. In those circles, the initiative was born to establish the Round Table of European Industrialists (ERT) which could serve as initiator and/or soundingboard for European projects (Hayen, 1990:54).

Allegedly, Davignon suggested that "if the companies would form a platform, he would not have to contact UNICE and other lobby groups. He would then tune his policies to the companies and he would know that, in any case, he could count on the support of strong, influential companies in each Member State" (IT company sources, Interview 16;1993).

Single European Market-Related Policies

Pursuant to the implementation of the SEM programme, the EC also stepped up its efforts in three closely related policy areas: standardization, trade and competition.

Standardization. In order to ensure an efficiently functioning common market, the Community felt it necessary to increase its standardization activities. Beyond the standard-setting promoted within the context of ESPRIT, the EC adopted in 1985 a new approach towards standardization, laying down the essential requirements concerning health and safety in EC legislations and delegating the actual technical harmonization to the European standardization bodies CEN, CENELEC and ETSI (Council Resolution of 7 May 1985). Over the period 1985 to 1990, the total number of European standards subsequently increased from less than 200 to over 1300 (Swann, 1992:155; CENELEC Annual Report 1992; CEN information brochure). The European-owned IT companies have played a substantial role in this standardization process, via their participation in technical committees within the national and European standardization bodies as well as their direct membership of the Standards Promotion and Application Group (SPAG), the European Computer Manufacturers Association (ECMA) and the European Workshop for Open Systems (EWOS) (van Walsum-Stachowicz, 1994; Chapter 7).

In December 1986, the Council adopted a decision stating that the M/S governments, who have been accounting for approximately 20 per cent of Community IT spending, should base their large public procurement orders for information technology on international and/or European IT standards (OJ L36, 1987; Rosario and Schmidt, 1991:192). As will be outlined in Chapter 5, this insistence on *non-proprietary* standards in public procurement has had major implications for IT companies in general and the European-owned IT companies in particular, as it helped opening up national procurement markets - the national champions' captive markets (COM(90)556:13) - to foreign competition.

Trade. Additionally, the Community felt it necessary to abolish the remaining national quotas[13]. Such national barriers had become incompatible with the EC's common market objective (Kelly et al., 1992:24). As Chapter 9 will show, the EC's abolishment of these national quotas or their translation into EC-wide quotas that will be phased out after a transition period (Barber, 9 February 1994:6), has had implications for the options available to national governments to support their respective home companies.

Competition. The Community began to enforce a stricter competition policy (EEC Treaty (58),(87): Art.85-94). Mergers and acquisitions of a "European dimension"[14], national incentives to attract companies, and state aids in particular, became subject to increasing Commission scrutiny[15]. As Chapter 9 will show, the Commission's stricter attitude towards state aids, has had major implications for the state-owned European IT companies in general, and Bull in particular.

3.2.3 EC TRADE POLICIES

Over the 1980s, the European IT industry was protected against cheap computer and semiconductor imports through the Common Customs Tariff (CCT). The European-located semiconductor companies were by far the largest beneficiaries of the protection provided by the CCT. In the period prior to 1986, imported semiconductor devices were subject to a 17 per cent duty (Most Favoured Nation rate) and after 1986 to a 14 per cent duty. Wafers, not yet cut into chips, were subject to a 9 per cent duty during the whole decade (see Table 3.3).

In January 1986, the tariffs on semiconductors were reduced to compensate Japan for the harm caused by the EC's decision to increase EC tariffs on VCRs from 8 to 14 per cent (Kostecki 1989:24). Despite this reduction, the tariff rate remained high, not only relative to tariffs on other IT products, but also in comparison with the American and Japanese rates - particularly after 1986, when the American and Japanese governments reduced their tariffs on semiconductor imports to zero (Kostecki, 1989:22). Computer imports, in contrast, were subject to relatively low tariffs, which gradually declined over the 1980s (see Table 3.3). According to Kostecki (1989:22), the Community's simple average tariff rate on automatic dataprocessing imports over the period 1984 to 1987 amounted to 2.5 per cent while the American and Japanese rates totalled 4.7 and 10.6 per cent respectively. The European-located computer producers thus not only received little protection, but also bore the burden of the high

Table 3.3

EC MOST FAVOURED NATION TARIFF RATES ON SEMICONDUCTORS AND COMPUTERS, 1980-1993

	SEMICONDUCTORS Dispersion	Wafers	Devices	COMPUTERS Dispersion
1980	6.3 - 17.0	9.0	17.0	0 - 6.7
1981	6.0 - 17.0	9.0	17.0	0 - 6.5
1982	5.8 - 17.0	9.0	17.0	0 - 6.2
1983	5.6 - 17.0	9.0	17.0	0 - 6.0
1984	5.3 - 17.0	9.0	17.0	0 - 5.7
1985	5.1 - 17.0	9.0	17.0	0 - 5.4
1986	4.6 - 17.2	9.0	17.0	0 - 4.9
1987	4.6 - 15.0	9.0	14.0	0 - 4.9
1988	4.6 - 14.0	9.0	14.0	0 - 4.9
1989	4.6 - 14.0	9.0	14.0	0 - 4.9
1990	4.6 - 14.0	9.0	14.0	0 - 4.9
1991	4.6 - 14.0	9.0	14.0	0 - 4.9
1992	4.6 - 14.0	9.0	14.0	0 - 4.9
1993	4.6 - 14.0	9.0	14.0	0 - 4.9

Sources: Semiconductors NIMEXE 85.21 (1980-87), CN 8541 and 8542 (1988-1993); Computers NIMEXE 84.53 (1980-87), CN 8471 (1988-93). OJ L342, 1979; OJ L315, 1980; OJ L335, 1981; OJ L318, 1982; OJ L313, 1983; OJ L320, 1984; OJ L331, 1985; OJ L345, 1986; OJ L256, 1987; OJ L298, 1988; OJ L282, 1989; OJ L247, 1990; OJ L259, 1991; OJ L267, 1992.

Notes

Dispersion — Lowest and highest tariff levels in the relevant NIMEXE and CN categories semiconductor tariffs.

The protection provided by the CCT, however, was not considered sufficient to counter unfair trading practices, notably by Japanese electronics producers. In 1987, a maximum of nine anti-dumping cases were initiated against Japanese electronics producers (CEC 6th Anti-Dumping Report, COM(89)106). In that year, the EC initiated, amongst others, anti-dumping proceedings against Japanese exporters of Dynamic Random Access Memories (DRAMs) and Erasable Programmable Read Only Memories (EPROMs) (OJ C181, 1987; OJ C101, 1987). In 1991, a third case was initiated against Korean exporters of DRAMs (OJ C57, 1991). The anti-dumping complaints were filed by the European Electronic Component Manufacturers' Association (EECA) on behalf of practically all actual or potential Community producers of the semiconductors in question. In the 1987 DRAM case, these constituted Motorola (US), Siemens (G), SGS (I), and Thomson (F). Although Philips was not a DRAM producer, it allegedly supported the procedure (IT company sources, Interview). In the EPROM case, the complainant companies SGS and Thomson were perceived as constituting "practically all actual or potential Community producers". In the 1991 DRAM case, EECA acted on behalf of Siemens and Motorola (OJ L20, 1990; OJ L65, 1991; OJ L272, 1992).

In all three investigations, the Commission found that the Japanese and Korean exporters had dumped their semiconductors - the origin of which had been determined on the basis of the EC's rules of origin (OJ L148, 1968; OJ L363, 1987; OJ L33, 1989) - in the European market, causing injury to the Community industry as represented by EECA. In respectively 1990 and 1991, the Commission accepted minimum price undertakings offered by all known Japanese manufacturers in the 1987 DRAM and EPROM cases, which established a floor price for the exported semiconductors for an agreed period of time. These minimum prices would provide the Community industry with "a safety net against predatory pricing (Europe, 22 June 1989:8). In order to ensure the effectiveness of the price agreements, the Commission also imposed provisional and, later, definitive anti-dumping duties on "grey market" sales of Japanese DRAMs and EPROMs to the Community (OJ L193, 1990; OJ L292, 1990; OJ L65, 1991a,b; OJ L20, 1990). The 1991 DRAM case against Korean exporters was concluded over the course of 1992/93 with the imposition of provisional anti-dumping duties, the subsequent adherence of the leading three Korean manufacturers to a minimum price system, and the imposition of definitive anti-dumping duties on remaining Korean exporters (OJ L272, 1992; OJ L66, 1993; Nak-Hieon, 28 September:3; Barber and Kehoe, 17 March 1993).

Corporate Diplomacy

The 1987 DRAM case was subject to substantial controversy, not only amongst the Japanese suppliers charged with dumping, but also amongst the European IT companies. In the course of the DRAM case, the European computer companies, operating through EUROBIT, argued that the price undertakings and anti-dumping duties would further raise the costs of inputs faced by the Community's computer companies and, thus, hamper their competitiveness. In line with the analysis of Lindblom and others (see Chapter 1), EUROBIT argued that if the EC would indeed take such measures, the Community's computer companies would be forced to discontinue their investments in the Community, re-locate part of their operations abroad, and shed thousands of jobs across the EC. Although EUROBIT expressed its support for the need to develop a strong European manufacturing capability in integrated circuits, it also found that no punitive measures should be imposed in this case, given the protection already afforded to the Community's semiconductor producers via the CCT (OJ L20, 1990:23).

EECA, in contrast, exercised its political weight by pointing at the overriding strategic importance of an indigenous DRAM production capability for the overall European electronics industry, justifying the introduction of measures which might impose a cost on the European-located DRAM users. EECA stressed the importance of IT production for accumulating manufacturing skills, which would not only drive progress within the semiconductor industry but also across the electronics industry. Moreover, EECA emphasised the importance of a European source of DRAMs for the competitiveness of DRAM users. In the absence of any European source of DRAMs, the European-located users would have to accept both the type of products supplied as well as the prices dictated by the Japanese producers, which, due to their vertical integration, would be their direct competitors. In the absence of any European source of DRAMs, the users would also have to forego the benefits of close cooperative links with European semiconductor suppliers (OJ L20:23).

In contrast to the 1987 DRAM case, the EPROM case proceeded relatively quietly. Although EUROBIT did express its opposition to the establishment of minimum prices for electronic components in general, arguing that it would create artificial market conditions, no formal objections by EUROBIT were recorded in the EPROM anti-dumping case according to the Commission account of the case outlined in OJ L65 (1991:13-14). There may have been a number of reasons for EUROBIT's acquiescence. First, EPROMs have been less important to the European computer producers than DRAMs; while the European EPROM consumption totalled only $ 500 mn in 1989, DRAM consumption amounted to $ 1.6 bn (Skapinker and Kellaway, 12 September 1990). Second, the Japanese companies have never dominated the European EPROM market like they have been dominating the DRAM market; Japanese companies have been holding an estimated share of 15 per cent of the European market in comparison to 55 per cent for American companies and 30 per cent for European companies (1990) (Financial Times, 13 March 1991). Various alternative sources of supply have thus been available.

The 1991 Korean DRAM case, however, was again subject of controversy, albeit not as vigorous as before. Two user groups, amongst which EUROBIT (Communication 17;1994), expressed their opposition to the imposition of anti-dumping duties. Their arguments were similar to those outlined by EUROBIT in the 1987 case; the duties would increase their costs of production, while the Community DRAM industry already benefitted from high tariffs and publicly supported R&TD projects (OJ L272,1992:23,24).

By accepting the DRAM and EPROM price undertakings and by imposing the anti-dumping duties, however, the European Commission made a strategic choice in favour of the Community semiconductor industry, irrespective of the validity of EUROBIT's arguments. Albeit aware of the arguments of users, the Commission argued that it was of utmost importance to maintain a viable and strong Community semiconductor industry, as semiconductors were perceived as the building blocks for downstream applications and, thus, for a viable user industry. In the words of one corporate executive:

> IT is like a tree. Communication and computers are the branches, semiconductors the stem, and R&D the roots. If the tree is to survive, you can cut off a branch, but you cannot cut down the stem (Interview 16;1993).

3.3 THE INFLUENCE OF THE IT ROUNDTABLE COMPANIES ON ESPRIT IN THE EARLY AND MID-1980s

Although the Community's IT R&TD programme ESPRIT, the Single European Market Programme and the Community's trade policies all affected the operations of the European-owned IT companies, it was ESPRIT that constituted the heart of the

Community's policy response to the plight of its IT industry in the 1980s. In contrast to the Single European Market programme, ESPRIT was specifically designed to promote the IT industry. In contrast to the short-termist solutions provided by the Community's trade policies and, particularly, its anti-dumping cases, ESPRIT formed a coherent, longer-term strategy to improve Europe's competitiveness in IT.

The above has outlined that the European-owned IT companies, as represented in the IT Roundtable, supported ESPRIT and lobbied for collaborative actions at the EC level. However, were the companies merely involved in the policy-making process or did they exert an influence over the development, approval and implementation of the programme? Did the IT Roundtable's diplomacy pay off?

3.3.1 POLICY FORMULATION

In late 1979, the Commission produced a document on a "common" IT strategy, which eventually, in 1981, led to the adoption of a meagre ECU 40 mn Microelectronics Programme, aimed at the development of equipment and computer aided design for VLSI (OJ L376, 1981; COM(87)22:1-8; Sandholtz, 1992:161-163; EP sources, Interview 20;1993).

Shortly after this document was presented, Davignon, recognizing that the Commission lacked the specialist technical knowledge necessary and that the cooperation and commitment of the Community's companies was essential, invited the largest European electronics companies for roundtable discussions to provide the Commission with policy-inputs (Sharp, 1993:206). During their discussions, over the course of 1979/80, the discussions initially focused on the establishment of joint production activities. These, however, proved hard to organize from the top-down. Moreover, the companies were reluctant to share information. If such projects were to occur, they could only occur on a "one-to-one basis as a natural development" (House of Lords, 1985:35). The discussions of these companies, later known as the IT Roundtable, subsequently focused on joint precompetitive R&TD activities. Not only could such activities "be discussed on a total Community basis" (House of Lords, 1985:35), also the activities would be compatible with the EC's competition legislation[16] (IT company sources, Interview 16;1993).

In late 1981, Davignon invited the companies to draw up a detailed work programme for their industry (Sharp, 1993:206; Sandholtz, 1992:164). A Steering Committee of Roundtable R&D executives, set up to advise the Commission on the broad outlines of an EC IT programme and on projects within that programme, established five technical working parties covering separate areas of research. Over 1982, approximately 100 employees of the twelve largest electronics companies cooperated in the context of these technical panels, leading the Commission to conclude that the companies "played a leading role so far in assisting the Commission in the preparation of the programme" (COM(82)486:7; see also COM(82)287:6; Sandholtz, 1992:166; van Tulder and Junne, 1988:214; Fishlock, 12 December 1984; IT Roundtable sources, Interview 36, 1993; House of Lords, 1985:36).

In May 1982, the Commission presented its first formal proposal of a larger scale, comprehensive R&D programme, which would build on the Microelectronics Programme, to the Council of Ministers. In its communication, "Towards a European Strategic Programme for Research and Development in Information Technology", the Commission explained the nature of ESPRIT and argued in favour of a pilot phase of collaborative R&TD projects, which would start in 1983 (COM(82)287:7,10). The pilot phase would allow the 12 largest companies to test the waters and let the Commission proof its ability to mount a Community-wide programme, without alarming the Member States concerning any large financial commitments (COM(82)486:4, Annex

4; Sharp 1993:207). The Council's positive reaction of 30 June 1982 led to a detailed preparation of the pilot plan by the Steering Committee and technical panels mentioned above. In December 1982, the Council allocated ECU 11.5 mn to the pilot phase, which was launched in February 1983. From September 1983, 38 pilot projects were initiated. More than 80 per cent of the contracts were allocated to the Big Twelve (CEC/ISEC/B1/83; CEC/Task Force:21; Sharp, 1993:207; House of Lords, 1985:xviii).

In May 1983, the Commission proposed the Council to adopt the ten-year ESPRIT programme (COM(83)258). Endorsed by the European Summit in July 1983 and encouraged by the success of the pilot phase, the first phase of ESPRIT was adopted in February 1984, after the decision had been held up for four months by the German and British governments which had made their approval conditional upon the Community's acceptance of budgetary reforms (House of Lords, 1985:xviii).

The European-owned IT companies, as represented in the IT Roundtable, thus played an important role in shaping the ESPRIT programme. As one national government official argued: "In that period, the companies discussed extensively the contents of ESPRIT with the Commission and I think they have seen many of their ideas realized" (Interview 39;1993). This view was confirmed by Mr. D.H. Roberts, Technical Director of GEC, one of the IT Roundtable companies[17]:

> I find it very difficult, as a member of GEC or any other of the 12 companies, to say that we do not think the shape of the programme as defined was sensible because we had excellent opportunity to influence it and in many areas I think we did [..] it is not a programme dreamt up by Brussels bureaucrats and forced on us, it is our programme.
>
> No doubt the large companies, the 12 who constitute the Round Table, had the inside track position in the first round [..]. (House of Lords, 1985:36,50).

3.3.2 POLICY APPROVAL

Not only did the IT Roundtable companies play an important role in developing and defining "the entire ESPRIT project with respect to concept, size, scope of research, management, and legal questions" (Nasko in Langlois et al., 1988:138), also they played an important role in getting the proposals for ESPRIT adopted (Peterson, 1992:244; van Tulder and Junne, 1988:213). On the basis of various interviews with Commission officials, Roundtable executives and national officials, Sandholtz (1992:173-175) confirms that the IT Roundtable companies "were instrumental in selling the programme to the governments". The IT Roundtable companies, mostly their home countries' national champions, were able to persuade their governments about the benefits of ESPRIT - a programme they considered the fruits of their efforts.

3.3.3 POLICY IMPLEMENTATION

Moreover, the IT Roundtable companies played an important role in ESPRIT's implementation for the following four reasons (Sandholtz, 1992:181-182; van Tulder and Junne, 1988:214; EP, DTI and IT Roundtable sources, Interviews 1,10,36;1993). First, the IT Roundtable companies continued to play a central role in the execution of ESPRIT, particularly in drafting the annual work programmes through their participation in the ESPRIT Steering Committee and, together with representatives from universities, smaller companies and research institutes, in the Industry Technical Panels and Workshops (see Figure 3.4). Second, during these drafting stages, the IT Roundtable companies maintained, individually and as a group, informal contacts with the Commission (Sandholtz, 1992:166,182; DG 13 sources, Interview 6;1993). Third, indirectly, their case was presented via the national government officials present in

Figure 3.4 ESPRIT Implementation: Involvement of IT Roundtable Companies

Commission (DG 13)

- Adopts final draft of annual work programme, agreed with EMC and EAB and sends this to the Council for approval
- Publishes calls for project proposals
- Under its auspices, evaluation of projects by independent experts which make recommendations to the EMC
- Awards contracts to selected parties after consultation with EAB and approval of EMC
- Supervises execution of contracts

Informal Interaction

- National Governments
- Academia and Research Institutes
- Industry via Federations, Professional Lobbyists, Associations, or Direct
- Other Societal Interests

Formal Interaction

- ESPRIT Management Committee (EMC)
- ESPRIT Advisory Board (EAB)
- ESPRIT Steering Committee (ESC)

ESC

- Membership includes IT Roundtable companies
- Workprogramme: general outline

Technical Panels and Workshops

- Membership: academia, research institutes, industry, including IT Roundtable
- Workprogramme: prepare programme in detail

EMC

- Membership: National Governments
- Workprogramme: gives advice; gives consent to final draft
- Selection of projects: final approval

EAB

- Membership: Experts from industry and academia in personal capacity
- Workprogramme: gives advice; gives consent to final draft
- Selection of Projects: advice

Sources: House of Lords (1985: xxii, 9, 19, 142); Sandholtz (1992:181-182); CEC (1985); DG 13, DTI and corporate sources, Interviews 6,12;1993 and Communication 29;1994.

ESPRIT's Management Committee (EMC) - the Committee which gave final approval to the ESPRIT projects selected by the Commission (initially the IT Task Force, set up to get around the existing bureaucracies within the Commission, and later DG 13). Fourth, representatives of the Roundtable companies were present on the ESPRIT Advisory Board (EAB). They were, however, not the only members; in order to increase ESPRIT's political acceptability, about 50 per cent of the EAB members came from research institutions, universities and SMEs (Sandholtz, 1992:182). Although, formally, the representatives were sitting on this advisory body in their personal capacity, "this is not always the case. There are tremendous vested interests involved" (Government sources, Interview 10;1993).

Although EC R&TD funding only constitutes an insignificant share in the IT Roundtable companies' total R&D budget and the funding has certainly not been the main reason for their participation in ESPRIT (Mytelka, 1991:190; BMFT and IT company sources, Interviews 15,29,33;1993), it is interesting to note that the IT Roundtable companies were the main beneficiaries of the pilot phase and ESPRIT I. In the pilot phase, 70 per cent of the funding was directed at the 12 largest companies. In ESPRIT I, these companies participated in 70 per cent of the projects and benefitted from 50 per cent of the funding (CEC/ERB, 1989:17; Sandholtz, 1992:171). However, over time, even within ESPRIT I, the share of the IT Roundtable companies in total funding fell; as Peterson (1992:226) argued: "the lock that the Big 12 [..] had on EC funding in the early stages of Framework has loosened over time" (see also CEC/ERB, 1989:17).

3.3.4 PREPONDERANT INFLUENCE

As follows from the above, the European-owned IT companies, as represented in the IT Roundtable, had a virtual monopoly on corporate policy input into the Commission, particularly in ESPRIT's starting phase. Moreover, on the basis of interviews with Community and national government officials, corporate executives and representatives and industry/government observers (Interviews 1,3,4,6,10,11,12,15,19,21,26,30,33,39, 1993; Communication 42, 1994), this thesis found that, in the early and mid-1980s, the IT Roundtable's involvement had gone beyond the level of giving policy inputs - a conclusion supported by Langlois et al. (1988:137-138;143), Mytelka (1990:14), Peterson (1992:232-233), Business Europe, 15 February 1991, House of Lords (1985), Sandholtz and Zysman (1989:113-114), and van Tulder and Junne (1988:177,196,213-216). The perception exists that, notably in the pilot and first phase of ESPRIT, the IT Roundtable exerted a preponderant influence over the shape, approval and implementation of ESPRIT. As one DG 3 official argued:

> Yes, the IT Roundtable companies were influential in the case of ESPRIT. The IT Roundtable played a determining role in getting the programme politically of the ground and in giving further suggestions as to the shape of the programme. This was justified at the time. It was conceived as a technology push programme. It was natural that the main technology suppliers would be the main actors (Interview 26;1993).

3.4 CONCLUSION

Despite attempts of the European Community to adopt a "common" solution to the European IT industry's competitiveness problems, only in the late 1970s the national governments and the European-owned IT companies became receptive to the idea of policy actions at the EC level. The declining competitiveness of the companies in the face of American and Japanese competition and the credible threat posed by the American and Japanese governments' programmes in support of their respective industries, alarmed European corporate management and national governments alike.

Their concern was due to the fact that information technology was considered to be of strategic importance for the future wealth of both companies and nations, and an indigenous IT production capability was perceived as necessary to capture the benefits of IT. Towards the end of the 1970s, it became clear that further action should be taken to strengthen the industry's competitiveness. By then, however, the shortcomings of national solutions to the European IT industry's competitiveness problems, which had been prevailing since the mid-1960s, had become apparent. In contrast, policies at the European Community level could offer a solution; it was felt that only an unfragmented market and the combined resources of the national champions could help Europe overcome its competitiveness problem.

Over the 1980s, the Community adopted a three-way approach towards the competitiveness problems of the European-owned IT industry: it established common R&TD programmes, providing for collaboration between European IT companies; it adopted the Single European Market programme, aimed at liberalizing the EC market; and it adopted trade policies offering protection to the European-owned IT companies. At the heart of the Community's policy response to the plight of its IT industry in the 1980s, however, was ESPRIT. ESPRIT formed a coherent, longer-term programme, specifically designed to promote the IT industry. Notably in the pilot and first phase of ESPRIT, the main beneficiaries of the EC subsidized programme were the IT Roundtable member companies.

These companies played an important role in the Community's IT policy-formulation, decision-making and implementation processes. First, the IT Roundtable companies, thereto invited by Commissioner Davignon, played an important role in shaping the contents of the ESPRIT programme. Second, the companies were vital in convincing the national governments to adopt ESPRIT. Finally, the IT Roundtable members were represented on committees affecting the execution of ESPRIT and contributed to the implementation of ESPRIT's annual workprogrammes. Overall, it was found, on the basis of interviews with Community and national government officials, corporate executives and representatives, and industry/government observers, that, in the early and mid-1980s, the IT Roundtable did not only have a virtual monopoly on corporate policy input into the Commission, but also exerted a preponderant influence over the shape, approval and implementation of ESPRIT - particularly in ESPRIT's starting phases.

3.5 NOTES

1. The following account relies on: Chesnais (1993: 203-205); Flamm (1987:153-167; 1988:134-171); Keck (1993:142-145); Malerba (1985; 1993:251-255); Sandholtz (1992:59-94); and van Tulder and Junne (1988:159-162).

2. In 1974, Siemens took over AEG's computer division in a bid approved by the German government (van Tulder and Junne, 1988:160).

3. Sources: Flamm (1988:157-159); Metze (1991:79-80); Sandholtz (1992:96-97); Sharp (1993:203); and Sharp in Freeman et al. (1991:61).

4. In the early 1980s, the Japanese government also launched the government-backed Optical Electronics Integrated Circuits (OEIC) Project and the New Functions Elements Project, which provided for research on new types of ICs, such as three-dimensional ICs (Langlois et al., 1988:132).

5. Sources: Flamm (1990:260); Langlois et al. (1988: 130-133,144); Lauber (1986:37); Ostry (1991:71-72); Sandholtz (1992:113-131); Sharp (1990:53-57).

6. In 1992, the estimated share of electronic components, including semiconductors, in the total value of electronic equipment production, including computers, was close to 20 per cent (EECA, European Electronic Components Industry Report 1992:3). EUROBIT estimates that ICs account for 30 to 60 per cent of the manufacturing costs of PCs and workstations, and 60 to 80 per cent of the manufacturing costs of processors and memory systems (EUROBIT information brochure).

7. The following review has been based on: André (1988); CEC/ERB (1989); CEC/ESPRIT brochures; European File, 15, 1989; Langlois et al. (1988:137-144); Mytelka (1990); (1991:182-210); Sandholtz (1992:4, 143-208); Sharp (1990:57-58), (1993:205-209); Sharp in Freeman et al. (1991:63-72).

8. EEC Treaty, Art. 235 states that: "If action by the Community should prove necessary to attain, in the course of the operation of the common market, one of the objectives of the Community and this Treaty has not provided the necessary powers, the Council shall, acting unanimously on a proposal from the Commission and after consulting the European Parliament take the appropriate measures."

9. Sources: Baum, 4 April 1991; Castle, 1 November 1991; De Jonquières, 5 April 1988; Dempsey and Dodsworth, 20 June 1989; Dodsworth, 29 October 1988; Economist, 2 February 1989:74; Financial Times, 18 June 1990:6; Gosh, 11 January 1993:12; JESSI office, Munich, Information Brochures/JessiNews bulletin.

10. I.e. semiconductor materials, semiconductor manufacturing equipment, semiconductors and applications.

11. Sources: Andersen (1992:243); Olav Meyer, General Director of the EUREKA European Research Program in Business Europe, 21 September 1990:4,5; Mytelka (1991:189); Sandholtz (1992:257,258,297); Sharp (1992:23-24; 1991:71-72); Swann (1992:317-19).

12. Plessey was not a founding member but joined the ERT shortly after its establishment (ERT sources, Communication 42;1994).

13. See, for instance, GATT (1989:160-170); Kelly et al. (1992:117); and McAleese (1990:440).

14. A merger or acquisition will have a European dimension if (1) the total worldwide turnover of all participating undertakings is larger than 5 bn ECU; (2) the combined EC turnover of each (of at least two) undertakings is larger than 250 mn ECU; and (3) each (of at least two) undertakings achieves less than two thirds of its turnover in one single Member State (Swann, 1992:141).

15. Sources: Barber, 29 July 1993:2; Brittan, 29 March 1994:17; CEC/Stateaid, 1990:1-3,1992:1-3; COM(90)556:8; Claveloux, 14 September 1992:3; Dixon, 11 March 1994:17; Hill, 28 May 1991:2; 9 July 1993:2; OJ C273, 1991:2-17.

16. Sources: EEC Treaty (58):Art.85(3); Commission guidelines 1968 in Curzon Price, 1990:175; Sharp (1991:64); Swann (1992:135,319).

17. See also Brian Oakley, former Director of the Alvey Programme; Sir Herbert Durkin representing Plessey; Memorandum submitted by ICL in the Minutes of Evidence, Select Committee on the European Communities (House of Lords, 1985:2,18,24,51).

Chapter 4

CORPORATE DIPLOMACY AND EC IT POLICIES
THE IT ROUNDTABLE'S WITHERING INFLUENCE IN THE LATE 1980s AND EARLY 1990s

Chapter 3 has outlined that the European-owned IT companies, represented in the IT Roundtable, exerted a preponderant political influence on ESPRIT - the EC's only long-term policy initiated in the early 1980s aimed specifically at improving Europe's competitiveness in IT. However, did the IT Roundtable's influence last into the early 1990s or was it subject to changes over time? On the basis of the continued importance of the IT Roundtable companies within the Community's industrial fabric, their discretion in deciding whether or not to internationalize their operations, and their ability to keep abreast of technological changes (see Chapter 1), one might expect that the IT Roundtable would have maintained its influence. Yet the IT Roundtable's continued lobbying for measures beyond the scope of the Community's IT policy approach of the early 1990s appears to tell a different story.

This chapter, which focuses on the period 1987-1993, discusses the IT Roundtable's role in the Community's IT policy-formulation, decision-making and implementation processes in that time period, and seeks to establish, on the basis of the perceptions of government officials, corporate executives and representatives, and industry/government observers, whether or not the IT Roundtable continued to exert a dominant influence on the Community's policy outcomes. The chapter starts with explaining why the Community felt it necessary to develop a new IT policy approach in the early 1990s. After a short discussion of the Community's continued market liberalization efforts and its trade policies in sections two and three, the fourth section focuses on the Community's new policy response to the plight of its IT industry in the early 1990s: the 1991 White Paper.

4.1 THE NECESSITY OF A NEW EC IT POLICY APPROACH

Despite the Community's efforts, by 1990, the competitive position of the European-owned IT companies had not improved. Although the companies had managed to sustain their positions in the world market, Europe's trade balance in both semiconductors and computers had in fact continued to deteriorate. Import penetration alone had increased to 67 per cent of European semiconductor consumption in 1990 and 37 per cent of European computer production. Moreover, the computer and semiconductor operations of most European-owned IT producers had become loss-making (see Chapter 5).

In 1990, three events, in particular, shocked IT producers and politicians alike. First, in January 1990, Siemens bought the heavily loss-making minicomputer producer Nixdorf. The success-story of the 1970s and early 1980s had been on the verge of bankruptcy. Second, in May 1990, it became clear that Philips, the Dutch electronics giant, would become loss-making. Faced with extremely high losses on its IT operations, the company announced in September 1990 its withdrawal from the highly prestigious, but also very costly SRAM project - thereby putting not only the future existence of JESSI into peril, but also the Dutch and European technological base in mainstream memory chips (Skapinker and van de Krol, 5 September 1990). Third, in July 1990, Fujitsu's impending acquisition of ICL, Europe's best performing IT company, became public (Cane, 20 July 1990; De Jonquières, 20 July 1990). The takeover of ICL in November 1990 would eventually lead, in February 1991, to the expulsion of ICL from the IT Roundtable on the grounds that membership of the association was reserved for truly European-owned companies and, in March 1991, to the exclusion of ICL from three of the five JESSI projects in which it had been participating (see Chapter 3; De Jonquières and Thomson, 5 February 1991; Skapinker, 27 March 1991:1; Business Europe, 15 February 1991:16; Coghlan, 6 April 1991:9).

This crisis in the European IT industry generated a sense of urgency; immediate political action needed to be undertaken to stop the European-owned IT industry from collapsing. As one Commission official described:

> [In 1990], it turned out that the IT industry had gotten into a disastrous state. It became obvious that a large number of firms were in trouble. Firms, like Philips, announced losses and layoffs. Everyone thought it was a disaster. ICL had been taken over, Nixdorf was nearly bankrupt, IBM faced reduced profits, et cetera. On top of that, there was the microelectronics disaster, which was made visible when Philips stepped out of the JESSI project.
>
> Then it became public - the poor state of the industry became known to the public. As a consequence, there were motions in the EP, in the press, bringing [the state of the industry] to the attention of the people. [Commissioner] Pandolfi had to put something on the table (Interview 11;1993).

The crisis developing in the IT industry gave the public the perception that ESPRIT, the Community's main answer to the IT industry's competitiveness problems, was not adequate to improve, or even sustain, the competitive position of Europe's IT producers; the expected new products, larger market shares and improved corporate results had failed to materialize (EP, UNICE and IT company sources, Interviews 1,4,8;1993). As the Economist (6 October 1990:18) commented: "As company profits slide and firms change hands, those programmes and the philosophies behind them look increasingly redundant".

ESPRIT, however, should not be considered a failure; it played a central role in promoting industrial cooperation and standardization efforts amongst European companies[1]. As one IT company executive commented: "The programmes brought corporations together and taught them how to cooperate" (Interview 8;1993). Rather, with the benefit of hindsight, one could argue that the expectations of what ESPRIT could achieve were set too high. ESPRIT did not and, arguably, could not succeed in improving the overall competitiveness of the European-owned IT companies for the following five reasons[2].

First, ESPRIT's focus on R&TD hampered its effectiveness in improving overall corporate competitiveness, as R&TD constitutes only one out of the many elements necessary to improve the competitiveness of companies (IRDAC sources, Interview 13;1993). Second, the amount of Community funding available for ESPRIT constituted a negligible part of the total funding necessary for corporate R&D and even these limited amounts were spread over a large number of projects (see Chapter 9). Third, the precompetitive nature of ESPRIT's R&TD projects thwarted the prospects of immediate and tangible commercial results (Dekker Report, 1992:19). Fourth, much of the work carried out in the context of ESPRIT was not central to the business strategies of the large participants, reducing the incentive to commercialize the research findings (Dekker Report, 1992:21-22). Fifth, ESPRIT's top-down approach, resulting in a relatively slow process of project approval, limited its ability to rapidly respond to changing market conditions (IT company sources, Interview 8;1993)

Whether justified or not, the mounting criticisms towards the efficacy of ESPRIT and the need to respond to the crisis developing in the IT industry prompted the European Community to develop a new IT policy approach. This policy approach was to form the basis of a series of measures to be implemented in concurrence with the EC's ongoing efforts to complete the Single European Market and its continued use of trade policy instruments (DG 3 sources, Interview 3;1993). After a short discussion of the main developments in the Community's market liberalization programme and trade policies in the early 1990s, the Community's new IT policy approach will be discussed.

4.2 SINGLE EUROPEAN MARKET PROGRAMME REVISITED

On the first of January 1993, the Single European Market came formally into being. By that time, however, about five per cent of the 282 measures identified in the Cockfield Report (see Chapter 3) had yet to be adopted by the Council of Ministers. Moreover, twenty to thirty per cent of the adopted measures still had to be incorporated into the Member States' legislations (Financial Times, 4 January 1993).

Corporate Diplomacy

In the early 1990s, the European-owned IT companies displayed an ambiguous attitude towards the completion of the Single European Market. Concerned by the tendency displayed by Member States to stall the process of completing the Single European Market, the companies called, both individually and collectively, for a speedy completion of the programme, as only a unified market would allow them to enjoy economies of scale (ERT, 1991:41-42; IT Roundtable, 1992; IT Roundtable sources, Interviews 14,16,36;1993).

At the same time, however, fears that the Community's liberalization process would open the door to non-European companies prompted the European-owned companies to call for "a realistic synchronisation of costs and revenue for Europe's own industry" and for "strict reciprocity" in the Community's trade and industrial policies (IT company sources, Interview 16;1993). The rapid market penetration by Japanese and South East Asian companies had prompted the companies to re-asses their previous position of outright support for the 1992 programme (see Chapter 3).

4.3 EC TRADE POLICIES REVISITED

In December 1993, the GATT Uruguay Round negotiations were brought to a conclusion. The agreement provided, amongst others, for reductions in the Community's semiconductor tariffs, albeit differentiated per product family (see Table

4.1). In those areas in which the Community had been developing a production capability, such as smartpower ICs, tariffs would be kept at the 14 per cent level. Alternatively, as in the case of DRAMs and EEPROMs, a grace period would be granted, after which the tariff would be reduced to 7 per cent. In those areas in which there had been no true European competitor, such as microprocessors and SRAMs, tariffs would be reduced - in some cases even to zero per cent (Communication 31;1994; Kehoe, 14 December 1993:4).

The Uruguay Round compromise reflected both the international pressure on the Community to lower its semiconductor tariffs as well as the Commission's recognition in its 1991 White Paper on the IT and electronics industries (see below) that "the inconsistencies in the present tariff structure for semiconductors are liable to place the Community's processing industries at a competitive disadvantage" (SEC(91)565:23,24). With imported components facing relatively high tariffs and finished products relatively low ones, the Community's semiconductor users were clearly handicapped (see Chapter 3).

In the White Paper, the Commission also recognized that its anti-dumping measures may have had a "controversial impact" on the semiconductor-consuming industries (SEC(91)565:23,24); the minimum price agreements, concluded in the context of the anti-dumping cases (see Chapter 3), have been imposing a cost on the semiconductor users by suspending price reductions which would normally occur in maturing semiconductor markets (EUROBIT, November 1991; Dataquest in Nakamoto, 3 July 1992:3).

Corporate Diplomacy

The Uruguay Round brought to conclusion, at least temporarily, the heated debate between the European-owned computer and semiconductor producers about the

Table 4.1

URUGUAY ROUND COMPROMISE: SEMICONDUCTOR TARIFF REDUCTIONS

CN No.	Description	Base Rt	Bound Rt
8541	**Diodes, transistors and similar SC devices; photosensitive SC devices; light emitting diodes; mounted piezo-electric crystals:**		
8541.10	*-Diodes, other than photosensitive or light emitting diodes:*		
8541.10.10	--Wafers not yet cut into chips	9.0	7.0
	--Other:		
8541.10.91	---Power rectifier diodes	14.0	7.0
8541.10.99	---Other	14.0	7.0
	-Transistors, other than photosensitive transistors:		
8541.21	--With a dissipation rate of less than 1W:		
8541.21.10	---Wafers not yet cut into chips	9.0	7.0
8541.21.90	---Other	14.0	7.0
8541.29	--Other:		
8541.29.10	---Wafers not yet cut into chips	9.0	7.0
8541.29.90	---Other:		
EX1-NEW	----PowerMOS field effective transistors *(To be phased in over 10 years. First reduction in year 6)*	14.0	10.0
EX2-NEW	----Integrated gate bipolar transistors	14.0	14.0
EX3-NEW	----Other	14.0	7.0
8541.30	*-Thyristors, diacs and triacs, other than photosensitive devices:*		
8541.30.10	--Wafers not yet cut into chips	9.0	7.0
8541.30.90	--Other	14.0	7.0
8541.40	*-Photosensitive SC devices; light emitting diodes:*		
8541.40.10	--Light emitting diodes:		
EX1-NEW	---Laser diodes	14.0	14.0
EX2-NEW	---Other	14.0	7.0
	--Other:		
8541.40.91	---Solar cells whether or not assembled in modules or made up into panels	4.6	2.3
8541.40.93	---Photodiodes, phototransistors, photo-thyristors or photocouples	4.6	0.0
8541.40.99	---Other	4.6	0.0
8541.50	*-Other SC devices:*		
8541.50.10	--Wafers not yet cut into chips	9.0	7.0
8541.50.90	--Other	14.0	7.0
8541.60.00	-Mounted piezo-electric crystals	8.0	4.0
8541.90.00	-Parts	5.8	2.9
8542	**Electronic ICs and Microassemblies:**		
	-Monolithic ICs:		
8542.11	--Digital:		
8542.11.10	---Wafers not yet into chips	9.0	7.0
	---Other:		
8542.11.30	----Chips	14.0	7.0

CN No.	Description	Base Rt	Bound Rt
	----Other:		
8542.11.71	-----Memories:		
EX1-NEW	------Dynamic random access memories (DRAMs) *(First 2 years: existing rate will remain unchanged. After 2 years: rate will become 7% in 3 equal steps)*	14.0	7.0
EX2-NEW	------UV erasable, programmable read-only memories (EPROMs)	14.0	7.0
EX3-NEW	------Electrically erasable, programmable read-only memories (EEPROMs), incl. FLASH EEPROMs *(First 4 years: existing rate will remain unchanged. After 4 years: 7 %)*	14.0	7.0
EX4-NEW	------Static random access memories (SRAMs); Mask-programmable ROM; Digital CAM; Digital cache-tag RAM; Digital FIFO; Digital LIFO; Ferroelectric memory	14.0	0.0
EX5-NEW	------Other	14.0	7.0
8542.11.75	-----Microprocessors and single-chip computers:		
EX1-NEW	------Microprocessors	14.0	0.0
	------Microcontrollers incl. microcomputers:		
EX2-NEW	-------With a processing capacity < 4 bits	14.0	0.0
EX3-NEW	-------With a processing capacity > 4 bits	14.0	14.0
8542.11.91	-----Logic Circuits, control circuits and interface circuits:		
EX1-NEW	------PLDs (ASICs); standard logic; micro-peripherals	14.0	0.0
EX2-NEW	------Gate Arrays; standard cells; full custom logic (ASICs) *(To be phased in over 10 years; first reduction in year 6)*	14.0	0.0
EX3-NEW	------Other	14.0	7.0
8542.11.99	-----Other:		
EX1-NEW	------Microperipherals	14.0	0.0
EX2-NEW	------Other	14.0	7.0
8542.19	--Other:		
8542.19.10	---Wafers not yet cut into chips	9.0	7.0
	---Other:		
8542.19.20	----Chips	14.0	7.0
	----Other:		
8542.19.30	-----Amplifiers	14.0	7.0
8542.19.50	-----Voltage and current regulators	14.0	7.0
8542.19.70	-----Interface circuits	14.0	7.0
8542.19.90	-----Other:		
EX1-NEW	------Smartpower ICs	14.0	14.0
EX2-NEW	------Mixed digital-analog IC *(First 4 years: rate will remain unchanged; after 4 years: reduction to 7%)*	14.0	7.0
EX3-NEW	------Other	14.0	7.0
8542.20.00	-Hybrid ICs	14.0	7.0
8542.80.00	-Other ICs and microassemblies	14.0	7.0
8542.90.00	-Parts	5.8	2.9

Source: Schedule LXXX-European Communities

Notes

CAM	Content Addressable Memory	RAM	Random Access Memory
FIFO	First-in/First-out memory	ROM	Read-Only Memory
IC	Integrated Circuit	SC	Semiconductor
LIFO	Last-in/Last-out memory	Rt	Rate

continued protection of the Community's semiconductor industry (see Chapter 3). The European semiconductor producers, as represented by EECA and supported by the Dutch, French and German governments, had argued that any reduction of the 14 per cent tariff might eventually lead to the disappearance of Europe's semiconductor production capability altogether (EECA sources, Interview 31;1993 and in Nakamoto, 28 May 1992). The European-grown computer producers, in contrast, favoured a zero per cent tariff on semiconductor imports - a position in which they were supported by foreign-owned computer producers like Digital Equipment (EUROBIT, 22 November 1991:3-5; Nakamoto, 28 May 1992; IT company sources, Interviews 5,15, 1993; Shingles, 5 July 1993). Allegedly, the strife between EECA and EUROBIT escalated to such a degree, that joint task force discussions with the Commission on IT industry policy guidelines broke down on this very issue. According to one observer, "there was no understanding between EECA and EUROBIT" (Interview 31;1993). The compromise found in the differentiated tariff reductions, however, shows that the Commission has sought to "iron out" the tariff inconsistencies, "while taking into account the respective interests of [both] Community producers and users" (SEC(91)565:23).

With respect to the Community's anti-dumping policies, the opinions were divided as well - the European semiconductor producers favouring price undertakings and the computer producers opposing them (see Chapter 3). The European computer companies, as represented by EUROBIT, did not contest the validity of actions against unfair trading practices. Rather, they argued that the minimum price undertakings had been distorting the market at their cost. According to EUROBIT sources,

> EUROBIT worked hard to have the EC Commission fully recognize the ambivalence of anti-dumping measures imposed on semiconductors for the IT industry (Communication 17;1993).

Following the Commission's recognition that its anti-dumping measures may have had a controversial impact on users, EUROBIT "feels a gradually growing consideration of the consequences of such measures for the European computer industry" (Communication 17;1993).

4.4 THE COMMUNITY'S NEW POLICY APPROACH: THE 1991 WHITE PAPER

The Community's main response to the competitiveness problems of its IT industry was to develop a new IT policy approach which would go beyond promoting collaborative R&TD. The following section will discuss the development, endorsement and implementation of the Community's new IT policy approach and outline the European-owned IT companies' involvement in these processes. Moreover, it seeks to answer the question whether or not the companies, as represented in the IT Roundtable, maintained their say over EC IT policies. Were they as influential as they used to be in the case of ESPRIT?

4.4.1 POLICY FORMULATION

In the late spring of 1990, the Commission started drafting its new IT policy approach. At this preliminary stage in the policy-formulation process, the IT Roundtable was closely involved; in July 1990, the Commission invited the chairmen of the largest European-owned IT companies for high-level discussions on the development of an IT policy framework (Cane, 18 July 1990; DG 3 sources, Interviews 3,11;1993).

In the subsequent months, however, the drafting process became a Commission affair. Although the draft policy paper allegedly took into account what was discussed at the July meeting, in contrast to ESPRIT, "industry was not involved in the actual formulation. This was a paper written by bureaucrats" (DG 3 sources, Interview 11;1993). One should realize, however, that constant informal interaction between the Commission officials and the IT industry, including contacts with the IT Roundtable, EECA and EUROBIT, did enable the IT industry to articulate its policy preferences (DG 3 and IT Roundtable sources, Interviews 3,11,36;1993).

In September 1990, a first draft of the new policy approach was presented by DG 13, the Commission's IT directorate. This draft was heavily criticized within the Commission, and in particular by DG 4 (Competition), for its interventionist and protectionist nature (Business Europe, 21 September 1990:4; DG 3 and IT company sources, Interviews 3,11,29;1993). The key conflict between the two directorates centred around the question whether or not the EC should have a European technological and industrial competence in IT and how the EC could secure such a capability. DG 13 advocated an industrial policy aimed at maintaining a European IT capability, while DG 4, as proponents of a free-market approach, rejected such a policy line *a priori*. DG 3, the Commission's Industry directorate, allegedly found itself in the middle of this ideological debate (DG 3 sources, Interviews 3,11;1993).

In November 1990, the Commission adopted a communication, entitled "Industrial Policy in an Open and Competitive Environment: Guidelines for a Community Approach" (COM(90)556). The communication, which was prepared by Industry Commissioner Bangemann in response to pressure by the European Parliament and with the view of giving shape to the Maastricht Treaty (DG 3 and EP sources, Interviews 11,20;1993), argued that companies, and not governments, bear the main responsibility for adapting to change. Governments, however, could assist the process of industrial change in three ways, namely (1) by creating and maintaining a favourable, open and competitive business environment, (2) by providing the catalysts for change, and (3) by introducing policies that would accelerate the ongoing structural adjustments (COM(90)556:7-18). The communication, which sought to side-step the ideological debate by defining the principles on the basis of which the Community could start applying industrial policy measures, was endorsed unanimously by the Council in its meeting of 26 November 1990 (Presse 10159/90; Catinat, 6 July 1993). In July 1991, the European Parliament approved the "first steps taken by the Commission" in this respect (OJ C240, 1991:219).

Bangemann's initiative proved very important, as it opened the way for an IT industrial policy at the Community level. By formulating the Community's new IT policy approach on the basis of these guidelines, the Commission would be able to present an IT industrial policy without arousing concerns, notably amongst DG 4 officials, that such a policy would hamper a strong competition policy.

Over the winter and spring of 1991, the proposals for a new EC IT policy approach were finalized. In late March 1991, the Commission presented its proposed policy response in a communication called "The European Electronics and Information Technology Industry: State of Play, Issues at Stake and Proposals for Action" (1991 White Paper: SEC(91)565).

The 1991 White Paper

On the basis of its analysis of the condition of the European IT industry, the Commission identified five areas of policy action (see Table 4.2)[3].

Business Environment. First, the Commission sought to improve the Community's business environment, through measures to improve EC financing systems, speed up standardization and integration of standards into products, integrate IT into the Community's structural policies, and stimulate cooperation amongst SMEs, MNEs and research institutions and amongst IT producers and users.

Table 4.2

IT POLICY POSITIONS

White Paper, April 1991	IT Roundtable 1991, (R&TD:1992/3)
Business Environment ► Standardization ► Improvement financing ► Cooperation ► IT and structural policies	*Business Environment* ► Strengthening within the context of EC R&TD
Labour ► Training	*Labour* ► Strengthening within the context of EC R&TD
R&TD ► Second Generation: - Smaller number - Better targeted - Closer to market - Closer cooperation with users	*R&TD* ► Second Generation: - More funding - Adaptations and improvements in scope and methods including R&TD closer to the market, the introduction of a clustering approach, and greater cooperation with EUREKA - Measures to stimulate stronger vertical ties
Competition/Market Access ► Establishment of equitable conditions of competition and market access: - Maintaining an open, multilateral trading system - Improvement of market access - Establishment of fair competition	*Competition/Market Access* ► Establishment of fair conditions of competition - Maintaining transitional protective arrangements to ensure a balanced opening of third country markets, including equitable concessions regarding the excluded sectors - Control of national incentives to inward investment
Demand Stimulation ► TENs	*Demand Stimulation* ► European Nervous System - Relaxation of EC anti-trust - Measures to ensure that European -owned IT companies are given first consideration

Council Resolution, November 1991	1991 Semiconductor Initiative	Implementation White Paper by December 93
Business Environment ► Speedy implementation White Paper	*Business Environment*	*Business Environment* ► Ongoing efforts
Labour ► Speedy implementation White Paper	*Labour*	*Labour* ► Ongoing efforts
R&TD ► Speedy implementation White Paper ► Relaxation EC anti-trust	*R&TD* ► Government subsidies for semiconductor R&D ► Vertical ties: increased involvement semiconductor users	*R&TD* ► 4th FW not yet adopted. (Adopted: Apr.94) Incl. 2nd gen. IT: - Relative fall ITC funding - Cluster approach: linkages & better targeted R&TD - Precompetitive R&TD closer to market - Coordination EUREKA - More user-oriented
Competition and Market Access ► Speedy implementation White Paper ► Monitoring of int. trading relations ► Potential departure of multilateral trading principles	*Competition and Market Access*	*Competition and Market Access* ► Centralized information point ► No departure of multilateral trading principles in IT. However, maintenance of 3% price preference in telecommunications procurement ► No control of national incentives to inward investment
Demand Stimulation ► Speedy implementation White Paper ► Relaxation EC anti-trust	*Demand Stimulation*	*Demand Stimulation* ► Implementation only in preliminary stage ► Difficulties in securing funding.

Labour. The Commission also sought to improve its human capital supply conditions through the creation and strengthening of labour training schemes.

R&TD. Additionally, the Commission advocated the launch of a second generation of R&TD projects, which would concentrate work on a smaller number of better targeted projects, ranging from those in the precompetitive sphere to those close to the market (near-market projects). The projects would have to involve closer cooperation with users, provide for training, and be opened up to international cooperation.

Competition/Market Access. Moreover, the Commission sought to maintain an open, multilateral trade system and to improve access to third country markets, through a satisfactory conclusion of the Uruguay Round. In order to establish fair competition in international markets, which could also further the market access objective, the Commission called upon non-European competitors to refrain from unfair practices in their own and third country markets. However, if such practices would be shown to exist, the Commission would bring pressure to bear on the relevant public authorities. While meeting its international obligations, the Commission outlined that, where necessary, it would have to fall back on defensive measures, namely: its customs regulations (temporary suspension of the autonomous duties of the CCT) and its trade policy instruments (anti-dumping measures and customs duties).

Demand Stimulation. Finally, the Commission sought to stimulate demand through the creation of pan-European infrastructural projects called Trans European Networks (TENs). These TENs would have the additional benefit of contributing to European integration - as already recognized by the ERT in the mid-1980s (ERT, 1986). Although the Commission envisaged mainly a coordinating and facilitating role for the Community in the realization of TENs, it did state that the Community might contribute to the financing of these programmes.

The IT Roundtable's Alternative Approach

The 1991 White Paper was perceived by the IT Roundtable and its members as a relatively general policy statement, constituting a step in the right direction - but merely a first step (Interviews 29,36;1993). The White Paper fell far short of the European IT industry's own policy recommendations, especially in terms of its support for the European-owned IT producers and its implications for foreign-owned competitors.

The core of the IT Roundtable's alternative policy approach was expressed in a February 1991 letter addressed to Industry Commissioner Bangemann and copied to R&TD Commissioner Pandolfi - coinciding with the final stages of the EC Commission's drafting process of its 1991 White Paper. The IT Roundtable's recommendations were reiterated and further explained in the Roundtable's reaction to Bangemann's Communication on an Industrial Policy. The circulation of its reaction in March and April 1991 coincided with the Commission's presentation of its new IT policy approach. The main points of these two documents were summarized in Business Europe, 19 April 1991:7.

In its policy recommendations regarding an IT industrial policy, the IT Roundtable argued that the key to its recovery would be "the creation of unified, coherent market demand, coupled with measures to establish a transition period" which would allow the European IT industry "to become strong in relation to the rest of the world" (IT Roundtable, 1991). Specifically, the policy recommendations centred around three themes: (1) the promotion of industrial restructuring; (2) the improvement of external trade and investment conditions; and (3) the stimulation of IT demand (see Table 4.2). In order to achieve "political acceptability for these moves", the IT Roundtable called upon the Commission to mount "a joint awareness campaign to a broad audience". This campaign should be directed at the European Parliament, the national governments and the general public (IT Roundtable, 1991).

Industrial Restructuring. The IT Roundtable urged the EC to introduce "policies which emulate the Japanese model of vertical integration". In order to bring about changes in the existing industrial structure, the Commission should combine its subsidies for collaborative R&D projects with additional measures that would foster stronger vertical ties between industry segments. R&D subsidies, for example, should be combined with subsidies for a pilot introduction of the product developed in the R&D project or with a purchasing programme. Similarly, the IT Roundtable suggested that the EC take measures to promote cooperative relations in the area of design and production between large and small companies (IT Roundtable, 1991).

External Trade and Investment Conditions. The IT Roundtable also advocated a number of measures to ensure fair competition at the regional and international level.

One key suggestion was that action should be undertaken "to ensure real access to the homogeneous markets of our competitors, or reciprocal action to limit the entry of foreign suppliers". In sectors where European-owned companies would not be able to compete on an equal basis with non-European competitors, the IT Roundtable argued that it might be necessary to "maintain transitional protective arrangements" which should be reviewed in the light of the opening of non-European markets. In that context, the IT Roundtable, which also represents telecommunications equipment producers (see Chapter 1), argued that any further concessions by the EC relating to the excluded government procurement sectors, including telecommunications, should be on an "agreed equivalent basis" (IT Roundtable, 1991; IT Roundtable sources, Interview 14;1993).

Another main recommendation was that the EC should control national incentives to foreign direct investment, especially in areas characterized by a surplus productive capacity. Supported in this matter by EECA, the IT Roundtable members argued that such incentives distort competition; the national governments were paying for new, top-of-the-line factories owned by foreign companies which would produce products that would compete with the European-owned IT companies' products, produced in un-subsidized, older facilities (IT Roundtable, 1991; EECA sources, Interview 31; IT Roundtable sources, Interviews 29,36;1993).

Demand Stimulation. Finally, the IT Roundtable suggested that the Commission shift its emphasis towards "programmes for the creation of pan-European demand", taking the form of, for example, the "European Nervous System" (ENS) - a project which would link the national computing and communication links into a common IT infrastructure or "information highways". In the implementation of these market development programmes, the IT Roundtable recommended, first of all, that measures be taken to ensure that the European-owned IT companies would be given first consideration. The IT Roundtable even called upon the Commission to insist that the development of the common infrastructure should be carried out by European-owned companies. An additional recommendation was that the Community relax its anti-trust legislation to allow for both the EC's financial participation as well as cooperation amongst the large European-owned companies in the implementation of these demand-stimulating programmes.

Although the IT Roundtable's recommendations could certainly be interpreted as protectionist and discriminatory, the recommendations could also be seen as reflecting tensions between (1) the absence of a level playing field in the world market and unilateral liberalization; (2) the increasingly internationalized nature of the IT industry and nationally or regionally oriented policies; and (3) the crisis in the IT industry and the need to reduce regional economic disparities.

First, the IT Roundtable members felt that the absence of a level playing field in the world market and the need to secure one warranted a deviation from the EC's unilateral liberalization principles. As the American and Japanese competitors benefitted from various preferential practices, the IT Roundtable argued, one should not make the mistake of subjecting competition between the European-owned companies and their main non-European rivals to exactly the same free market principles applicable to competition amongst European-owned companies. In order to secure a level playing field in the world market, liberalization of the Community's market should go at par with liberalization in the American and Japanese markets. Seen from this perspective, the IT Roundtable's policy demands for preferential treatment in the implementation of the demand-stimulating programmes and their insistence on transitional protective arrangements reflected the IT Roundtable's fear that unilateral liberalization of the Community's markets, including that of its procurement market, would not be balanced with greater openness of the American and Japanese markets. As one IT company executive argued:

> A carrot will not be enough. You need a stick to relax some barriers (Interview 5;1993).

Second, the IT Roundtable companies felt that the increasingly globalized conditions of competition in the world industry (see Chapter 5) warranted a policy perspective reaching beyond the national/regional borders. In an internationalized industry, the IT Roundtable members argued, a company's position in the national or regional markets does not matter as much as its position in the global market. Seen from this perspective, the IT Roundtable's demand for eased anti-trust regulations reflected the need to survive in the global market. As an executive at an IT Roundtable member company argued:

> Especially in the area of IT, competition policy must not be seen only in the European field. To survive, we need to have certain dimensions and strength relative to the world market, not only relative to the European market. From a European point of view, this may lead to a very large company with a dominant position, but this is not necessarily a large company in the international field. You cannot say that any European semiconductor

> manufacturer may not have a monopoly [in the European market] when 90 per cent of the world market is dominated by the Japanese. In that sense, the Commission should not be too strict in its implementation of its competition policy (Interview 29;1993).

Third, the IT Roundtable companies felt that the crisis in the IT industry warranted a more coherent regional policy (Interviews 29,31;1993). As one IT company executive argued:

> We thought it absurd to allow billions of ECUs to be pumped into Japanese plants in Greece and Portugal in a sector in which we had commercial and industrial policies attempting to protect the European industry against Japan. There was no coordination (Interview 29;1993).

Seen from this perspective, the IT Roundtable's call for controls on national incentives to FDI reflected an attempt to bring about coherence between the Community's industrial and commercial policies on the one hand, and its regional policies on the other.

The IT Roundtable's Alternative Approach: Reaching Far Beyond the 1991 White Paper

Comparing the IT Roundtable's recommendations with the Commission's White Paper, however, it becomes clear why the latter fell short of the IT Roundtable's preferences. First, despite the importance attached to the improvement of third country market access and the elimination of unfair practices in the White Paper, the Commission did not envisage maintaining transitional protective arrangements to secure a balanced opening of Triad markets. Second, the Commission had not included provisions regarding the control of national incentives to foreign direct investment in areas characterized by a surplus productive capacity. Third, although the Commission's White Paper identified the stimulation of demand through pan-European projects as an area of policy action, the paper refrained from advocating any form of preferential treatment for the European-owned IT firms in the implementation of these demand-stimulating projects. Fourth, the White Paper did not call for a relaxation of anti-trust legislations with respect to inter-company allegiances and EC assistance in the implementation of these projects.

In fact, according to Commission sources, Commissioner Bangemann "would never countenance some of the IT Roundtable's suggestions", particularly with respect to the use of transitionary protective measures to force open foreign markets (Business Europe, 19 April 1991:6).

4.4.2 POLICY ENDORSEMENT

On the 29th of April 1991, the EC Industry Council endorsed the Commission's White Paper. The representatives of the national governments, however, differed substantially on the concrete measures to be taken. The Council debate broadly reflected a split between the nations now enjoying substantial foreign direct investment, notably the UK, Ireland, Spain and Portugal, and the countries with large home-grown and home-owned IT firms, namely France, Italy, Germany and the Netherlands (see Chapter 1).

While fully endorsing the Commission's policy approach, the latter group called for an implementation which would give sufficient support and protection to the European-owned IT industry in general, and the semiconductor industry in particular. The UK, Ireland, Spain and Portugal, meanwhile, expressed both their opposition to measures that would discriminate against foreign-owned companies, and their concern that special support might be concentrated on the European-owned IT MNEs, located in the centre of the Community, at the cost of support for SMEs in peripheral areas (Europe, 29/30 April 1991:7-8; Goldsmith, 30 April 1991:9; WSJ, 30 April 1991:A21).

In the end, the Council called upon the Commission to propose, in close consultation with a high-level working party comprising of national specialists and in dialogue with industrialists, users and investors, specific initiatives and concrete measures to implement the new policy approach. These proposals were to be in line with the principles adopted on a common industrial policy at the Council meeting of 26 November 1990. With the aim of maintaining an open world market based on equitable conditions of competition, the Council also asked the Commission to rapidly carry out in-depth studies on the risks of distortions in international competition (Presse 5812/91).

The European Parliament's response to the Commission's White Paper was only presented in January 1994, after the EP's Economic and Monetary Affairs and Industrial Policy Committee presented its long-awaited report on the state of the IT industry (PE 206.993, 1994; DG 3 sources, Communication 3;1994). In pursuance of this so-called "Metten Report", the Parliament adopted on 18 January 1994, in the presence of Commissioner Bangemann, a resolution which, ironically, called for an active industrial and commercial IT policy to be implemented as a matter of *urgency* "so that Europe does not lose control over, and access to, subsectors of electronics and does not become dependent on third parties in this strategic and dynamic area" (PE 178.920, 1994).

4.4.3 INTERMEZZO

Not fully satisfied with the 1991 White Paper, the IT Roundtable companies pressed both the Commission as well as their respective national governments for a more far-reaching implementation of the five areas of action identified in the White Paper, and for specific support measures beyond the scope of the White Paper. Initially, their efforts seemed to have some success.

The November Council Resolution

In the face of the crisis in the European IT industry, the Member States decided that the urgency of the matter justified them taking the initiative. Rather than opting for the more time-consuming, formal route through the Commission, the Council Presidency presented a resolution to the Council of Ministers, developed by the Member States in close cooperation with representatives from the Commission (DG 3 and DG 13) (DG 3 and national government sources, Interviews 3,11,39;1993).

The Resolution, which was adopted in November 1991, called not only for a swift implementation of the five action areas identified in the White Paper, but also set out guidelines for a more aggressive implementation of the external trade, R&TD and demand-stimulation provisions outlined in the White Paper (see Table 4.2).

First, the Council argued in its Resolution that it is "convinced of the necessity for industry in the Community to be competitive at a world level, particularly when assessing strategic alliances and capital-intensive investment in the framework of the rules of competition" (OJ C325, 1991:3). This clause has been interpreted by some M/S officials as providing for a relaxation of the Community's anti-trust regulations when evaluating the impact of collaborative ventures on competition; it could ease the Community's competition regulations in the case of, for example, collaborative R&TD ventures or capital-intensive investments on TENs, if these are considered to be necessary for improving Europe's international competitive position (Interview 17;1993).

Second, the Council accepted the need to monitor international trading practices, and recognized that a departure from the Community's multilateral trading principles might be necessary in the case of the IT industry; "additional bilateral initiatives of the Community, without prejudice to existing GATT obligations, may be necessary to create effective market access with equal opportunities" (OJ C325, 1991:3). Although the Commission had recognized the need to maintain "detailed statistics" and "investigate the existence of [unfair] practices" and had stressed in its executive summary (but *not* in the actual text of the White Paper) that the Community may have "to recourse to bilateral measures" (SEC(91)565:4,24), it was the Council Resolution which instituted the principles of monitoring unfair practices and concluding bilateral agreements. According to one Commission official:

> This was for the first time ever that the EC did not adhere to multilateralism. It was the first time that such bilateral trade arrangements have been considered (Interview 11;1993).

The Council Resolution, however, has only been a partial success. Although the Community's anti-trust regulations appear to have been eased over the early 1990s, one could question whether this was a direct consequence of the Resolution. Far more important appears to have been the decision of Delors to nominate Karel van Miert as Competition Commissioner in January 1993. In contrast to his predecessor Sir Leon Brittan, van Miert has recognized that in certain industries and, particularly, electronics, the world market and not the national or European market are increasingly the more appropriate reference points for determining whether or not collaborative ventures are anti-competitive (Hill, 25 October 1993:36). Taking the intense competition in the world market for Liquid Crystal Display (LCD) screens into account, the Commission, for example, has allowed the only two European producers, i.e. Philips and SGS-Thomson, to cooperate on the research, development and production of LCD screens (Hill, 25 October 1993:36). Similarly, the nomination of Martin Bangemann as Commissioner for Industry and ITC technologies may have contributed to a relaxation of the Community's anti-trust legislation; Bangemann is known for his pragmatic rather than ideological, case-by-case approach to industrial policy (Hill, 30 November 1992:32; Bangemann, 1992; IT Roundtable sources, Interviews 14,36;1993).

Moreover, the Council Resolution has been perceived as being of little effect in bringing about a more aggressive market opening policy. In this respect, it is important to note that the M/S support for the Resolution was never whole-hearted. While the French government advocated a relatively protectionist policy stance, the United Kingdom's position was far more liberal. Only the German government allegedly succeeded in convincing the British government to accept the Resolution (CEC, national government and industry representative sources, Interviews 11,19,32,39;1993). According to one national government official, "bringing all twelve Member States on one line had been a hard row to hoe" (Interview 39;1993).

Hampered by controversies amongst the Member States, the only tangible consequence of the Council Resolution with respect to third country market access in the area of information technology, appears to have been the establishment of a centralized information point (Catinat, 6 July 1993). The task of this information point has been to monitor the (unfair) marketing, market access and distribution practices of other industrialized countries, notably those of the United States and Japan, and to feed this information into bilateral and multilateral negotiations (DG 3 sources, Interview 3;1993). According to both corporate as well as national government sources, in the end, the Resolution turned out to be little more than a "paper solution" (Interviews 19,32,34,39;1993).

A Semiconductor Initiative

On the 19th and 20th of April 1991, gathered at a secret meeting in Burgundy, the CEOs of Siemens, Philips, Olivetti, Bull and Thomson pressed President Delors and Commissioners Bangemann and Pandolfi for specific support measures going beyond the action areas outlined by the Commission in its White Paper (Dawkins and Buchan, 23 April 1991:3,18). It was within this context that plans for a Semiconductor

Initiative were discussed, affecting Siemens, Philips and SGS-Thomson (Jenkins and Lorenz, 5 May 1991; IT company sources, Interview 29;1993).

The initiative, which sought to develop a presence in each generation of mainstream memory ICs, comprised four elements (see Table 4.2): (1) restructuring of the production capabilities of the three companies to adapt to the changing needs; (2) increased cooperation with semiconductor users; (3) substantial government subsidies for joint R&D; and (4) a capital injection of public funds to overcome problems of undercapitalization - a particularly pressing problem for SGS-Thomson (DG 3 and IT company sources, Interviews 3,29;1993; Skapinker, 29 April 1991). Interestingly, the plan did not envisage any external trade policy prescriptions. As one participant explained:

> There was a consensus not to speak about that, as we had the ambition of involving the main users into the capitalization of the venture. The tariff level is a sensitive issue, as users prefer to buy cheaper products. We almost succeeded in convincing them to put capital into semiconductor production. Creating links between the semiconductor producers and users would be beneficial to the users: manufacturers could provide the users with the products adapted to their needs (Interview 29;1993).

The cost of the proposed programme, to be born in part by the Commission and the Member States, allegedly would amount to ECU 24 bn for a duration of 5 to 7 years (DG 3 and IT company sources, Interviews 3,29;1993).

The Semiconductor Initiative, however, never got off the ground. Diverging corporate strategies and lack of funding hampered its realization.

At the financial level, the companies faced difficulties in raising the necessary funds. The German government refused to support the plan altogether. The Commission was willing to finance part of the expenditures within the context of its R&TD and Structural Programmes, but only if certain conditions would and could be met (DG 3 sources, Interview 3;1993). First, the Commission would only be able to finance the envisaged R&D activities if it would re-allocate its R&TD resources and shift funding away from other sectors to the semiconductor industry - a move unlikely to be politically acceptable. Second, the Commission could only help if the companies would invest in regionally deprived areas. But, as one IT company executive explained: "that was not possible. We are not a kind of industry that can just move. We need to locate our manufacturing facilities near our R&D facilities" (Interview 29;1993). Third, the measures would not be horizontal but directed at specific companies. As such, they would be opposed, most likely, by DG 4.

At the corporate level, the companies were unable to agree on one strategy. While SGS-Thomson had been advocating closer ties, and even a mega-merger, with Siemens and Philips on the production of mainstream memory chips, Philips' departure from SRAM production and Siemens conclusion of an alliance with IBM to develop 64M DRAMs undermined both SGS' dreams as well as the success of the Semiconductor Initiative[4]. By the autumn of 1991, the Semiconductor Initiative had definitely collapsed. At a lower level, however, the initiative did have a spinoff, namely the collaboration between SGS-Thomson and Philips on semiconductor technology (IT company sources, Interview 29;1993).

4.4.4 POLICY IMPLEMENTATION

In February 1993, the IT Roundtable met Commissioner Bangemann to discuss the state of the industry and the policy measures to be taken. At this meeting, the IT Roundtable allegedly asked for specific support measures. As one IT Roundtable source commented:

> There are some emerging sectors where help is necessary, like Airbus. We feel that microelectronics is a similar area. Bangemann has not said yes or no. Other areas of importance include software and flat panel display. We need political and financial stimulation for a limited and defined period. If you let it go, you will not get any development at all.

> Bangemann is partly in favour. If it is really of transitional nature and there exists a clear time frame. Four years. This is not protection but "support", which would enable us to overcome the difficulties of producing the initial products. A small plant needs the cover of a glass house. If the plant is out in April, it will die. Bangemann is not against it, but it needs careful consideration (Interview 36;1993).

By that time, however, the Commission appears to have been fully tied up in trying to implement the recommendations outlined in the 1991 White Paper and Council Resolution, let alone in attempting to realize any specific support measures going beyond the scope of the White Paper.

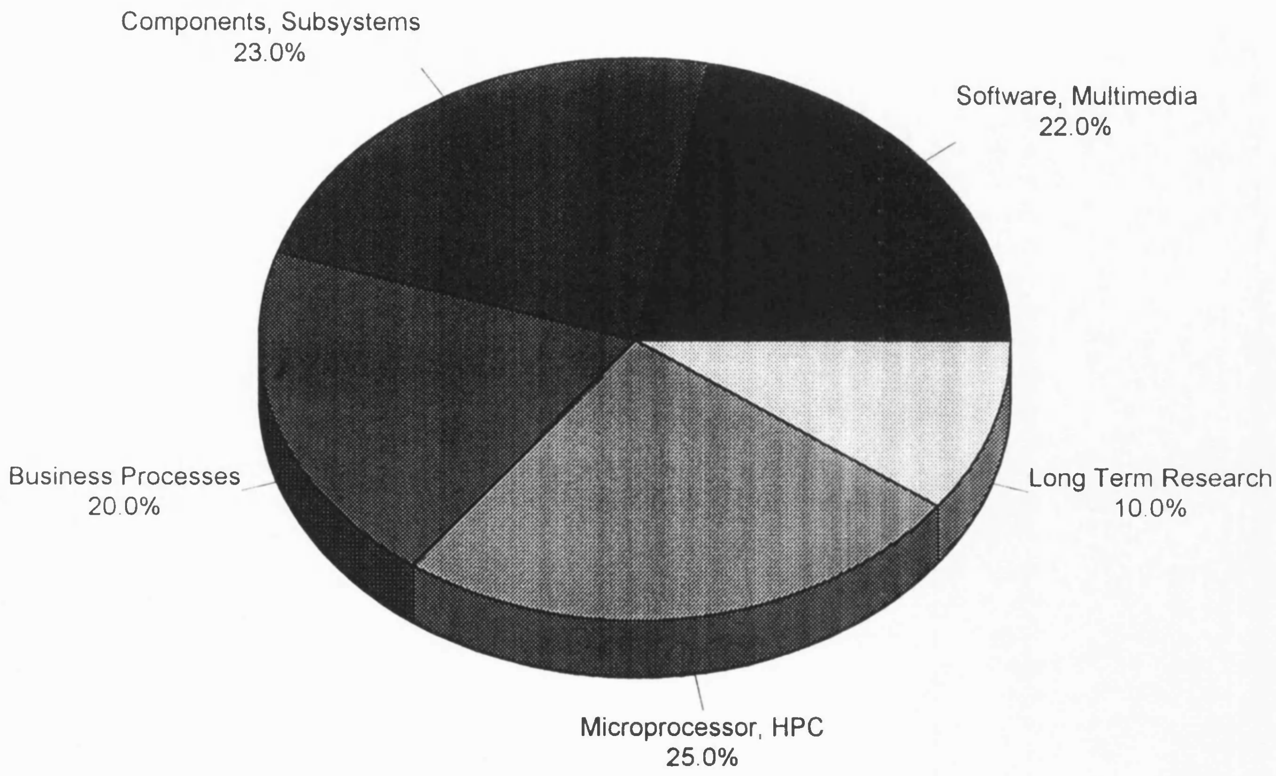
Despite the Council's insistence on urgent action in its November Resolution (OJ C325, 1991), the implementation of the five areas identified in the White Paper proved to be a time-consuming process, notably in the more politically sensitive areas of R&TD, competition and market access, and demand-stimulation (see Table 4.2). By December 1993, the Fourth Framework Programme, providing for a second generation of IT research projects, had yet to be adopted; IT market access agreements had yet to materialize; and the realization of TENs had not moved beyond a preliminary stage (see Figure 4.1).

To the extent that progress was made on the implementation of these five areas, the IT Roundtable and its companies did succeed in getting various of their ideas, confined by the scope of the White Paper, translated into the policy proposals - notably those on IT research and TENs. The IT Roundtable and its members, however, did not succeed in securing the preferred levels of funding for these initiatives (see Figure 4.1). The following sections will discuss in detail these initiatives as well as the implementation of the White Paper's clause on market access.

R&TD: Second Generation

The Fourth R&TD Framework Programme was adopted only in April 1994,

Figure 4.1 Second Generation IT R&TD Programme: Proposed Breakdown by Activity



Source: COM(93)459:59

four months after it was supposed to start, delaying the actual start of the R&TD projects to approximately 1995 (DG 3 sources, Interview 28;1993). The delay in adoption was caused by the disagreement between the Commission, the Council and the European Parliament about the size of the Framework's overall budget and the allocation of the available funds over the various categories.

As Table 4.3 illustrates, the Commission and Parliament favoured a budget of ECU 13.1 bn - already less than the originally envisaged ECU 14.7 bn package (COM(92)406). Within the Commission proposal, 35.7 per cent of the ECU 10.9 bn earmarked for R&TD would be devoted to information technology and communications (ITC) research, including 19.6 per cent for IT R&TD (COM(93)459). Germany, France and the UK, however, refused to allocate more than ECU 11 bn to the Framework Programme in total. In December 1993, the European Council, however, decided that "not less than ECU 12 bn" should be allocated to the Framework Programme and a reserve of ECU 1 bn might be added at a later stage. Within the Council compromise, 28.2 per cent of the ECU 10.5 bn R&TD budget would allegedly be allocated to ITC research - a considerably smaller share than envisaged in the Commission proposal (Hill, 26 October 1993:16; 12 October 1993:2; 13 December 1993:3). The budget finally adopted in April 1994 amounted to 12.3 bn. In the end, 31.9 per cent of the ECU 10.6 bn R&TD budget was allocated to ITC R&TD, including 18.1 per cent for IT R&TD (OJ L126, 1994).

Like other lobby groups, such as EUROBIT (1993) and UNICE (1992), the IT Roundtable had called for a "significant increase in funding for the IT part" in its position paper on the competitiveness of the European IT industry and R&TD programmes (1992), and for "adaptations and improvements" in the scope and methods of the Fourth Framework Programme. The IT Roundtable called specifically for the introduction of R&TD programmes beyond the precompetitive stage into the sphere

Table 4.3

FOURTH FRAMEWORK PROGRAMME: BUDGET PROPOSALS

In ECU mn	Total Budget	R&TD (1st Act.)	ITC	ITC/T	IT	IT/T
CEC Proposal 1992	14,700	11,600	N/A	N/A	N/A	N/A
CEC Proposal 1993	13,100	10,925	3,900	35.7%	2,138*E*	19.6%
Council Proposal 12/93	12,000 (+ 1,000)	10,500	2,961*E*	28.2%	N/A	N/A
Approved budget	12,300	10,686	3,405	31.9%	1,932	18.1%

Sources: COM(92)406; COM(93)459; Hill, 13 December 1993:3; OJ L126, 1994.

Notes

E Estimate
T Total Budget

of product development, the adoption of a "clustering" approach providing for greater coherence in R&D and better targeted funding, and greater cooperation with EUREKA (IT Roundtable, 1992/93; IT Roundtable sources, Interview 36;1993; Economist, 8 June 1991:26).

Judging by the Fourth Framework Programme's funds allocated to ITC research and, within this category, to IT research, the IT Roundtable's call for more funds was not very effective. Although the Framework Programmes are not fully comparable due to inflation and changes in the Programmes' composition, the share of ITC/IT R&TD in total funding has declined in the Fourth Framework Programme in comparison to the Second and Third Programmes - despite an increase in absolute terms (see Table 4.4). Moreover, securing both the absolute as well relative size of funding for ITC/IT R&TD remained difficult in the case of the Fourth Framework; in the end, ITC/IT R&TD was allocated less than originally envisaged by the Commission (see Table 4.3), due to competition from other HT sectors, such as biotechnology (see Chapter 9).

Judging by the contents of the Fourth Framework Programme, however, the IT Roundtable was more successful. The Fourth Framework's specific programme in information technology provides for new orientations in both technical scope and method of implementation - in line with various of the IT Roundtable's policy preferences (COM(93)459:42-43) as well as evaluations and recommendations made by the Dekker commission (1992), IRDAC (1992), the Court of Auditors (1991)[5] and other committees and organizations.

With respect to technical scope (see Figure 4.1), the Commission has emphasized those areas, i.e. software, multimedia, components and subsystems, that contribute to the development of a "common information infrastructure" in line with the Community's new R&TD orientation. Moreover, in contrast to the initial phases of ESPRIT, which were far more directed towards the supply rather than the demand

Table 4.4

EC FRAMEWORK PROGRAMMES: IT AND ITC BUDGET ALLOCATIONS

In ECU mn	Total Budget	R&TD	ITC	ITC/T	IT	IT/T
1st Framework	3,750		N/A	N/A	N/A	N/A
2nd Framework	5,396		2,275	42.2%	1,600	29.7%
3rd Framework	5,700		2,221	39.0%	1,352	23.7%
4th Framework	12,300	10,686	3,405	31.9%	1,932	18.1%

Sources: OJ C208, 1983; OJ L302, 1987; OJ L117, 1990; OJ L126, 1994.

Notes

T Total Budget

-side, the IT programme provided for in the Fourth Framework, emphasizes the demand-side. According to one DG 3 official,

> The programme does not seek to give a technology push in search of bigger market shares for the IT suppliers. The goal is not merely competitiveness of the IT industry as such, but of the whole industry. Rather, this programme concentrates on contributing to a European IT infrastructure. It seeks to facilitate access of users to information technology (Interview 26;1993).

With respect to the method of implementation, four changes are worth mentioning. First, in addition to the more traditional R&TD projects fostering a stronger intra-European cooperation, the new specific IT R&TD programme provides for the launch of "focused clusters", which are sets of a broader range of activities focused on a single, well-defined goal (COM(93)459:42). In order to increase the effectiveness of the programmes, these clusters may incorporate activities, beyond precompetitive R&TD, some of which may be closer to the market, such as product development, manufacturing and commercialization. The EC's financial support, however, will be confined to the up-stream, precompetitive elements of the projects (DG 3 sources, Interview 3;1993). By including near-market activities, the focused clusters may also foster stronger vertical linkages, as recommended by the IT Roundtable (see above).

Second, these focused cluster projects should be central to the participating firms' operations - a goal which the Commission seeks to secure through the involvement of both IT producers as well as users in the drafting of the work programmes on the basis of which the EC issues its call for proposals, and through the imposition of this objective as a precondition for participating in the EC's specific IT R&TD programme (DG 3 sources, Interviews 26,28;1993). The realization of this objective has been facilitated by the economic pressures faced by most IT companies in the early 1990s, which has forced them to cooperate on elements that are an integral part of their business strategies rather than on marginal issues. As one DG 3 official argued:

> Nobody can do it alone. It is not possible any more to cooperate on marginal issues only. You have to concentrate your funding. Firms have to focus. (Interview 26;1993).

Due to their centrality to the participating companies' strategies, it is believed that corporate management will be committed to turn these focused cluster projects into a technological ànd commercial success.

Third, the EC's IT R&TD projects will be conducted in greater synergy and complementarity with the more market-oriented EUREKA projects (DG 3,12 sources, Interviews 3,9;1993; COM(93)276:12,15). As the Commission's working document on the specific programmes implementing the Fourth Framework Programme outlines, the focused clusters may involve cooperation with EUREKA (COM(93)459:42). Theoretically, this could involve EC financial participation in EUREKA projects, as advocated by the IT Roundtable (1992, 1993). Its decentralized management arguably make EUREKA more suitable for the execution of near-market R&TD projects than the EC (UNICE, 10 March 1993; UNICE sources, Interview 4;1993).

Fourth, the procedure of application for these projects has been altered, to facilitate application, particularly of SMEs. In contrast to the former procedure, which was regarded as "cumbersome and too expensive, especially for SMEs", the new procedure provides for (1) four calls a year at fixed dates, overcoming the problems of irregular, infrequent calls, and (2) a spread of the proposals, allowing the applicants, and particularly the SMEs, to spread both the work-load of preparing a proposal as well as the costs of bidding (DG 3, Interview 28;1993).

With the change in the methods of implementation and technical focus of the IT programme, the Commission has altered its consultation mechanisms as well. As one IT Roundtable source argued: "Initially the Commission almost exclusively dealt with our club. Now, the Commission has extended its circle of consultation" (Interview

36;1993). This has affected, in particular, the involvement of users and, to a lesser extent, the involvement of software and services companies.

Following the shift in focus towards the development of an information infrastructure and the increased emphasis on access and usability, the Commission has argued that the "programme must to a greater extent be led by the needs of users and the market" - an intention which has been reflected in the involvement of users in the policy-making procedure. Although the IT Roundtable was closely involved in the formulation of this second generation IT R&TD programme, both through more as well as less formal ways of interaction, it was not the only one to be consulted. As illustrated by a DG 3 official,

> When the new programme was formulated, the IT Roundtable was consulted, but we also had consultations with a wide range of users, such as the pharmaceutical industry, banking, chemical industry, car industry, transport industry, health, education, telecommunications and telematics (Interview 26;1993).

Similarly, the IT Roundtable is expected to lose its near-monopoly on policy-input in the implementation of the new programme (see Chapter 3). The companies will still participate in an IT (formerly ESPRIT) Steering Committee and play an active part in the Industrial Working Groups (Technical Panels) which prepare the annual work programmes, but they will not be represented in the newly established Industry Advisory Panels which look at the overall work programmes from a user point of view. Although the Commission recognizes that IT companies are also consumers of IT - a point stressed by the IT Roundtable (1993) -, "the Industrial Advisory Panels are the place to look at other industries" (DG 3 sources, Interview 28;1993; also IT Roundtable sources, Communication 36;1994).

As software has become more important and pervasive over time, correspondingly, software producers have also become increasingly involved in the policy formulation of the Community's IT R&TD programmes (DG 3 sources, Communication 28;1994). The increasing involvement of software (and services) companies, however, cannot be compared with the rise of users. Software suppliers have always been involved in the process - partly because software is not only produced by specialized software houses but also by hardware producers and IT users.

Beyond the involvement of the largest IT hardware producers, IT users and software and services companies, the Commission has also received the policy input from SMEs. It has been a long-standing goal of the Commission to increase the involvement of SMEs in R&TD policy-formulation and implementation (House of Lords, 1985). Their limited resources, however, have often impeded the smaller companies to undertake political activity and prepare project proposals. Through the changes in the new programme's application procedures, the Commission has sought to increase the involvement of the smaller companies, including the many smaller software producers, in the policy-formulation process (DG 3 sources, Communication 28;1994).

Informal input has also been given by foreign-owned companies, both within the context of the Community's R&TD programmes as well as beyond - the participation of IBM Europe and the currently Japanese-owned ICL in the 1994 Bangemann Group being a case in point (see Chapter 7). The new IT R&TD projects will remain open to participation of foreign firms, provided that these companies meet the necessary conditions (see Chapter 3). Both the continued participation of foreign companies as well as the terms on which they would be allowed to participate, had been put into doubt following the take-over of ICL by Fujitsu. In the Research Council of 24 April 1991, however, the Council declared that the Community's R&TD programmes remain open to foreign participation, provided the necessary conditions are met, and questioned the benefits of a Code of Conduct for foreign firms participating in EC R&TD programmes. The Code, proposed by the French, was based, amongst others, on the principle that foreign firms must not "undermine the interests of European industrialists present in sensitive sectors" (Business Europe, 3 May 1991:6). The Commission's allocation of important ESPRIT projects on Artificial Intelligence computers to ICL in 1992, confirms that the EC R&TD programmes remain open to foreign-owned IT companies (Cane, 1 September 1992:14).

Fair Competition and Market Access

By December 1993, the only tangible result of the 1991 White Paper and the Council Resolution with respect to improving market access had been the establishment of a centralized information point (see above). Although various IT issues, such as US subsidies for parallel computing research and prototype production, have been discussed in bilateral and multilateral fora, no specific bilateral IT agreements remotely similar to the 1991 US-Japan Semiconductor Trade Agreement have been adopted so far[6] - let alone transitional protective arrangements to enforce a balanced opening of the American and Japanese IT markets, as suggested by the IT Roundtable. Neither has the Resolution led to other measures, beyond those outlined in the Uruguay Round agreement, that would improve the EC companies' market access.

In the area of telecommunications, however, the EC did maintain, at least temporarily, the 3 per cent price preference given to "European" companies[7] in the allocation of public sector contracts - in line with the IT Roundtable's preferences (IT Roundtable, 1991; Dawkins, 3 December 1992). After substantial negotiations with the American government, agreement was reached in April 1993 to waive the Article 29 provisions in the case of American companies bidding for EC government procurement contracts in the excluded sectors of transport, water and electricity, in return for a gradual elimination of the "Buy American" clauses at the US state level which hamper

European companies bidding for American government procurement. This waiver, however, did not apply to telecommunications (Barber, 23 April 1993:7; Dunne, 22 April 1993:7; Financial Times, 16 December 1993:4).

Although the Commission did tighten its competition policy in the context of the completion of the Single European Market (see Chapter 3), by December 1993, the EC had not introduced any mechanism to control national incentives on FDI, as preferred by the IT Roundtable. The absence of any controls on national incentives to inward investment did not reflect a lack of political activity; EECA, for example, lobbied for the introduction of a code of conduct. These guidelines, which would apply in particular to cases in which financial or other forms of support would be sought from a public authority, outlined criteria for the evaluation of inward investment proposals - the basic objective being that any inward investment policy should ensure the EC's long-term technological and economic interests, without damage to the indigenous industry[8]. Not surprisingly, the guidelines failed to gain acceptance of the Commission's directorate for Regional Policy (Interview 31;1993).

Trans European Networks

By December 1993, the demand-stimulating TENs were still in their preliminary stages, delayed in part by the slow ratification of the Maastricht Treaty. Although a major impetus was given to the realization of the TENs in December 1993, when the European Council endorsed the Commission's communication on Growth, Competitiveness and Employment, the European Council did not agree with the Commission's proposed financing schemes - and particularly the idea to raise ECU 8 bn on the financial markets through the issue of "Union Bonds" (Dixon, 21 February 1994:17). Rather, it decided to submit the financing of the Commission's TENs initiative for further perusal to a taskforce consisting of high-level Member State officials - causing further delays in the implementation of TENs (Barber and Marsh, 11-12 December 1993:1; Dixon, 21 February 1993:17). Only in June 1994, at the European Summit in Corfu, some hurdles were cleared which could speed up the implementation of TENs. The European Summit outlined its commitment to financing the TENS and endorsed the Bangemann Group's report, which stated that the liberalization of the national telecommunications markets should be accelerated - both necessary conditions for the realization of the TENs (see Chapter 9; Gardner, 27 June 1994:3; Tucker and Adonis, 28 June 1994:3).

The IT Roundtable companies, which had been involved in the preparation of the Commission's communication both on a collective and individual basis, appeared concerned about the financial controversies, but pleased with the provisions on TENs in the communication. As one IT company executive commented:

> [Our company] put together extensive contributions, especially on the Common Infrastructure Area and the Trans European Networks. Our ideas have been fed into the Commission through interfacing. This has been extremely effective. The final version of the [1993] White Paper could have been written by us. It is not because of us having more power, but because some of our ideas were right and were shared by other companies and the Commission (Interview 5;1993).

In its communication, the Commission called for a Telecommunications or Information Network, which would constitute the "nervous system" of the economy (COM(93)700: 87-89). This network would not only provide the necessary infrastructure for a "common information area" and thus contribute to the completion of the SEM, it would also create new demand for IT/telecommunications products (COM(93)700:105-114). So far, however, no mention has been made of any form of preferential treatment of the European-owned IT companies in the implementation of these networks, as recommended by the IT Roundtable - although, in theory, Article 29 could apply.

4.4.5 CORPORATE POLITICAL INFLUENCE

In contrast to the early and mid-1980s, when the IT Roundtable exerted a preponderant influence on ESPRIT (see Chapter 3), the association of the largest, European-owned IT companies looked less influential in the early 1990s, for three reasons. First, the fact that the Commission's 1991 White Paper fell far short of the IT Roundtable's own policy preferences, as expressed in the Roundtable's 1991 position papers, appears to indicate that the IT Roundtable was unable to exert a determining influence on the development of the Commission's new policy approach towards the IT industry. Second, the lack of results of the Council Resolution and the failure of the Semiconductor Initiative seem to indicate that the IT Roundtable was unable to mobilize adequate support - neither for a more aggressive implementation of the areas identified in the White Paper nor for the adoption of more specific support measures beyond the scope of the White Paper. Third, the slow implementation of the areas identified in the White Paper appear to indicate that the IT Roundtable was unable to mobilize sufficient support for a swift implementation of the 1991 White Paper. Moreover, the controversies surrounding the funding of the Fourth Framework Programme and the TENs seemed to imply that the IT Roundtable was unsuccessful in securing the preferred levels of funding.

On the basis of interviews with Community and national government officials, corporate executives and representatives and industry/government observers, this thesis has indeed found that, in the late 1980s and early 1990s, the IT Roundtable was less influential than it used to be (Interviews 1,3,4,8,11,12,15,19,26,30,33,39;1993). This was the case even in the IT Roundtable's traditional stronghold, namely R&TD policies, on which it arguably exercised the greatest influence. As one national government official described:

> In the past, there was a close relationship between the Big 12 and the Commission, especially in the lead of Davignon. In that time, Davignon asked the industry: "give me a paper about what we should do".
>
> Now, the situation has changed. It is more the task of the Commission to give some ideas and industry is invited to react. The IT Roundtable still has a good influence, but it is a smaller one. [..] The influence of the IT Roundtable is not as strong as it was in the beginning (Interview 33;1993).

Although the loss of influence became only apparent in the early 1990s, in the context of the Community's White Paper, according to one government official, "the influence [of the IT Roundtable companies] disappeared after 1987. It was still there in ESPRIT II, but not afterwards" (Interview 11).

While the companies had been extremely influential in the early and mid-1980s, by the early 1990s this situation had changed, leading one IT company executive to conclude that:

> The value of the Roundtable has been doubted and has been under discussion - even within [our company] (Interview 8;1993).

4.5 CONCLUSION

Despite the EC's efforts to foster the competitiveness of its IT industry over the 1980s, by 1990 the situation had not improved. The crisis developing in the IT industry over the course of 1990, combined with mounting criticisms regarding the efficacy of ESPRIT in improving corporate competitiveness, prompted the European Community to develop a new IT policy approach, which would form the basis of a series of measures. These measures would complement the Community's ongoing efforts to complete the Single European Market and its continued use of trade policy instruments.

In April 1991, the Commission presented its new policy approach identifying five areas of policy action, namely: (1) the improvement of the business environment, including standardization, (2) the advancement of training, (3) the strengthening of technological mastery and dissemination, including the development of a second generation of R&TD projects, (4) the establishment of equitable conditions of competition and market access in an open, multilateral international trade system, and (5) the stimulation of demand through pan-European infrastructural projects (TENs). Although the White Paper was perceived as a step in the right direction by the IT Roundtable, the policy approach fell far short of the European IT industry's own policy recommendations on the improvement of external trade and investment conditions, the stimulation of demand, and the improvement of vertical integration - fuelling the impression that the IT Roundtable was unable to exert a determining influence on the development of the Commission's new policy approach towards its IT industry.

Not fully satisfied with the White Paper, the IT Roundtable companies pressed both the Commission as well as the respective national governments for a more far-reaching implementation of the five action areas identified in the White Paper, and for specific support measures beyond the scope of the new IT policy approach. The Council Resolution of November 1991, which was to provide for a more aggressive implementation of the White Paper's provisions on market access, R&TD and demand-stimulating projects, could hardly be called a success. Although the Community appears to have eased the application of its anti-trust regulations over the early 1990s, one could question whether this was due to the Council Resolution. Moreover, no IT market access improving measures have resulted from the Resolution beyond the establishment of a centralized information point. Additionally, the Semiconductor Initiative, which was to provide for specific support measures, never came off the ground. In both the case of the Council Resolution as well as the Semiconductor Initiative, the IT Roundtable appeared unable to mobilize adequate support for their full implementation.

Despite the Council Resolution's call for a swift implementation, implementing the White Paper proved to be a time-consuming process - fuelling the impression that the IT Roundtable was unable to mobilize sufficient support for immediate action. The Fourth Framework Programme, providing for a second generation of IT research, was adopted four months after it was supposed to go into effect. By December 1993, no substantial progress had been made in opening third country markets for computers and semiconductors, beyond the opening provided for by the GATT agreement. Moreover, the implementation of TENs had remained in a preliminary stage. Although the IT Roundtable did see various of its policy preferences, that were *within* the scope of the White Paper, translated into the new IT R&TD programme and into the TENs, the European-owned IT companies seemed unsuccessful in securing the preferred levels of funding.

This perception of a loss in influence on the side of the IT Roundtable, even in the area of R&TD, was supported by the results of interviews with Community and national government officials, corporate executives and representatives, and industry/government observers. Although this loss in influence does *not* imply that, in the late 1980s and early 1990s, the IT Roundtable was completely ineffective and did not exercise any influence, it does imply that the IT Roundtable was less influential in that time period than it used to be.

4.6 NOTES

1. Sources: IT company sources, Interviews 8,15;1993; CEC/ERB (1989); Hans Günter Danielmeyer, Head Research of Siemens in Sietmann (1993); Mytelka (1991:192); Sandholtz (1992:201); Sharp (1990:58).

2. The following discussion of ESPRIT relies on the following sources: IT company, corporate representative, CEC and national government sources, Interviews 4,5,8,16,19,26,33,39, 1993; Mytelka (1991:189,207); Sandholtz (1992:188).

3. SEC(91)565:19-26. Other sources: Business Europe, 5 April 1991:6-7; Europe, 27 March 1991:9; Hill, 27 March 1991:2; Levine, 25 March 1991:48; 1992, 5 April 1991:5.

4. Sources: de Jonquières, 19 June 1991; Dawkins and Skapinker, 11 June 1991; Skapinker, 25 October 1991; Dawkins, 15 October 1991:27; DG 3 and IT company sources, Interviews 3,8,29;1993.

5. In Taylor, 17 March 1992.

6. The 1991 bilateral agreement between the EC Commission and the US Justice Department to cooperate on anti-trust issues may affect IT market access; it is expected, for example, that the 1994 anti-trust deal between Microsoft and the US Justice Department/EC Commission will make it easier for competitors of any nationality to penetrate the world software market (Financial Times, 19 July 1994). The competition agreement, however, does not require the US to alter those aspects of its anti-trust policy that might hinder European IT companies in entering the American IT market.

7. Article 29 of Council Directive 90/531/EEC of 17 September 1990 outlines that a price preference shall be given to those tenders that meet a de facto local content requirement; the proportion of the products originating in third countries, as determined on the basis of the EC's rules of origin, should not exceed 50 per cent of the total value of the products constituting the tender (OJ L297, 1990).

8. EECA (no date). "Inward Investment: Guidelines on Behalf of the EC Electronic Components Industry". Mimeo. Distributed around 1993.

PART 3

Chapter 5

IMPERATIVES FOR CHANGE:
THE CHANGING ECONOMICS OF THE IT INDUSTRY

Part III seeks to answer the question why the IT Roundtable has lost some of its political influence over the Community's IT policies in the late 1980s and early 1990s, using the framework of analysis outlined in Chapter 2. Chapters 5 and 6 focus on the changing political economy within which both policy-makers as well as companies operate and identify the main structural and short-term changes in the production and policy-supply arrangements. Chapters 7 to 9 outline how these changes in the IT industry and in Community politics have affected the determinants of corporate political influence, i.e.: (1) the political activity undertaken by the IT Roundtable members, both individually and as a group, (2) the political weight attached by the EC and the national governments to the IT Roundtable's policy preferences, and (3) the extent to which the EC and its Member States have been able to realize the IT Roundtable's preferences.

This chapter focuses on the changes in the international IT production structure, which governs what is produced, how, on what terms, by whom and where. In particular, it analyzes the changing economic conditions encountered by the European-owned companies in the two segments of the IT industry that are politically most sensitive: the semiconductor and the computer industry (see Appendix 1.2). Each industry profile consists of three parts. The first part gives a historical overview of the main players in the industry until the early 1990s. Supply and demand conditions will be outlined in the three main world markets, with a particular focus on European IT production and consumption. The second part outlines the major changes taking place in the production of semiconductors and computers, including the globalization and intensification of competition, rapid technological change, and changes in the size and nature of demand (see Chapter 2). The final part discusses the corporate responses to these challenges, including the further internationalization of operations and the conclusion of M&A and alliances (see Chapter 2).

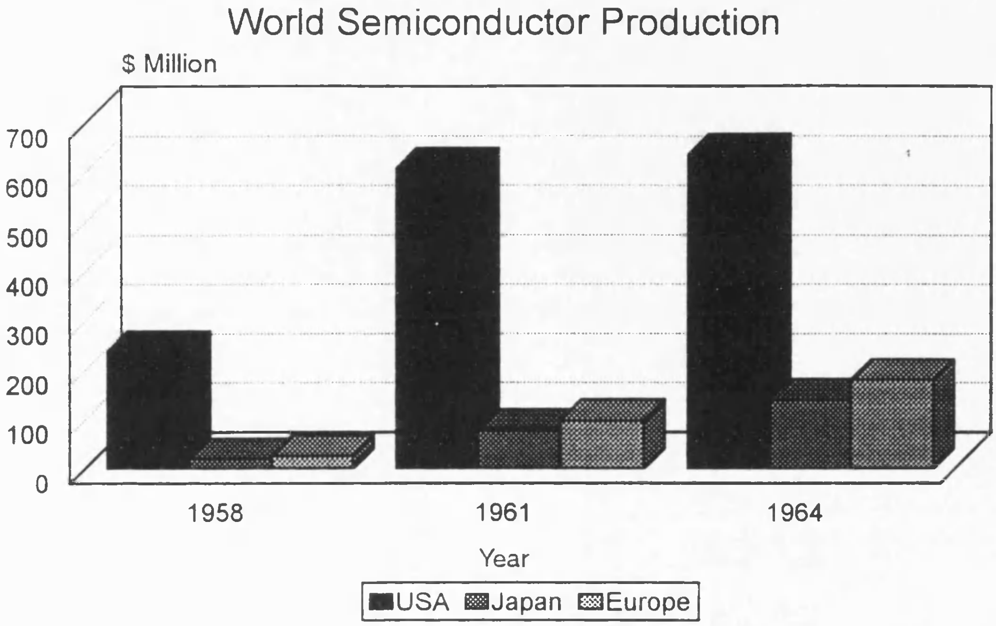
5.1 THE SEMICONDUCTOR INDUSTRY

5.1.1 THE PLAYERS

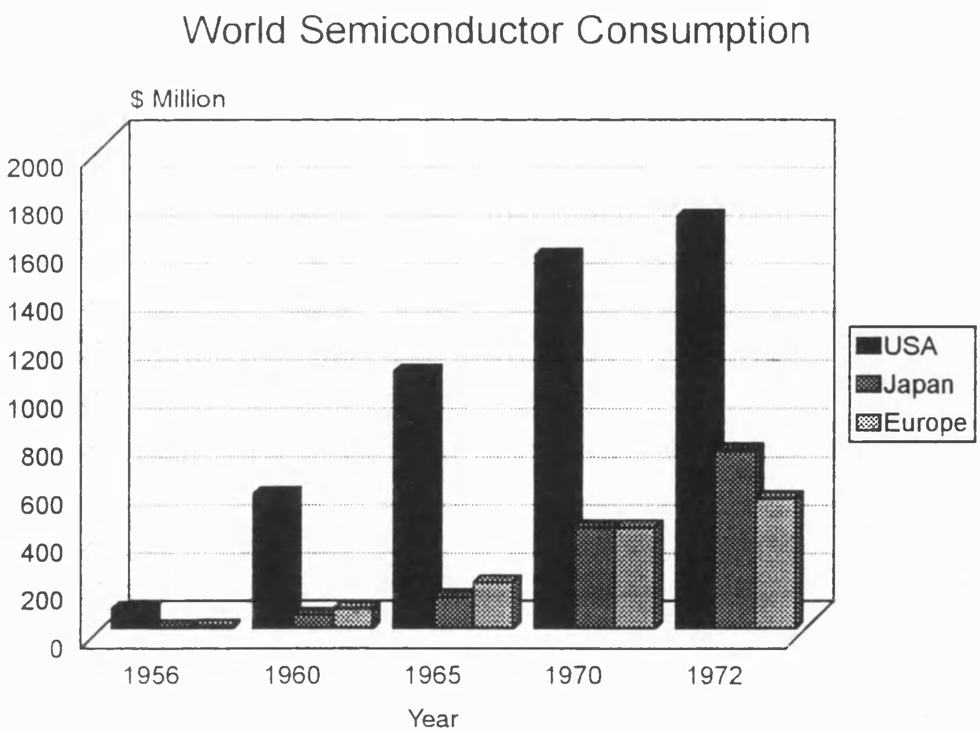
In 1947, the discovery of the transistor at Bell Laboratories "officially established the semiconductor industry" (Malerba, 1985:5)[1]. Over the 1950s, the world semiconductor industry expanded rapidly. By the late 1950s, the United States was by far the largest producer and consumer of semiconductors, followed by the European countries, which had entered the industry in the first half of that decade, and Japan, which had started commercial production in the second half (see Figure 5.1). American penetration of the European and Japanese markets, however, remained relatively limited over that period. American entry into the European market was hampered by the competitive strength of the indigenous European producers, while, in Japan, market entry was discouraged by the Japanese government's barriers to foreign entry (Malerba, 1985:65,69,87-88,136-137,224).

In the 1960s, however, it became clear that the American semiconductor industry had enjoyed two major advantages over its European and Japanese counterparts over the 1950s: (1) a large and technologically sophisticated domestic market and (2) consistent and sizeable government support. The American demand for semiconductors had expanded rapidly, driven by public procurement for US defence and space programs and by a fast growing computer industry. The size of the market had allowed the American producers to yield economies of scale and learning in production, and thus to create a competitive edge over Japanese and European

Figure 5.1 World Semiconductor Production, Consumption and US Dominance in Supplying Markets, 1950s-1960s

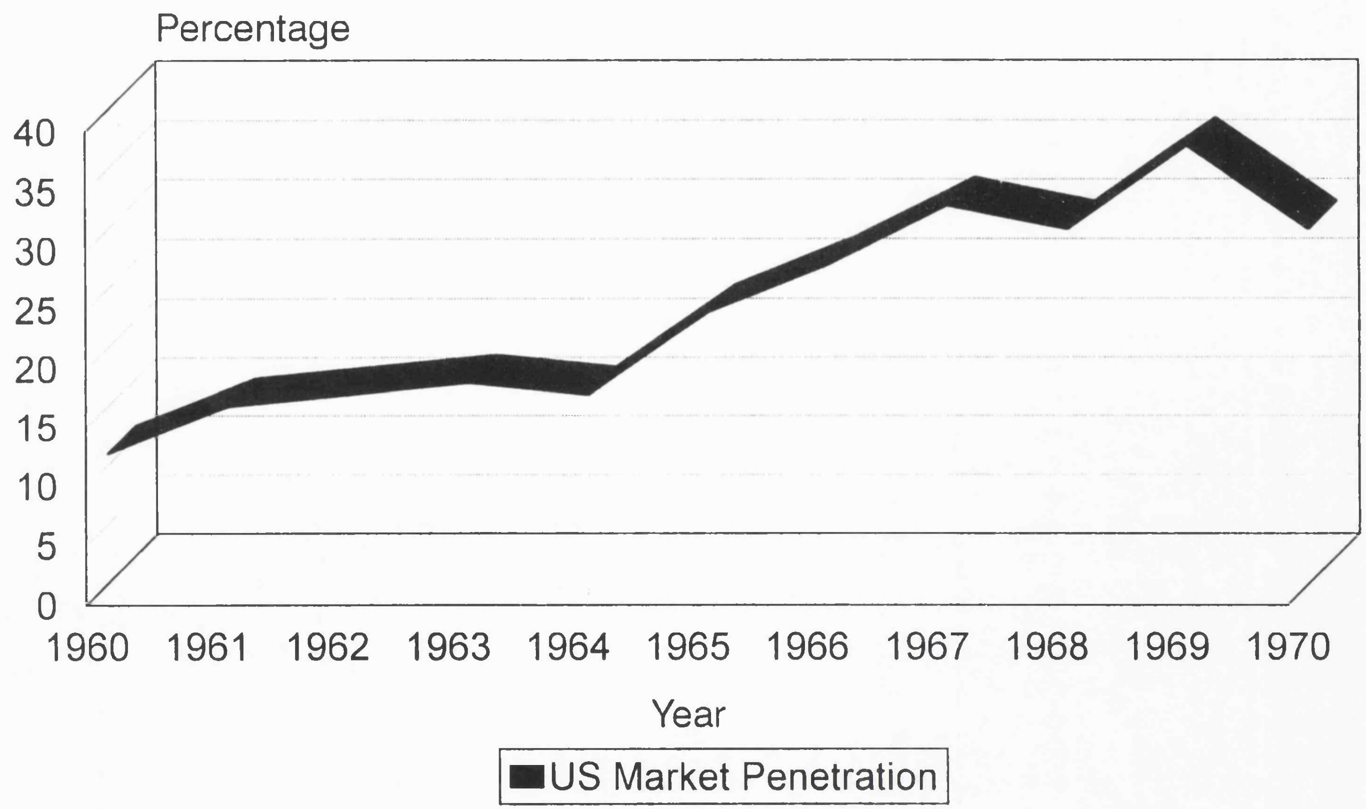


Source: Appendix 5.2



Source: Appendix 5.2

US Dominance in Supplying World Semiconductor Markets



Source: Appendix 5.2

manufacturers. The technologically sophisticated nature of the demand of both the military and the computer industry had stimulated progress in semiconductor technology, culminating in the development of the integrated circuit (IC). R&D subsidies and product refinement contracts provided further support for the American semiconductor producers.

In contrast, both European and Japanese producers were supplying smaller and less sophisticated markets over the 1950s. The consumer electronics industry, and not the computer industry or military, constituted the largest consumer of European[2] and Japanese semiconductor output. Moreover, government support programmes were either absent or limited, while preferential government procurement was small in absolute size. As a consequence, by the early 1960s, European and Japanese manufacturers trailed the American producers in the more advanced integrated circuit market, both competitively and technologically (Malerba, 1985:75-88;224-225).

When the European demand for ICs took off during the second half of the 1960s, the indigenous European producers were unable to successfully compete with their American rivals. Evading Europe's relatively high semiconductor tariffs (see Chapter 3) through FDI, American producers established a strong position in the European IC market. While in 1960, only 11 per cent of the total French, German and British consumption of semiconductors was supplied by imports from the United States, by the end of the 1960s, the American share of these markets had increased to approximately 40 per cent (Finan in Malerba, 1985:90,105,112; Braun and MacDonald, 1978:151).

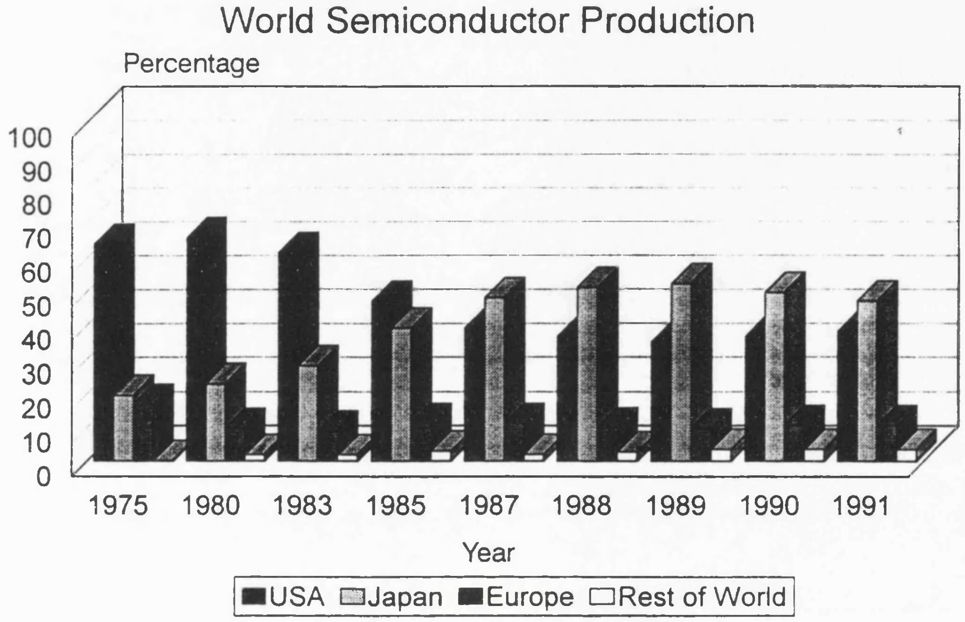
In Japan, the government protected its semiconductor and computer industry not only from American imports but also from American inward investment. Import barriers took the form of quotas and tariffs. Barriers to inward investment included the prohibition of both greenfield as well as majority stake brownfield investments;

provided they would meet stringent conditions, western companies could only acquire a minority stake in a Japanese-based joint venture. Only Texas Instruments succeeded in establishing a wholly-owned subsidiary after a transitionary period of joint ownership, using its semiconductor technology patents as a bargaining chip (Langlois et al., 1988:72-73). Overall, the Japanese barriers to American imports and FDI hindered the American penetration of the Japanese market; in 1968, American producers accounted for only 10 per cent of the Japanese market (Braun and MacDonald, 1978:151; Malerba, 1985:103-110;131,136-137).

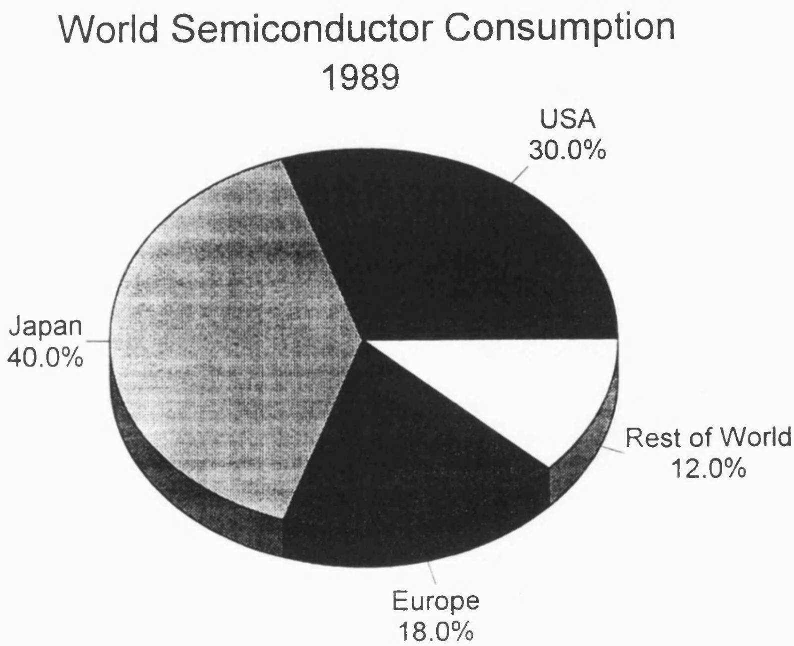
Over the 1970s and early 1980s, the American producers maintained their dominant position, although their lead shrank over time. Nevertheless, in the early 1980s, American producers still accounted for more than half of world semiconductor production (see Figure 5.2). In Europe, meanwhile, the indigenous semiconductor manufacturers had come under increasing competitive pressure. During the price war of 1970-1971, most European producers were forced out of mainstream, high volume semiconductor production, with the exception of the larger companies Philips (NL), Siemens (G), SGS (I), Sescosem (Thomson-CSF) (F) and AEG-Telefunken (G) (Dosi 1983:185). Despite increasing government support (see Chapter 3), the share of these large European-owned companies in world semiconductor production declined from approximately 17 per cent in 1975 to 11 per cent in 1985. In contrast, Toshiba, Hitachi, Mitsubishi and Fujitsu succeeded in developing an internationally competitive semiconductor production capability over those years; Japan's share in world semiconductor production rose from 19 per cent in 1975 to 39 per cent in 1985 (see Figure 5.2).

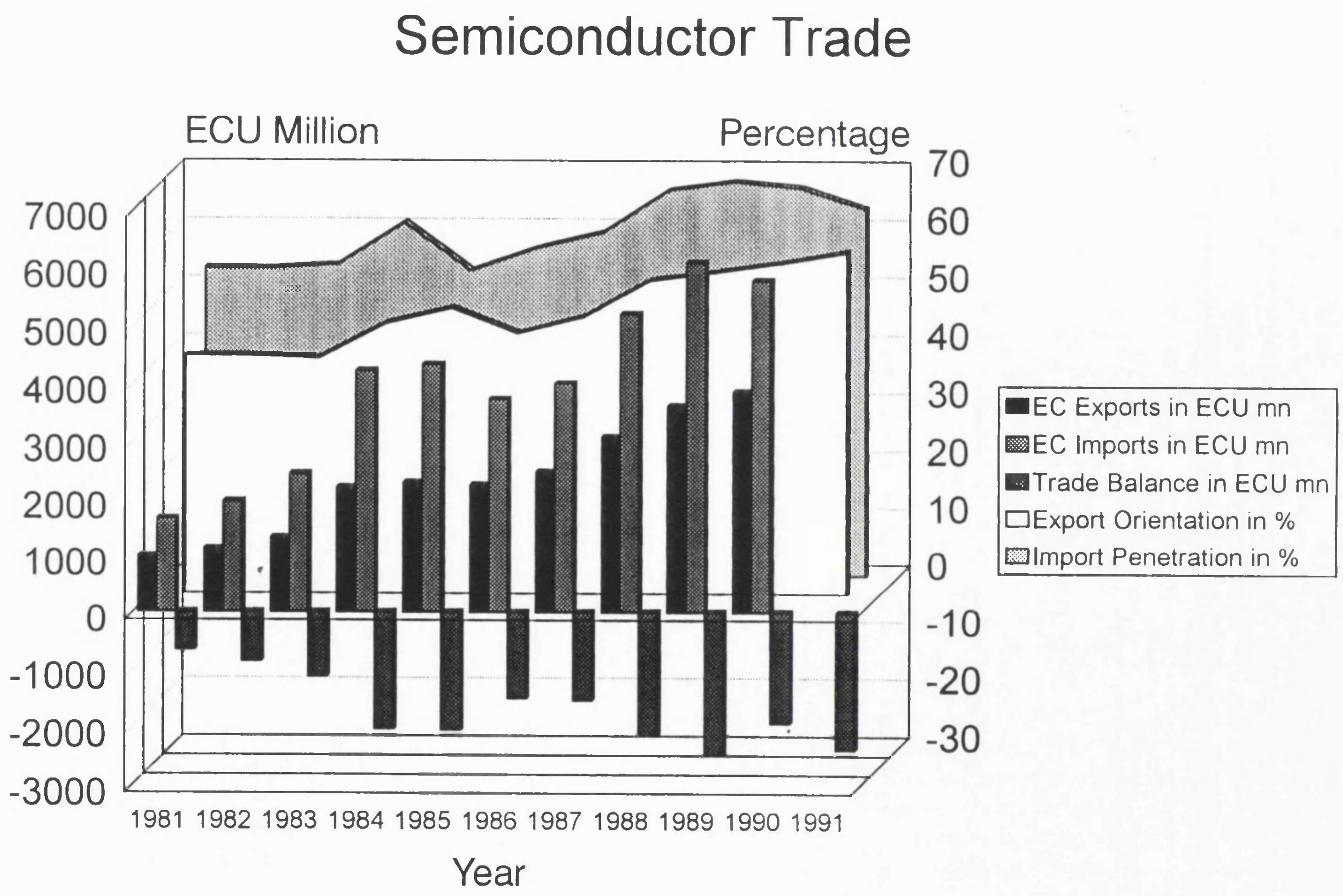
This success of the Japanese producers can be explained by three main factors. First, in contrast to the European market, the Japanese market continued to be protected against both imports and FDI during the late 1960s and early 1970s, when

Figure 5.2 World Semiconductor Production, Consumption and Trade, 1975-1991



Source: Appendix 5.3





Source: Appendix 5.3; Import Penetration/Export Orientation for Active Components

American investments into the European market were most intensive (Tyson and Yoffie, 1993:33). Only in the mid-1970s, the Japanese market gradually opened under pressure from the United States[3].

Second, the Japanese computer industry developed rapidly over the early 1970s, which dramatically increased Japan's demand for the more sophisticated integrated circuits. In Europe, meanwhile, the less sophisticated semiconductors (discrete devices) continued to account for a disproportionally large share in production. Moreover, in Europe, the demand was fragmented; the firms were operating in a larger number of smaller, national markets (see Chapter 3).

Third, in the early 1970s, when market liberalization was looming, the Japanese government decided to target the semiconductor industry as a strategic industry. Industrial development was stimulated through a coherent and consistent programme of government coordinated and subsidized collaborative R&D programmes and through government procurement, targeting a larger number of competing firms (Malerba, 1985:205-207). In contrast, the European semiconductor policies were less coherent and mostly directed at one national champion (see Chapter 3).

By 1986, Japan had surpassed the United States as the largest producer of semiconductors. In the early 1990s, Japan maintained its dominant position, despite the resurgence of American producers. The latter was caused by a rapid growth in the US-dominated microprocessor segments and by a fall in prices in the Japan-dominated memory segments (Tyson, 1992:127; Skapinker, Thomson and Kehoe, 19 March 1991). The European semiconductor industry's position stabilized over the 1980s and early 1990s at approximately 10 per cent of the world market; clearly the third player in an industry dominated by Japan and the United States (see Figure 5.2). As will be seen in Chapter 9, this situation has affected the Community's bargaining position in international semiconductor-related negotiations.

European firms accounted for less than 1 per cent of the Japanese market, and approximately 5 to 6 per cent of the American market (Dataquest in Skapinker, 26 March 1991; EECA, press-release, October 1993). Even within the European market, their core market[4], the European firms' did not command a dominant position; their market share fell from 45 per cent in 1978 to 38 per cent in 1991. In 1991, over 60 per cent of European semiconductor demand was supplied by American, Japanese and other, mostly South East Asian producers[5]. Over the 1980s, the market share of the American companies fell from over 50 per cent in 1978 to approximately 42 per cent in 1991, while the Japanese share increased from a negligible percentage in 1978 to 20 per cent in 1991 (Dataquest in Nakamoto, 28 May 1992:6). Due to the European semiconductor producers' lack of competitiveness, Europe's semiconductor trade balance deteriorated and its import and investment penetration ratios increased (see Figure 5.2).

Although world production over the 1970s, 1980s and early 1990s was concentrated in the hands of Japanese and American producers, the industrial structure itself showed a reasonable degree of dispersion. In 1992, the top four firms (T4) accounted for approximately 30 per cent of world semiconductor revenues. The T4-indices for 1972 and 1983 also amounted to 30 per cent, demonstrating the stability of the level of concentration in world semiconductor markets over the past two decades (Dataquest in Kehoe, 9 February 1993:13; Malerba, 1985:159).

The concentration in the European semiconductor market was higher than the concentration in the world market (see Table 5.1), but declining. In 1974, the European T4 accounted for over 50 per cent of the market. By 1983, their share had fallen to 39 per cent. In 1990, the T-4 index totalled 33 per cent (Malerba, 1985:160; EC Panorama 1992:12-5). The reduction in concentration took place despite the consolidation taking place in the European semiconductor industry. In 1987, Thomson-CSF merged its civil

Table 5.1

CONCENTRATION IN THE WORLD AND EUROPEAN SEMICONDUCTOR MARKETS, 1987-1992

Year	1992	1991	1990	1989	1988	1987	T20 1987
Concentration in the World Semiconductor Market, 1987-1992							
T1 in %	7.7	8.0	N/A	8.8	8.9	N/A	11.5
T4 in %	29.6	28.8	N/A	30.1	30.4	N/A	39.2
T10 in %	53.9	54.9	N/A	55.2	57.2	N/A	
World Total in $ mn	65587.0	59636*E*	N/A	57213.0	50859.0	N/A	T20: 29219.0
Concentration in the European Semiconductor Market, 1987-1992							
T1 in %	N/A	10.3	10.8	10.9	N/A	N/A	17.6
T4 in %	N/A	33.3	35.6	37.5	N/A	N/A	46.0
T10 in %	N/A	60.4	62.3	68.2	N/A	N/A	
EUR Market, $ mn	N/A	11370.0	12284*E*	8808.6	N/A	N/A	T20: 5495.0

Source: Appendix 5.4

Notes

- The index-values have been calculated by dividing the sum of revenues of respectively the largest (T1), the 4 largest (T4) or the 10 largest firms (T10) by the cumulative total revenues

E Estimate based on reverse calculation, through calculating the sum of each Top 10 player's ((sales/market share) x 100), and dividing this by 10 semiconductor operations with SGS Microelettronica. The resulting SGS-Thomson subsequently acquired the British semiconductor producer Inmos. In 1989, Plessey was jointly taken over by Siemens and GEC; Plessey's semiconductor operations, however, were consolidated within GEC (see Appendix 1.1). Plessey, meanwhile, had already acquired Ferranti.

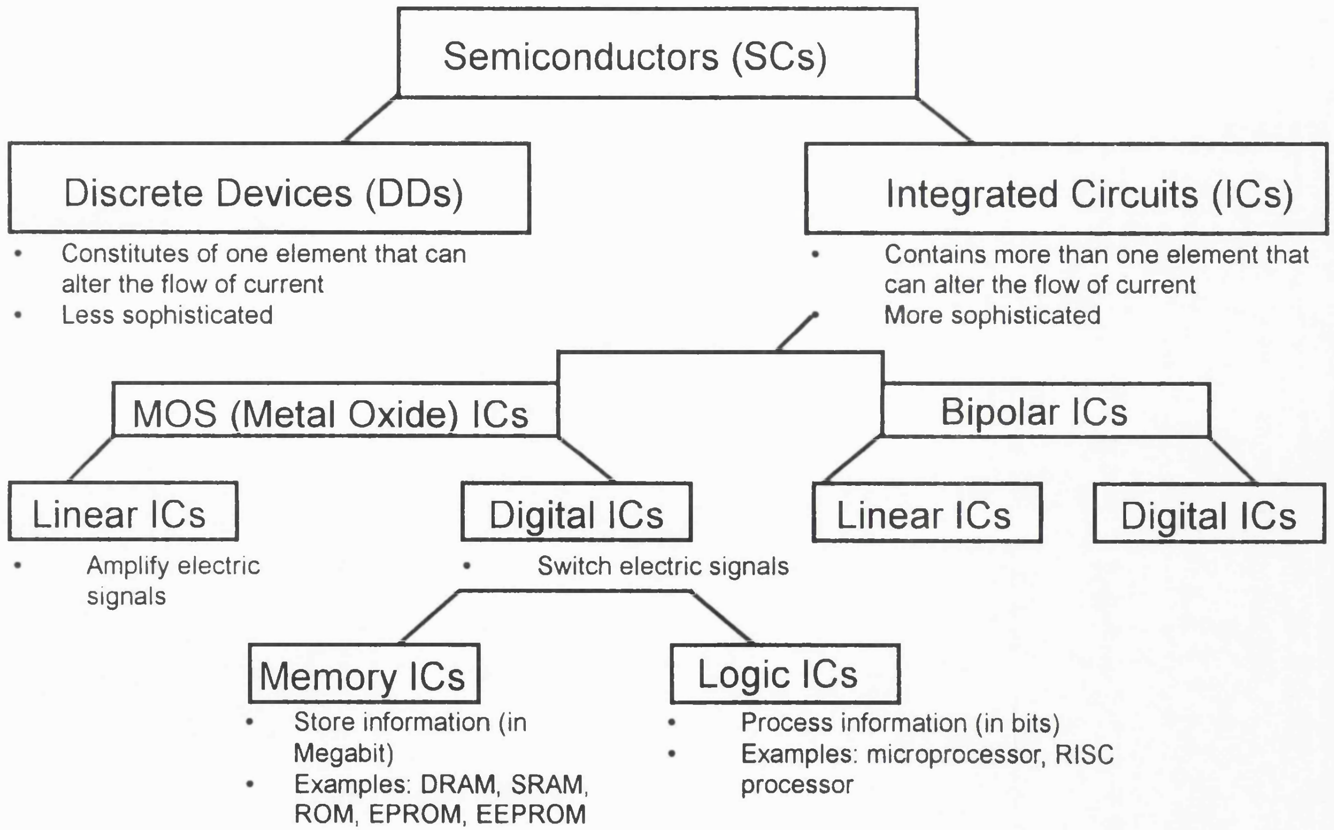
5.1.2 PRODUCTION: SHORT-TERM AND STRUCTURAL CHANGES

Since the introduction of the integrated circuit in the early 1960s, the share of these devices in world semiconductor production and consumption has been increasing at the expense of the less technologically advanced discrete devices (see Figure 5.3). At the end of the 1980s, ICs accounted for over 80 per cent of world production and consumption.

The American semiconductor companies were the first entrants into IC production and have shown a relative bias towards the manufacture of these devices ever since. Japanese producers, which were initially heavily biased towards the production of discrete devices, rapidly caught up with the American producers during the early 1970s - stimulated by the Japanese government and attracted by the increasing demand from the fast growing Japanese computer industry. The European-owned manufacturers only made a serious attempt to develop an IC production capability in the mid-1970s, when it transpired that discrete devices were becoming less and less important even in their traditional markets.

The European-owned producers' late entry into IC production has implied that the European industry has been relatively biased towards the technologically less advanced discrete devices. In 1979, ICs accounted for 36 per cent of European production, in comparison to respectively 79 and 60 per cent of American and Japanese

Figure 5.3 Semiconductor Typology



Sources: UNCTC, 1986:3-7; Langlois et al., 1988:8-25 semiconductor production (Langlois et al, 1988:27). By 1989, this share had increased to 72, 88 and 79 per cent respectively (EC Panorama, 1991:12-10).

In particular, the European-owned semiconductor producers have been relatively late in developing and producing two key IC product categories: (1) metal oxide (MOS) memory ICs, and (2) microprocessors (see Figure 5.3).

MOS Memory ICs

In the early 1990s, memory ICs accounted for approximately 25 per cent of the world semiconductor market (Economist, 30 May 1992). Figure 5.3 shows that there exist various types of MOS memory chips. This thesis will focus predominantly on the dynamic random access memory chip (DRAM), although the following discourse will also be applicable to other types of MOS memory devices. The reason for this emphasis is that DRAMs account for the largest share of the MOS memory IC market. In 1984, for example, DRAMs accounted for 51 per cent of the MOS memory IC market, while SRAMs and EPROMs accounted for 18 per cent each. Estimates for 1991 envisage a 44, 21 and 21 per cent share for DRAMs, SRAMs and EPROMs respectively (Langlois et al., 1988:19).

Like SRAMs and EPROMs, DRAMs are standard devices with a wide application in computers, office equipment, telecommunications, consumer electronics and industrial equipment. The rapid technological progress made in DRAMs, as reflected in a quick succession of new generations, have stimulated innovations in those industries in which these memories have been incorporated, such as computers. The first generation of dynamic random access memory chips, the 1 Kilobit DRAM, was introduced to the market by the American producers Intel and Advanced Memory Systems in 1970. This was followed by the 4K DRAM in 1973, the 16K in 1976, the 64K in 1978, the 256K in 1983, the 1 Megabit in 1986, the 4M DRAM in 1989, and the 16M DRAM in 1992 (Turner and Hodges, 1993:51).

During the 1980s, DRAMs were considered "technology drivers". As DRAMs are high-volume products with relatively simple designs, it was understood that the production of DRAMs would yield skills in large scale production process technology that could be transferred to more complex, less-standardized, higher value-added chips, and thus could help "drive" the producer down a steep learning curve. This, in its turn, would improve the "yield" of these semiconductors, i.e. the share of usable semiconductors in total output. A better yield would decrease the manufacturing cost per semiconductor, and thus improve the competitive position of the company in question (Baldwin and Krugman, 1988:173,174; Langlois et al., 1988:16;88; Yoffie, 1988:84; Tyson, 1992:98; Tyson and Yoffie, 1993:30).

The production of the earlier generations of DRAMs was dominated by American semiconductor manufacturers (see Table 5.2). However, by the time that the 64K DRAM was introduced, Japanese semiconductor producers had reached technological and competitive parity with the American suppliers. Their success was facilitated by Japanese industrial policies, and notably the VLSI collaborative R&D programme of the mid-1970s; government protection allowed Japanese producers the time to move down the learning curve and to reach the necessary minimum scale while "promotion reduced their risk in making the big capital investments necessary to enter" (Tyson, 1992:98). The Japanese producers' success was further facilitated by the decision of American producers to cut back capacity in the recession of 1975, which led to production shortfalls (Tyson, 1992:97; Fallows, 1994:21-71).

Similarly, the American DRAM producers' response to the recession of the mid-1980s played in the hands of the Japanese suppliers. As in the mid-1970s, the cyclical fall in consumption and the failure of semiconductor producers to adjust their production in line with demand resulted in over-supply. The subsequent fall in prices,

Table 5.2

TOP 10 DRAM PRODUCERS, 1972-1991

1972 (1K)	1975 (4K)	1978 (16K)	1981 (64K)	1984 (256K)	1987 (1M)	1991
TI	TI	TI	Motorola	Hitachi	Toshiba	Toshiba
Motorola	Fairchild	Motorola	TI	NEC	Hitachi	Samsung
Fairchild	N.Semicon.	N.Semicon.	NEC	Fujitsu	Mitsubishi	Hitachi
RCA	Intel	Intel	Hitachi	Toshiba	NEC	NEC
GE	Motorola	NEC	N.Semicon.	ATT Techn.	Oki	Fujitsu
N.Semicon.	Rockwell	Fairchild	Toshiba	Mitsubishi	Fujitsu	TI
GI	GI	Hitachi	Intel	Oki	TI	Mitsub.
Corning	RCA	Signeticsa	Philips	TCMC	Matsushita	Oki
Westinghouse	Signeticsa	Mostek	Fujitsu	TI		Micron
American	American	Toshiba	Fairchild	Intel		Siemens

Sources: Dataquest in Butler and Kehoe, 14 July 1992:17 and Okimoto in The Economist, 2 December 1989:9-10

Notes

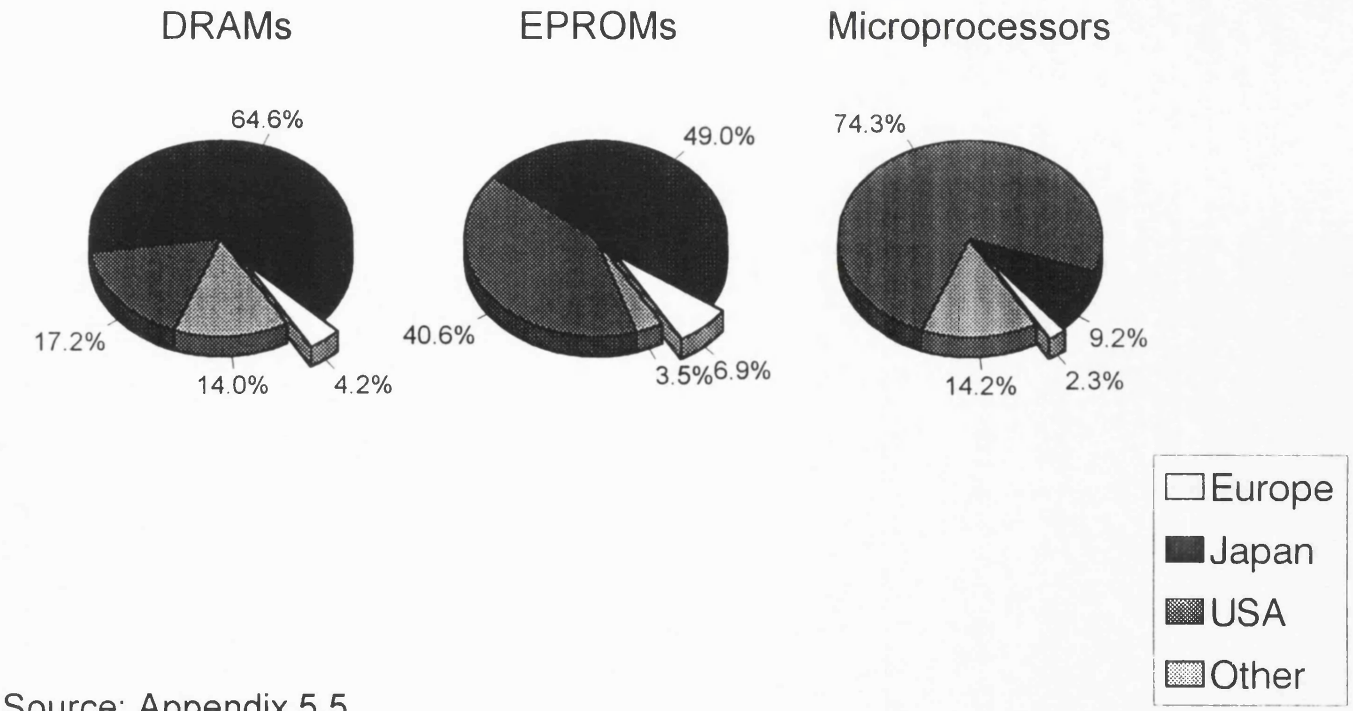
a Signetics was acquired by Philips in 1975 exacerbated by vigorous price competition and dumping, forced many American producers to withdraw from DRAM production. By the time demand picked up again, the American manufacturing capability had contracted to such a degree that the remaining American semiconductor producers could no longer keep up with the rise in demand. Since DRAMs produced by different manufacturers according to the industry standard are near-perfect substitutes, consumers could easily switch from American to other sources of supply. The American response of cutting production in a downturn, while Japanese manufacturers continued to produce at full capacity, left the Japanese firms in the mid-1980s with a firm control over DRAM supplies (Kehoe, 31 January 1992:12; Wall Street Journal, 22 August 1989; Howell, Benz and Wolff 1986:249).

In 1990, Japanese producers, notably Toshiba, Hitachi, NEC, Mitsubishi and Fujitsu, still accounted for over 60 per cent of world production - despite increasing competition from South East Asian producers and, especially, Samsung. In that year, American producers accounted for 17 per cent of world production, South East Asian producers for 14 per cent, and Siemens - the sole European DRAM manufacturer, for 4 per cent. In the same year, the larger Japanese firms controlled nearly 50 per cent of the EPROM market and a substantial share of the SRAM market (see Figure 5.4).

Microprocessors

In 1971, Intel launched the first commercially developed microprocessor - an integrated circuit which includes most or all of the central processing functions of a computer on a single chip (see Figure 5.3). The introduction of the 4-bit CISC (Complex Instruction Set Computing) microprocessor was followed by the 8-bit microprocessor in 1972, the 16-bit in 1974 and the 32-bit in 1982. In the mid-1980s, a new type of microprocessor was introduced to the market, the RISC (reduced

Figure 5.4 World Memory and Microprocessor Production by Region
1990



Source: Appendix 5.5

instruction set computing) processor, which is expected to replace the conventional 32-bit CISC microprocessor, especially in the smaller computer systems (Langlois et al., 1988:13; EC Panorama 1991:12-7; Kehoe, 10 November 1992:28).

Microprocessors are standard inputs into a larger number of applications. For our purposes, it is particularly important to stress that the introduction of the microprocessor has revolutionized the computer industry (see below), through the development of the microcomputer. Over the 1970s and 1980s, the application of successive generations of microprocessors in computers has allowed computers to become smaller and cheaper while improving upon their dataprocessing capabilities, thus effectively undermining the larger systems producers (Langlois et al., 1988:21: Trainor and Krasnewich, 1992:40-43; Kehoe, 8 March 1993:15). Similarly, the RISC processor is expected to increase the performance/cost ratio of future generations of microcomputers.

The production of microprocessors has been dominated by American producers, notably Intel and, to a lesser extent, Motorola. In 1990, Intel accounted for 53.2 per cent of the world microprocessor market, followed by Motorola with 13.3 per cent (Dataquest in Tyson, 1992:127). Japanese producers have never been able to establish a dominant presence in the microprocessor markets, and have been largely confined to manufacturing microprocessors of American design in the context of second source and licensing agreements with American producers (Langlois et al., 1988:36). The costs of late entry in the production of microprocessors are higher than in the case of DRAM manufacturing, reducing the chances that Japanese producers can repeat their DRAM success-story in the microprocessor industry (Tyson, 1992:98).

In contrast to DRAMs, microprocessors of different manufacturers are not near-perfect substitutes, but are characterized by proprietary designs. Consequently, new proprietary designs are unlikely to get accepted by the market when the de facto industry standard has already been set; the costs of switching from one design to another would be prohibitively high. In the conventional 16 and 32-bit microprocessor markets, for example, the Intel design has been the primary industry standard. With the exception of Motorola, the microprocessor supplier to Apple, other proprietary designs have posed little competitive threat to Intel over the 1980s and most of the early 1990s. Rather, competition has come from the smaller clone makers, such as Advanced Micro Devices (AMD), which undercut the price of Intel's established products. AMD, for example, currently accounts for 50 per cent of the Intel 386 market (Ligtenberg, 23 March 1993:15-16).

The high costs of switching have implied that a new proprietary design producer can only enter the market with some chance of success when the product is at a relatively early stage in its product life cycle and the industry standard has not yet been set. In the case of RISC production, for example, no industry standard has been set as yet; various companies, including IBM and DEC, have entered this market and are currently competing with each other for consumers of their respective RISC variations in order to set the standard.

In 1990, the larger American producers accounted for more than 70 per cent of the world production of microprocessors, in comparison to 9 per cent for the larger Japanese producers and 2.3 per cent for SGS-Thomson, the only European-owned microprocessor manufacturer of any significance (see Figure 5.4). The American companies' first-mover advantages and their restrictive licensing policies towards their Japanese partners appear to have contained effectively the competitive threat posed by Japanese producers in this product segment. Moreover, it has allowed them to develop new generations before clone producers would be able to copy the then prevailing generation (Skapinker, Thomson and Kehoe, 19 March 1991).

The European-owned Semiconductor Producers' Legacy of Late Entry

The European-owned semiconductor producers' late entry into both memory and microprocessor production has implied that the firms have not been able to benefit from first-mover advantages. These play an important role in an industry, characterized by high entry barriers in the form of high fixed costs, scale and learning economies, and proprietary standards, and by substantial price competition and shortening product life cycles.

The manufacturing of ICs involves large and rising investments in R&D, plants and machinery. The initial capital investment required to set up a new semiconductor plant, for example, increased from approximately $ 2 mn in the 1960s to at least $150 mn at the end of the 1980s (Dicken, 1992:320). The next generation of wafer fabrication plants is expected to cost between $ 800 mn and $ 1 bn per factory (Kehoe, 9 February 1993). Similarly, R&D costs have escalated; while the development of the 4M DRAM involved an investment of $ 250 mn in R&D, the 16M DRAM requires $ 850 mn (NRC, 15 July 1992:15). The development of the future generation of memory chips, the 256M DRAMs, is expected to cost $ 1 bn (Causey, 12 October 1993:11). In contrast, the variable costs of IC production have been relatively low. Even labour costs, the largest variable cost item, can be reduced through either automatization or assembly in low-wage countries. The costs of raw materials (silicon), operations, distribution and marketing incurred in producing one additional device are said to total $ 1 per chip (Economist, 22 November 1986).

Faced with high fixed costs and low variable costs, semiconductor producers have an incentive to maximize sales on a global scale, as this would allow them to recuperate the high initial costs of investment, and reduce their cost per unit through exploiting economies of scale and learning. In a market, which has been characterized by price-based competition, the most effective strategy to increase market share is to undercut the competitors' prices up to the level where the price equals the producer's variable costs (Economist, 22 November 1986).

Although prices have been rising occasionally, following cyclical upturns and government intervention in the form of tariffs, anti-dumping duties, price accords and import and export agreements (see Chapters 3 and 4), this cost-competition strategy has turned memory ICs and the older generations of microprocessors into commodities characterized by ample supply and low prices. As the Economist (2 December 1989:9-10) illustrates in the case of memory ICs:

> At its peak in 1978, the 4K [DRAM] was being produced at a rate of 100 mn units a year and priced at 50 cents a kilobit. By 1978, the 16K DRAM had become the standard memory chip. Three years later, some 200 mn pieces were being produced annually for about ten cents a kilobit. [..] At peak production [of the 64K DRAM], in 1984, more than 800 mn pieces a year were spilling out of the semiconductor industry's 'fab' plants. [..] By 1985, prices [for the 256K DRAM] had plummeted below one cent a kilobit.

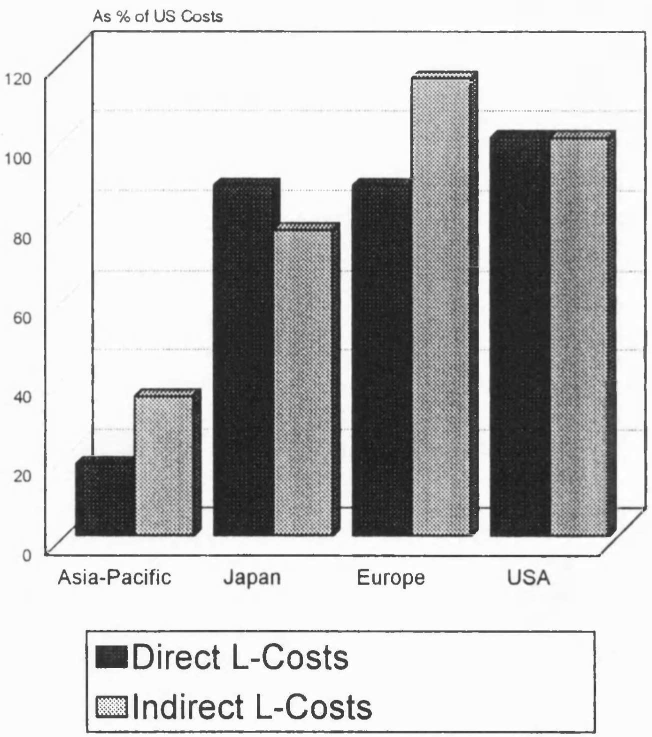
However, this strategy has one great disadvantage; prices may be driven down to the level where companies cannot recuperate their initial investments and/or finance future investments. This has been particularly the case in the memory segments. This problem has been aggravated by shortening product life cycles; newer generations with improved performance/cost ratios have been introduced in a rapid sequence at ever lower price differentials, leaving producers less and less time to recoup their fixed costs before a new generation hits the market. In the case of DRAMs, for example, new generations should be introduced at premium prices of 30 to 40 times the price of the mainstream devices. Under the pressure of competition, however, they are launched at far smaller price differentials (Economist, 23 February 1991:66).

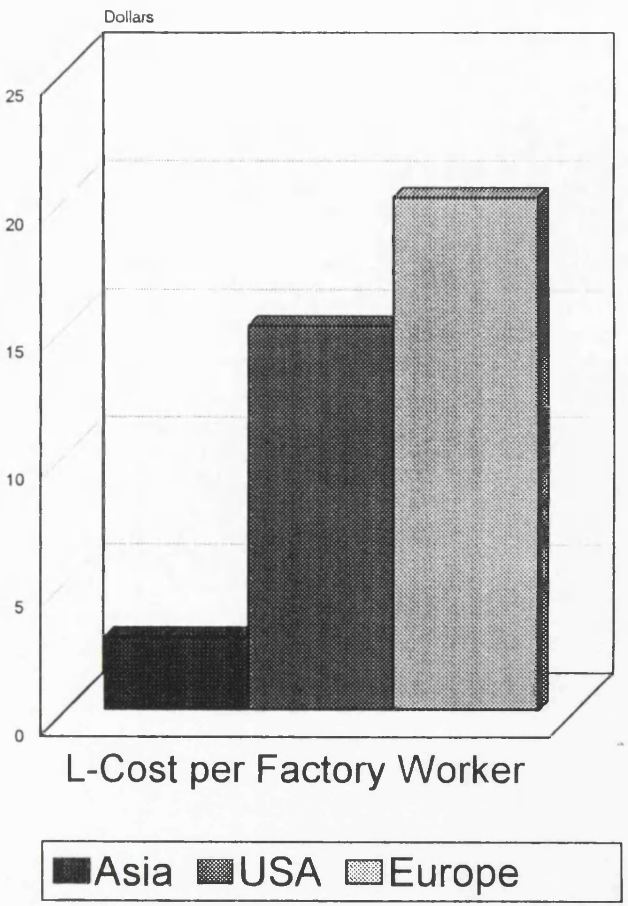
Under these conditions, moving first allows a company to develop a lead on the learning curve and, thus, establish a cost-advantage towards its competitors. A subsequent build-up in volume of production allows it to exploit economies of scale and further reduce the per unit costs, thus increasing its chances to record a profit on its operations. The initial lack of competition allows the company to sell products at premium prices before increased competition drives prices down. In the microprocessor markets, this period of premium pricing has been relatively long, as clone microprocessor producers have been trailing the market leaders substantially. Finally, in the case of microprocessors, the establishment of a large market share or even a monopoly position allows the first-mover to turn its product into the industry standard. This, in turn, will secure a demand for the producer's product and/or its technology.

The European producers had none of the above first-mover advantages. Consequently, the European manufacturers were unable to conquer a large share of the market and build up large volumes with all the associated benefits (see Figure 5.4). This occurred not only in the world market, but also in companies' home markets which, in contrast to Japan, had not been heavily protected against foreign direct investment.

The competitive difficulties faced by the European-owned semiconductor producers was further aggravated by regional and company-specific demand factors. Company-specific reasons comprise, inter alia, lack of strategic insight and poor management. Philips' Megabit project, for example, illustrates the consequences of Philips' unfortunate choice for SRAMs, the difficulties of developing rather than buying the technology necessary for an inhouse production capability, and the disproportional importance attached by the highest management levels to prestige over profitability (see Metze, 1991:290-293). Regional-specific factors include the fragmentation of the European market, the weak demand from Europe's small and technologically trailing computer industry (see above), the falling demand from the semiconductor industry's largest consumer, the consumer electronics industry, and the comparatively high costs of capital and labour (see Figure 5.5)[6]. According to Heinz Hagmeister, Head of Philips' semiconductor division,

Figure 5.5 Labour (L) Costs in the Semiconductor Industry:
Regional Comparison
Circa 1992





Nakamoto, 16 November 1992

> The same [semiconductor] plant, of the same size, making the same product in the same production volumes will have 10 to 20 per cent higher costs in Europe than its identical sisters in the US and Japan, and more than 30 per cent higher costs than an identical plant in a newly industrialized country (quoted in Nakamoto, 16 November 1992).

Despite the support of their respective home governments, all of the above made it very difficult for the European firms to turn their large R&D and capital investments in semiconductors into successful commercial ventures, as the following will show.

Philips started developing advanced memory chips in 1984, when it began cooperating with Siemens in the government-subsidized Megabit project (see Table 3.2). In this attempt to catch up, Philips chose to develop the static random access memory chip, which is particularly suitable for consumer electronics applications. In hindsight, this proved to be the wrong move. Not only did the demand for SRAMs develop below expectations, also the competition in this market turned out to be suffocating, as most late-entrants into the MOS memory IC market had opted for SRAMs rather than DRAMs (Metze, 1991:290,294). Although the project was a technological success - by 1987, Philips had developed a functioning 1M SRAM chip and by 1989, the company had started to produce the 64 and 256K SRAMs -, financially the project proved to be extremely costly. In 1989, the costs of the Megabit project allegedly totalled 1 mn guilders a day (Metze, 1991:293-294) (see Figure 5.5).

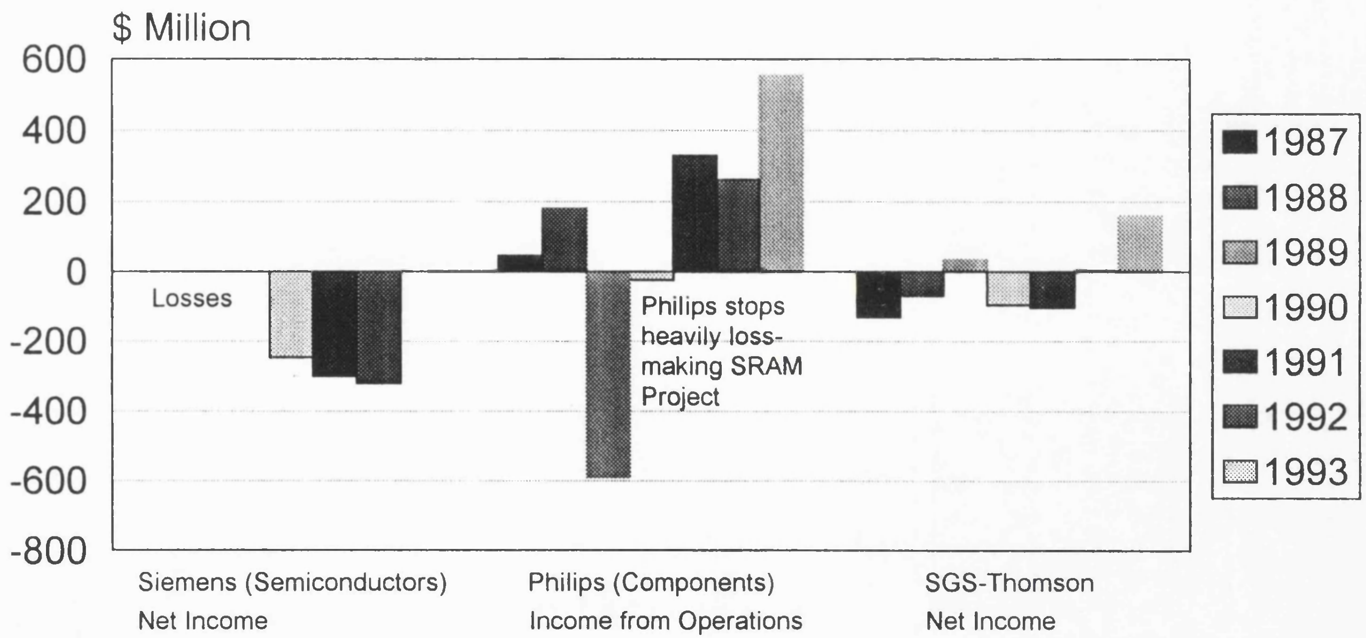
Siemens, meanwhile, had opted for the development of dynamic random access memories, which the company could use for application in its computer range. Realizing that the investments in memory technology could only pay off if the company would be able to reduce its innovation time-span and enter the market quickly, Siemens decided to secure access to the latest technology through an alliance with Toshiba (Metze, 1991:291-292). In 1988, when demand for 1M DRAMs rose, Siemens brought its version to the market and managed to capture approximately 4 per cent of world demand (1990). Yet, this success was reached at a high cost. According to a Siemens' official, the group has been making a loss for every DRAM it sells (Nakamoto, 2 September 1992:15) (see Figure 5.5).

Like Siemens and Philips, SGS-Thomson sought to develop its presence in the memory chip markets. By the turn of the decade, SGS-Thomson had succeeded in establishing its position in the world EPROM markets with a solid share of 7 per cent (1990). SGS-Thomson also succeeded in establishing a share, albeit small, in the world SRAM markets; its SRAM sales, boosted by the acquisition of Inmos, totalled $ 49 mn or about 12 per cent of the European SRAM market. This, however, compares favourably with Philips' SRAM sales of $ 3 mn (Dataquest in Tyson, 1992:125 and in Skapinker and van de Krol, 5 September 1990). SGS-Thomson's attempts to develop a DRAM production capability were less successful; by 1990, it had not been able to find a partner to share the costs of R&D and capital investments (Skapinker, 25 October 1990).

The acquisition of Inmos also endowed SGS-Thomson with a microprocessor production capability. While Siemens and Philips have remained dependent on second-source agreements with respectively Intel and Motorola for their production of microprocessors, the Inmos acquisition has given SGS-Thomson access to the transputer - a microprocessor which is currently as fast as DEC's RISC variation (Cane, 30 March 1993:19). In 1990, SGS-Thomson held 2.3 per cent of the world market. Although SGS-Thomson's was thus successful in establishing a presence in both memory and microprocessor segments, its operations were loss-making for most of the late 1980s and early 1990s. Only in 1992, helped by a resurgence in demand, the company returned to the black (see Figure 5.5).

In conclusion, by 1990, the semiconductor operations of all large, European-owned semiconductor producers were loss-making (see Figure 5.6). This constitutes a

Figure 5.6 Performance of the European-Owned Semiconductor MNEs
1987-1993



Philips Data Distortions: (1) Data applies to components including loss-making semiconductor operations; (2) Data represents income from operations rather than net income

Sources: Siemens: Data 1993 N/A (Annual Reports; EC Panorama 1991:12-11; Nakamoto, 2 September 1992:15; Fisher, 17 January 1992:22; Parkes and Fisher, 23 November 1993:32; Parkes, 15 January 1993:15); Philips: (Annual Reports; NRC, 2 December 1993:19); SGS: (Annual Reports Thomson-CSF; Hudson and Gumbel, 18 May 1994; Friedman, 14 July 1989; Graham, 7 February 1989) . Conversion into $: see Appendix 5.1

significant development as it affected the policy preferences of the European-owned IT companies, their effort put into political activity, and the weight attached to their policy preferences (see Chapters 7,8).

5.1.3 CORPORATE RESPONSES

The substantial losses made on semiconductor production prompted the European-owned semiconductor producers to implement restructuring programmes and alter their strategies. Attempts by Siemens, Philips and SGS-Thomson to return to the black can be organized as follows: (1) reorganization of operations; (2) reduction of labour force; (3) return to core activities; (4) retargeting production from the general purpose, mainstream memory and logic chips to the semi-customized application specific integrated circuits (ASICs); and (5) accelerated internationalization of operations, including the conclusion of cross-border mergers, acquisitions and alliances[7]. These actions will be discussed in greater detail, as they have affected the political influence of the European-owned IT companies and their interest groups (see Chapters 7 to 9).

Reorganizations

In order to improve their profitability, all European-owned semiconductor producers introduced changes in their management and financial organization to streamline their operations, reduce their costs and improve their efficiency. With the exception of the changes implemented by SGS-Thomson following its merger (see Appendix 1.1), the measures introduced by the European-owned IT companies are discussed in greater detail in the context of the computer industry.

Reduction of Labour Force

The most politically sensitive measures taken in the context of the companies' restructuring programmes have been the reductions in the companies' semiconductor-related employment. At SGS-Thomson, for example, the labour force shrank by 16 per cent (3472 employees) over the years 1990-1992. Philips' withdrawal from SRAM production and its cost-reduction in the context of Operation Centurion (see Appendix 1.1) caused a loss of 7000 out of the 27,000 jobs in its semiconductor division - a member of the product group Components and Semiconductors. Similarly, Siemens has trimmed its semiconductor labour force.

Return to Core Activities

In 1990, Philips announced that it would halt the production of SRAMs and that it would withdraw from a JESSI programme aimed at developing the 16 and 64M memory IC (see Chapter 4). By doing so, Philips resigned as a player in both current as well as future general purpose RAM markets, as the entry barriers, especially in the form of the knowledge acquired from learning-by-doing, could hamper any such move. Philips' withdrawal from the SRAM production had only a marginal impact on its sales; SRAMs did not even account for 1 per cent of Philips' total component sales[8]. Yet, it dramatically improved the financial health of Philips' remaining semiconductor and component operations (see Figure 5.5 and van de Krol, 6 August 1993:15).

Siemens also announced its intention to reduce its concentration on memory production, albeit in a more gradual manner. In June 1992, Siemens decided to withdraw from its agreement with IBM to build a 64M DRAM production facility, on the grounds that Siemens did not seek to be "a major player in the DRAM market after the 16-megabit." (Siemens sources, Financial Times, 19 June 1992:26). Siemens' decision may seem surprising, considering the fact that Siemens has been the only

European-owned producer to catch up and secure a share in the world DRAM market. Yet, Siemens has been deriving less than 3 per cent of its semiconductor sales from its 1M DRAM deliveries[9] and these operations have been heavily loss-making.

SGS-Thomson, however, has continued to focus on the mainstream memory and microprocessor segments - regarding those as its core business. Beyond the strategic importance attached to its operations by the larger Thomson group, SGS-Thomson's drive towards a greater presence in the memory and microprocessor segments in all areas of the Triad reflect its intention to avoid a situation in which it is too large to be a niche player, but too small to operate profitably in the mainstream of the market. With less than $ 2 bn in sales and less than 5 per cent of the world semiconductor market[10], SGS-Thomson will have to continue increasing its turnover and profitability in order to yield the necessary funds for reinvestment (Skapinker, 25 October 1991; Causey, 12 October 1993:11).

Shift towards ASICs

The decision of Siemens and Philips to reduce their presence in dynamic or static RAM production reflects a general shift in emphasis in production away from mainstream memory chips to the more profitable, application specific integrated circuits (ASICs). Despite its continued focus on mainstream memory production, SGS-Thomson has also increased its emphasis on ASICs.

The European-owned semiconductor producers currently have a greater share in the production of ASICs than in any other IC segment (EC Panorama, 1991:12-11). Nevertheless, their position in the ASIC segment is not without concern. According to EECA sources, the current lack of advanced consumer applications within Europe limits the demand for highly advanced semiconductors (Interview 31;1993).

In the context of the shift from DRAMs to ASICs, the necessity of mass *production* of the technology-driving DRAMs has been re-assessed. It has been argued that the value in the semiconductor industry is not longer a function of the industry's mass-manufacturing processes but a function of specialization. As, for example, Rappaport and Halevi (1991:73) argue: "specialization depends on responsive design, not on high-volume, low-cost production". Philips' decision to withdraw from SRAM production can be interpreted in that light. It allowed the company to concentrate on the wide range of more specialized, higher value-added ASICs, utilising the knowledge acquired in the development of SRAMs. Similarly, Siemens' intention to withdraw from future DRAM production can be seen as a reassessment of the need to *produce* DRAMs.

Siemens, however, did not give up its capability to *develop* DRAMs, as illustrated by the conclusion of an alliance with IBM and Toshiba to develop the 256M DRAM chip for $ 1 bn in July 1992, shortly after it announced its intention to withdraw from future DRAM production. Possibly Siemens believes that the skills acquired from developing DRAMs are still important for developing and manufacturing ASICs (Financial Times, 19 June 1992:26; Siemens Annual Report, 1992:22). However, even a technological capability in DRAMs or other memories may no longer necessary to maintain a presence in ASICs. While the previous generations of DRAMs used to precede the equivalent generations of ASICs by more than a year, currently the gap has become much smaller. According to DG 3 sources, this implies that increasingly a producer can use ASIC lithography to maintain technological leadership rather than having to depend on a transfer of know-how from the development and production of DRAMs (Interview 3;1993).

Internationalization, Mergers and Acquisitions, and Alliances

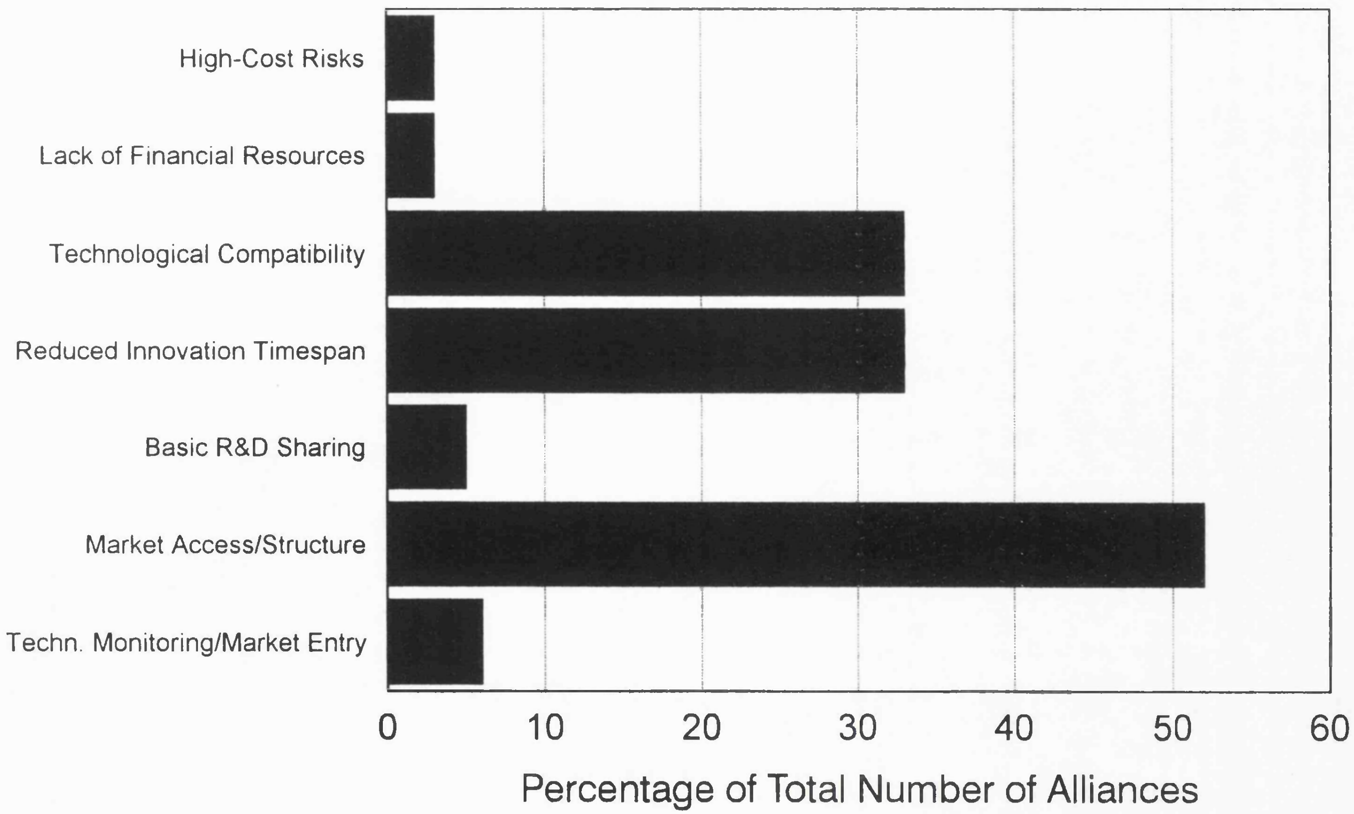
The European-owned semiconductor producers, like most other semiconductor manufacturers, have been internationalizing their operations and have been concluding cross-border mergers, acquisitions (M&A) and alliances. Internationalization allows firms to establish their production and sales operations in those locations where costs and risks are minimized and/or where considerations of market access and presence are making direct investment imperative. M&A and alliances offer companies the opportunity to share the costs and risks involved in R&D and to speed up innovations, to get access to complementary assets, including market channels and technology, to establish the necessary scale and to secure demand for the firms' own products (see Figure 5.7).

The world semiconductor industry is one of the most internationalized industries; semiconductor production has been organized on a world wide basis (Dicken, 1992:330). The general investment pattern has been to move the labour-intensive assembly and testing stages to the developing countries, characterized by their low labour costs and more flexible labour practices (offshore-assembly). In some cases, however, the assembly and testing stages have been moved to industrialized countries, when access-to-market considerations made such "point-of-sale" assembly and testing operations imperative.

In contrast, the capital-intensive, R&D-intensive and high value-added stages in the production process, namely the design and generation of photomasks and the fabrication of wafers, including the etching of electronic circuits on the surface of the silicon wafers (diffusion), have been located in the home country and in industrialized host countries. Investments in complete manufacturing in industrialized countries other than the home country have been prompted by both political pressures exerted by host governments as well as by commercial imperatives. Political imperatives include the threat of exclusion from the market in question unless the foreign semiconductor producers upgrade their investments. Commercial imperatives include the need to

Figure 5.7 Main Motives for Alliances in the Semiconductor Industry

1980-1989: 383 Alliances



Source: Hagedoorn and Schakenraad in The Economist, 27 March 1993 follow the semiconductor users abroad in order to secure their buyer-supplier relationships, or the need to interact closely with the semiconductor users, particularly when it concerns ASICs (Dicken, 1992; Flamm, 1990; Langlois et al., 1988; Skapinker, 26 March 1991; UNCTC, 1986).

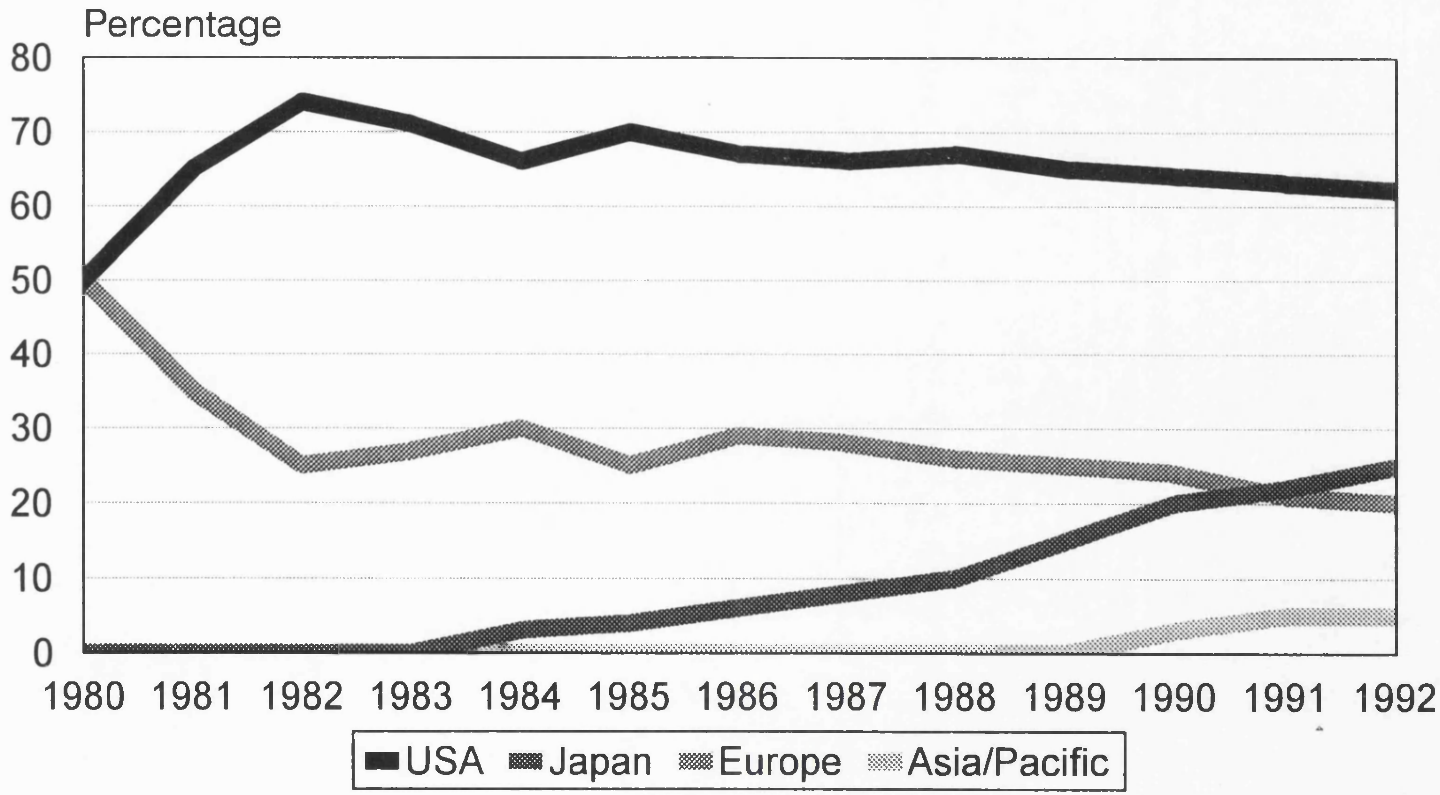
In comparison to their American and Japanese counterparts, the large, European-owned semiconductor companies have been far less "internationalized"; their global production networks appear modest in comparison to those of their American and, even, their Japanese counterparts (see Figure 5.8; Dicken, 1992:334). The European semiconductor producers' investments in POS assembly operations or complete manufacturing abroad, for example, have been limited; over recent years European firms were involved in only two FDI deals into American semiconductor operations, in comparison to over 40 deals concluded by Japanese companies (Nakamoto, 7 August 1992:4). This is not surprising considering the companies' small share of the main non-European semiconductor markets, i.e. the American and Japanese markets.

Figure 5.8, however, does not reveal that Philips, Siemens and SGS-Thomson did move the majority of their labour-intensive semiconductor testing and assembly operations to developing countries for cost-competitiveness reasons. While, in 1988, the diffusion of only 6 per cent of the companies' ICs sold in the European market took place abroad, 63 per cent of the European firms' ICs sold in the European market were tested and assembled outside of the Community (Flamm, 1990:267-271).

While European investments in the US and Japan have remained limited, American and Japanese producers have invested substantially in the European Community, notably since the announcement of the EC's Single European Market programme (see Chapter 3). In many cases, these foreign firms benefitted from government investment incentive schemes. The main recipients of these inward

Figure 5.8 Share of ICs Produced Offshore in Total IC Manufacturing

By Origin of Parent Company, 1980-1992



Source: Dataquest in Tyson (1992:144)

investments were Ireland, the United Kingdom, and Germany. American companies have invested more heavily in complete manufacturing than in assembly and testing facilities; in 1988, 43 per cent of US companies' ICs sold in Europe were diffused in Europe, while 24 per cent was assembled locally. Japanese companies, by contrast, have been biased towards investments in assembly facilities; in 1988, 39 per cent of their ICs sold in Europe were assembled locally, while only 5 per cent was diffused within Europe (Dicken, 1992:332-335; Flamm, 1988:271). Following the change in the Community's rules of origin (see Chapter 9), Japanese companies have been prompted to upgrade their European production facilities.

In the process of internationalization, semiconductor companies have concluded an increasing number of cross-border M&A and alliances. Forced by the increasing costs and risks of production and their reduced profitability, companies have become more willing to cooperate on issues, central to their business strategy (DG 12 sources, Interview 26;1993).

In addition to cooperation amongst European producers, notably in the context of ESPRIT and JESSI (see Chapter 3), the European-owned semiconductor companies have continued and intensified their cooperation with foreign semiconductor companies, as, for example, Siemens' alliances with Toshiba and IBM on DRAM technology exemplify. In their choice of partners, the European-owned semiconductor producers have displayed a preference for American over Japanese or other Asian partners. Between January 1980 and July 1986, 38 major cooperation agreements were concluded involving European semiconductor producers. Nearly 60 per cent of these agreements involved a partnership between a European and an American company; only 24 per cent involved an alliance with a Japanese firm (van Tulder and Junne, 1988:234-243; see also Haklish in Langlois et al., 1988:84). The cultural proximity of American management and a shared threat perception concerning Japanese companies, may have contributed to the European-owned companies' preferences for American partners.

5.2 THE COMPUTER INDUSTRY

5.2.1 THE PLAYERS

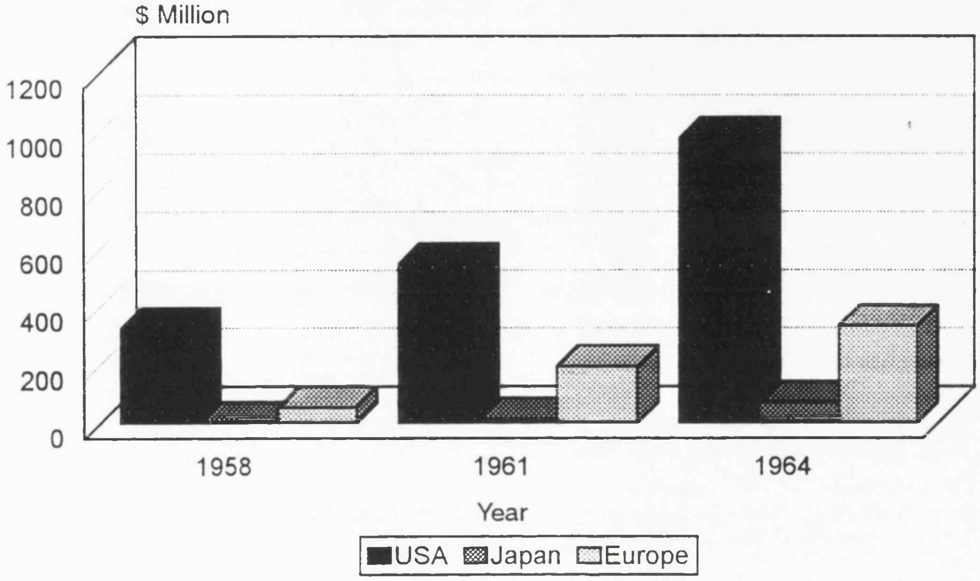
The modern computer industry has its foundation in the development of the first electronic digital computer by American and British research teams in the early post-war period[11]. At the end of the 1940s, Britain rivalled the American computer research and development capabilities. Moreover, Britain's employment of computers was roughly equal to that of the United States. By 1950, the United Kingdom had an estimated three electronic digital computers in use, while the United States employed two devices (Flamm, 1988:135).

Yet, over the 1950s, Britain quickly lost ground to the rapidly growing US industry. During the 1950s, the American market for computers boomed while European and Japanese demand increased at a far slower pace (see Figure 5.9). When demand took off in the European and Japanese markets in the 1960s, the American firms, benefitting from substantial government R&D support, fiscal incentives, and sizeable military procurement (Flamm, 1987:93-124), sought to take advantage of their competitive strength in the Japanese and European market.

In the European market, where the indigenous commercial computer industry was relatively uncompetitive[12] and barriers to trade and investment comparatively low[13], the large American producers managed to establish themselves and increase their market share. By the time that the European governments responded to this "American Challenge" with R&D subsidies and preferential government procurement

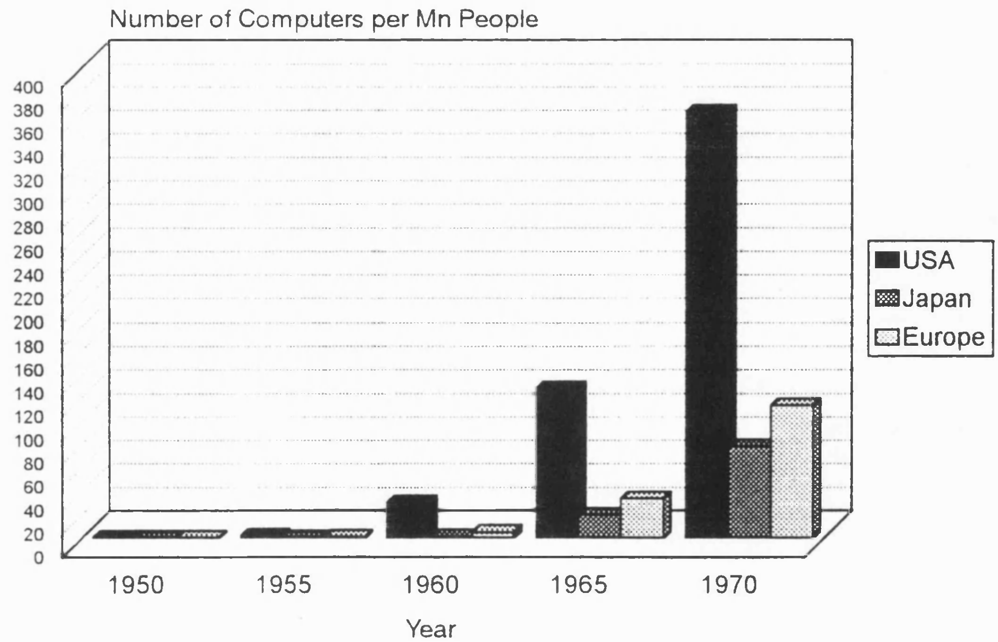
Figure 5.9 World Computer Production, Consumption and US Dominance in Supplying Markets, 1950s-1960s

World Computer Production



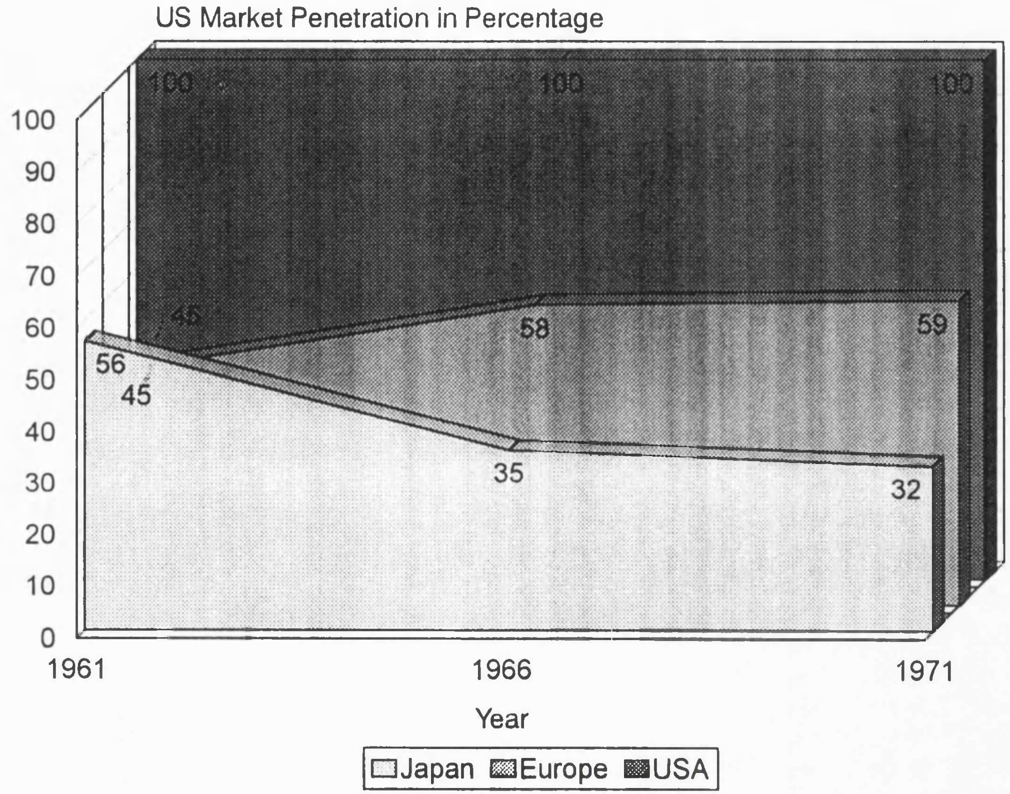
Source: Appendix 5.6

World Computer Consumption



Source: Appendix 5.6

US Dominance in Supplying World Computer Markets



Source: Appendix 5.6

(see Chapter 3), IBM and the "Bunch"[14] had already consolidated their market positions; their share had increased from 45 per cent in 1961 to 59 per cent in 1971 (see Figure 5.9; Flamm, 1988:134-171; 1987:154).

The American firms encountered more difficulties to establish a solid position in the Japanese market. In contrast to the European governments, the Japanese government had sealed off the Japanese market during the 1950s; it imposed stringent barriers to imports and inward investments. IBM, as the market leader in computers, was the only foreign computer company allowed to operate through a wholly-owned subsidiary in Japan, in exchange for Japanese producers obtaining the right to use certain IBM patents (Flamm, 1988:181-182).

Like the European governments, Japan also resorted to public policies to stimulate the performance of its computer industry during the 1960s (see Chapter 3). In contrast to the European policies, however, the Japanese policy package targeted a small group of competing, commercially-oriented computer firms rather than one national champion. As a consequence, the Japanese computer firms were never shielded from competition. Moreover, in contrast to the European governments, the Japanese government simultaneously targeted computers and semiconductors, recognizing the mutual interdependence existing between the two industries; computer producers would benefit from a competitive semiconductor industry while semiconductor producers would benefit from the computer industry's sizeable and sophisticated demand for ICs. Finally, in contrast to the European producers, the Japanese IT firms benefitted from an unfragmented market (Flamm, 1987:126-131; 1988:172-202; Howell, Benz and Wolff, 1986:240-242).

As a consequence of this strategy, the share of American producers in the Japanese market declined from 56 per cent in 1961 to 32 per cent in 1971, with IBM accounting for the majority of this share (Malerba, 1985:137) (see Figure 5.9). By the time Japan liberalized its computer market, its companies were strong enough to face the test of competition[15].

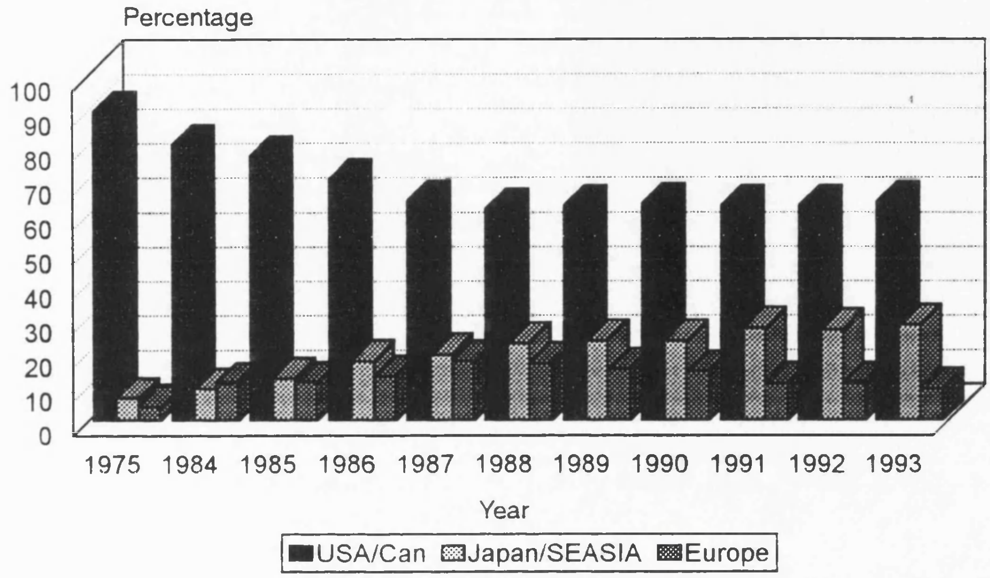
By the mid-1970s, American companies still supplied nearly 90% of the world computer market (Malerba, Torrisi and von Tunzelmann, 1991:96, 107-108). From the mid-1970s onwards, however, their dominance was challenged by Japanese companies. By 1992, the American producers' share had fallen to roughly 63 per cent, while the Japanese share had risen to over a quarter of world production (see Figure 5.10). These trends have also been reflected in the various segments of processing hardware: mainframes, minicomputers, and micros (Malerba, Torrisi and von Tunzelmann, 1991:104). Notably in the mainframe market did the American producers' preponderant position erode under the competitive pressures of Japanese firms (see Figure 5.11).

Meanwhile, the rise in the share of the European computer industry in world production over the late 1970s and early and mid-1980s had come to a halt. While in 1987, European producers still accounted for 17 per cent of world production, by 1993, the European share had declined to 9 per cent. Within the European market, the European producers' main market[16], the companies supplied approximately 30 per cent of demand. The majority of Europe's consumption was supplied by American firms[17]. Not surprisingly, Europe's negative balance in computer trade deteriorated over time (see Figure 5.10). European firms only accounted for marginal shares in the American (4%) and Asian (3%) markets (Gartner Group in Gomes-Casseres, 1993:94). As in semiconductors, the European computer producers remained small actors in the world markets - a situation which has compromised the EC's bargaining position in negotiations on computer-related issues (see Chapter 9).

Following the rise of non-American producers as well as smaller American start-ups, the concentration in the world computer industry fell from 65 per cent in 1975 to approximately 50 per cent in the late 1980s (McKinsey in Economist, 22

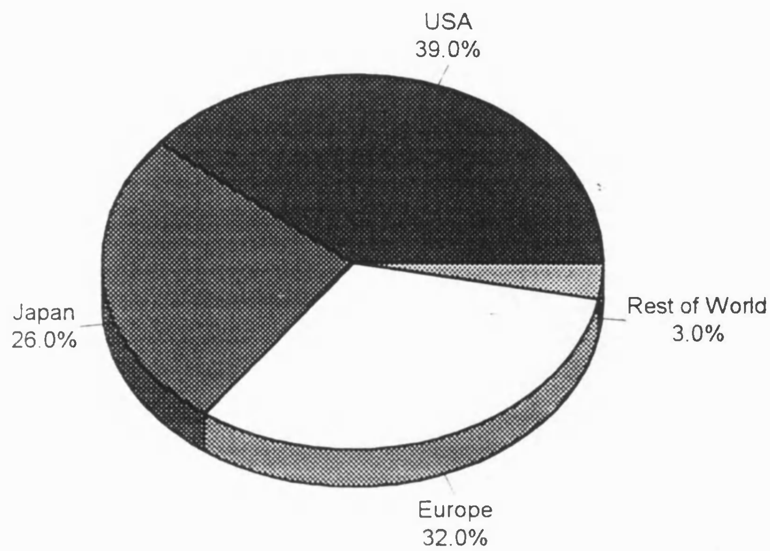
Figure 5.10 World Computer Production, Consumption and Trade, 1975-1993

World Computer Production

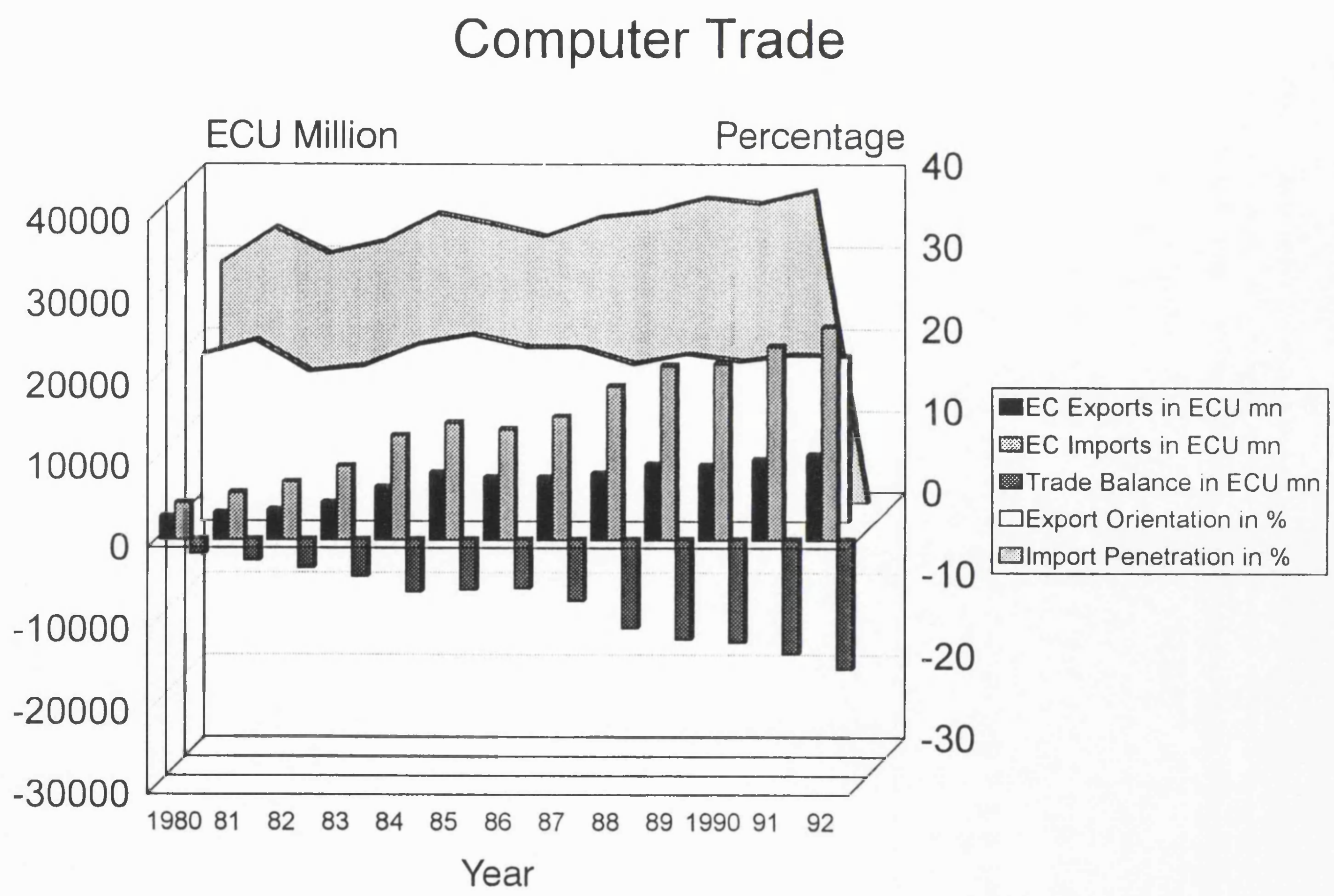


Source: Appendix 5.7

World Computer Consumption
1989: $ 255.8 bn



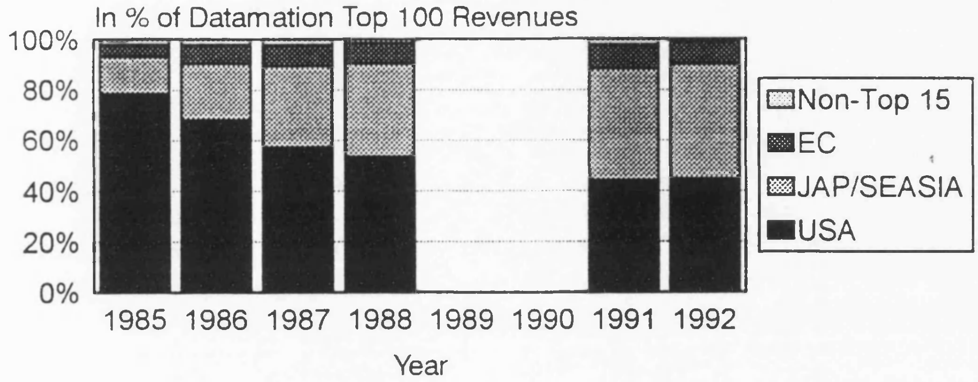
Source: Appendix 5.7



Source: Appendix 5.7 Import Penetration 1992: N/A

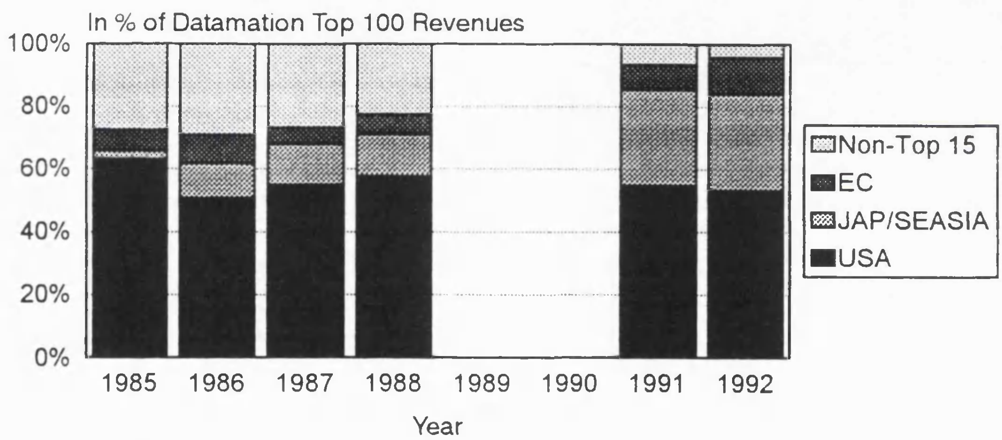
Figure 5.11 Marketshares of the Leading 15 Firms by Product Segment and Region of Origin, 1985-1992

Mainframes



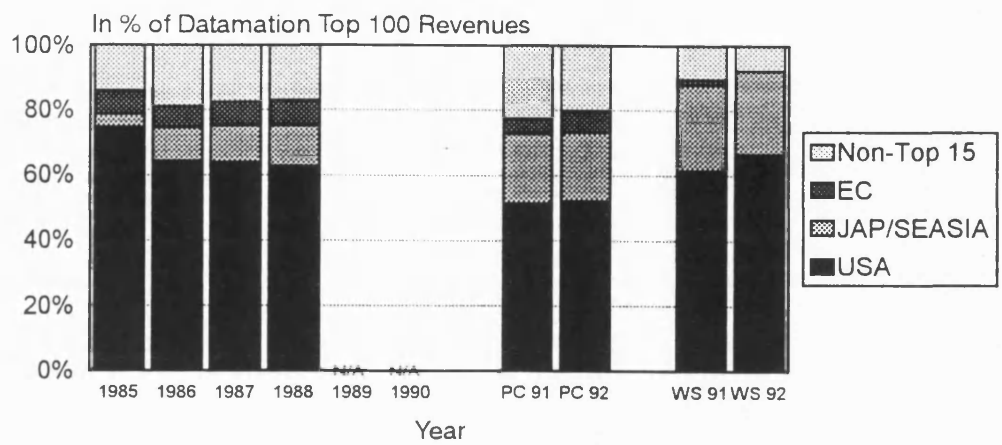
Source: Appendix 5.8 Data 1989-1990: N/A

Minicomputers



Appendix 5.8

Microcomputers



Source: Appendix 5.8 PC = Personal Computer WS = Workstation

December 1990:94). Despite the preponderance of IBM[18], the world computer industry was not overly concentrated over the period 1987-1993, although considerably more so than the semiconductor industry (see Tables 5.1,5.3). Moreover, the degree of concentration in the world computer industry remained relatively stable over that period, thus refuting foregone conclusions that developments taking place in the processing hardware segments (see below) would inevitably lead to a further concentration of the world computer industry[19] (see Table 5.3).

In comparison to the world market, the European market showed a slightly higher degree of concentration; in 1991, the largest four suppliers to the European market accounted for a 60 per cent share of the European market in comparison to a T4 index of 54 per cent for the world market. The European T4 index remained surprisingly stable over the late 1980s and early 1990s, despite take-over activities taking place. In 1990, Siemens took over Nixdorf. In the same year, Fujitsu acquired ICL which, in its turn, took over Nokia Data. In 1991, Philips and Mannesmann sold their computer divisions to Digital Equipment. Nevertheless, these take-overs did not consolidate supply.

5.2.2 PRODUCTION: SHORT-TERM AND STRUCTURAL CHANGES

The leading American computer manufacturers as well as their Japanese and European counterparts specialized initially in producing mainframe computers, i.e. large, expensive and high performance computers. In the mid-1960s, however, a number of new firms, mostly American, entered the computer market. These firms specialized in minicomputers, i.e. mid-range sized, lower priced computers with a smaller processing speed and storage capacity than the mainframes. From the mid-1970s onwards, another wave of new companies entered the market. Their operations

Table 5.3

CONCENTRATION IN THE WORLD AND EUROPEAN COMPUTER MARKETS, 1987-1993

Year	1993	1992	1991	1990	1989	1988	1987
Concentration in the World Computer Market, 1987-1993							
T1 in %	18.6	20.3	21.7	24.1	23.8	22.6	24.2
T4 in %	34.6	35.9	38.5	37.7	37.8	36.5	37.5
T10 in %	52.7	54.2	56.1	55.1	55.0	53.1	54.2
T100 in $ mn	337997.9	317993.3	289921.6	278511.6	255773.3	243122.4	208881.9
Concentration in the European Computer Market, 1987-1993							
T1 in %	N/A	N/A	34.7	36.0	33.4	N/A	34.2
T4 in %	N/A	N/A	60.4	59.9	56.7	N/A	57.1
Cum. T20 in $mn	N/A	N/A	72365.1	74513.3	63718.7	N/A	53670.3

Source: Appendix 5.9.

Notes

- The index-values have been calculated by dividing the sum of revenues of respectively the largest (T1), the 4 largest (T4) or the 10 largest (T10) firms by the cumulative total revenues. Ideally, the indexes should be calculated as a share of the total world/European/European-grown production. Unfortunately, compatible data was not available.

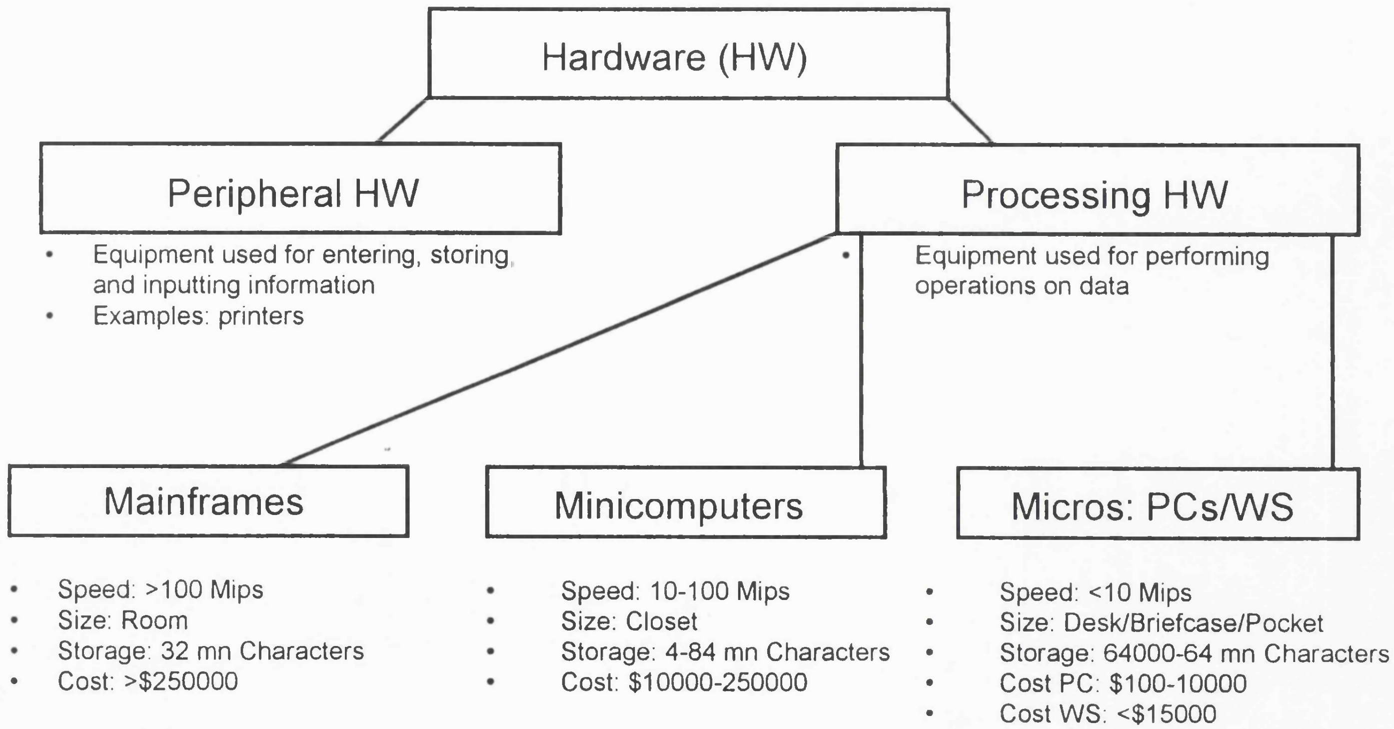
were in microcomputers, i.e. hardware that is relatively small and low-priced and offers a relatively low performance in comparison to the larger mainframe and mid-range systems (see Figure 5.12). Although mini and microcomputers initially were not competing with mainframes, over time, these computers substantially undermined the demand for mainframes.

Over the last two decades, rapid technological change in both the architecture of the computer[20] and in its components[21] has resulted in the development of increasingly smaller, cheaper and more powerful devices. With every improvement, new applications have sprung up in all product segments from micros to mainframes, and new sources of demand have been tapped. Yet, the performance, cost and size of the smaller systems has improved faster than the performance, cost and size of the larger systems (see Figure 5.13; Malerba, Torrisi and von Tunzelmann, 1991:97). This differential rate of technological change in the computer product segments has resulted in the erosion of the existing markets for the larger systems. Microcomputers, and especially the low cost, high performance workstations, have begun to compete with the larger mainframes and minis in segments that were originally considered to be the latter's application areas (Malerba, Torrisi and von Tunzelmann, 1991:98).

Faced with cheaper alternatives, large computer consumers, such as governments, have been switching their demand from the larger to the smaller systems - first, from mainframes to minis; more recently, from mid-range to microsystems. As a result, the smaller systems have grown in relative importance in the world markets at the cost of mainframes and minis (see Figure 5.14)[22].

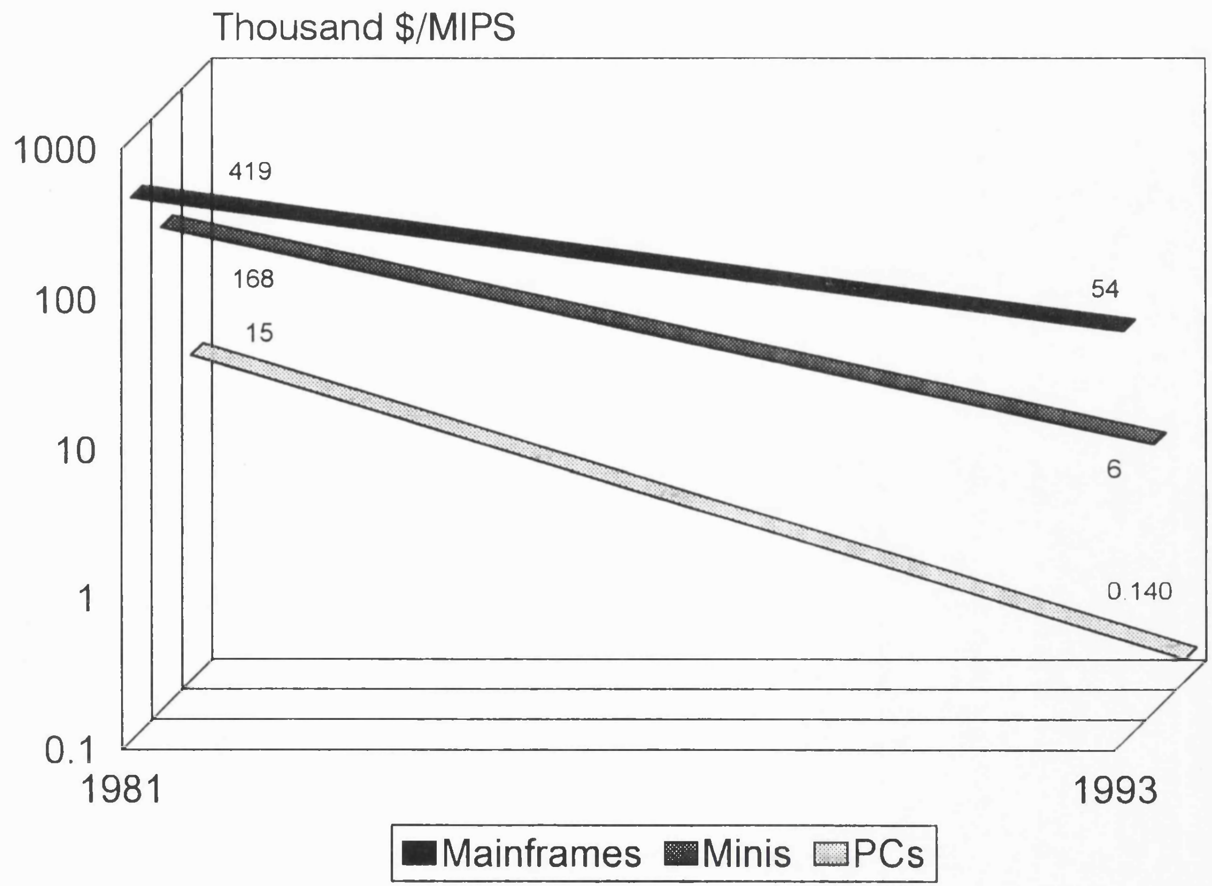
With the shift in production from the larger to the smaller systems, the profitability of producing processing hardware has substantially declined. Rather than gross profit margins of 60 per cent, as was common in the case of producing proprietary mainframes and minis, the industry's margins declined to 20-30 per cent

Figure 5.12 Hardware Typology



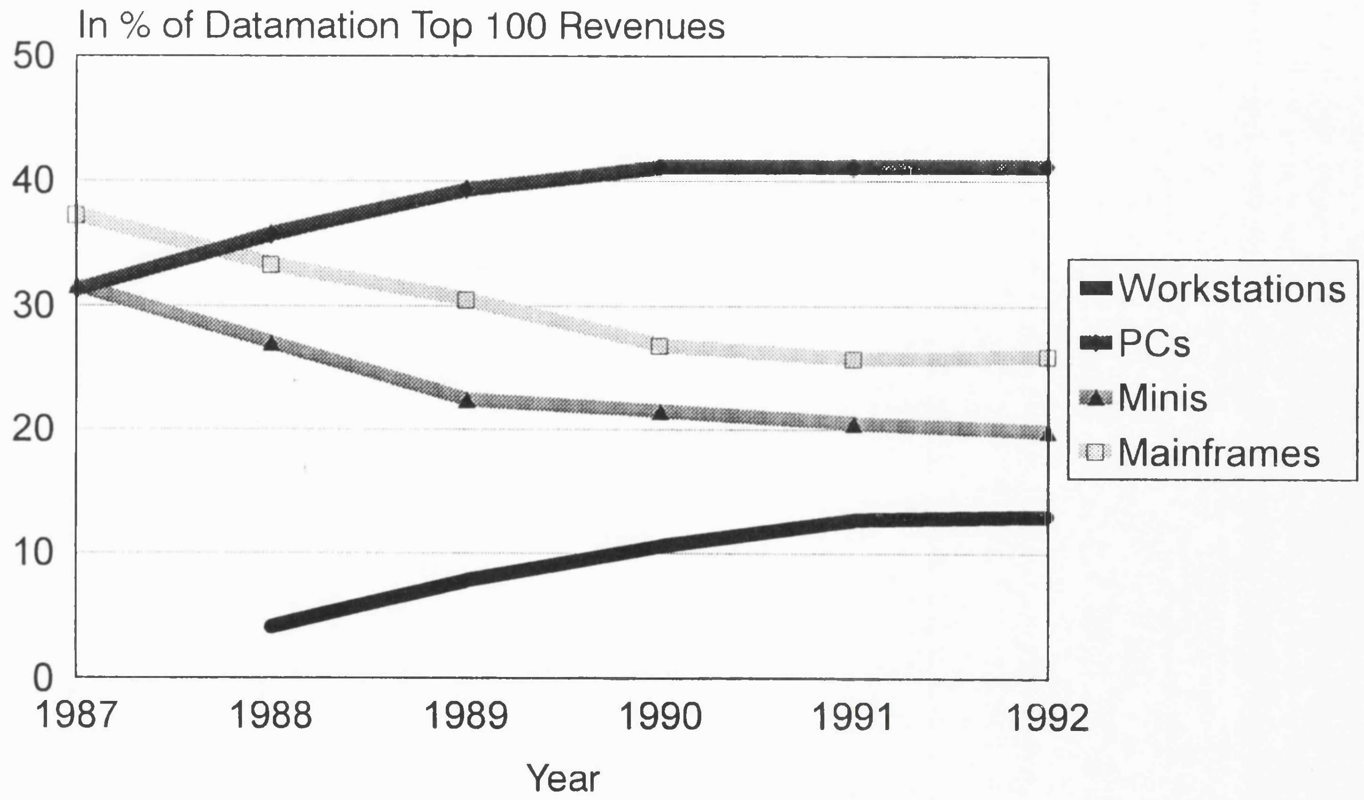
Sources: Trainor and Krasnewich (1992:248); Tebutt, 23 June 1992:3

Figure 5.13 Trends in Computer Price, 1981-1993



Source: Gartner Group in Malerba, Torrisi and von Tunzelman (1991:98)

Figure 5.14 World Processing Hardware Markets by Segment, 1987-1992



Source: Appendix 5.10

or less in the early 1990s (Cane, 7 April 1992:I; de Jonquières, 23 April 1991:XIII). Three main reasons underlie this fall in profitability, namely (1) the commoditization of the smaller computer systems, intensifying competitive pressures (2) the trend towards standardization, and (3) changes in the size and nature of consumer demand.

Commoditization

The costs of producing PCs and workstations are considerably lower than the cost of manufacturing mainframes or minicomputers. While the estimated cost of a mainframe computer lies around the 54000 dollars per MIPS, the cost of a PC is estimated to be 140 dollars per MIPS (Garner Group in Malerba, Torrisi and von Tunzelmann, 1991:98). With the reduction in production costs, the barriers to entry into the industry have been lowered as well (Cane, 29 October 1992:16; Taylor, 18 November 1992: 21. As Cane (7 April 1992:I) outlines, any producer can quite simply manufacture a cheap PC without any need for heavy expenditure in R&D, through combining a high performance microprocessor chip and some standard operating software. The resulting increase in competition has turned PCs and workstations into commodities; microcomputers have become both widely available at relatively low prices. Albeit a favourable development for consumers, the continuous downward pressure on the sales price of the smaller systems, culminating into annual price reductions of 25 to 40 per cent (Cane, 7 April 1992:I), has reduced the profit margins of the suppliers of the smaller systems.

Standardization

The trend towards the "commoditization" of microcomputers has been accelerated by the increasing standardization in both hardware and software. Until recently, most computer manufacturers developed their products according to their own, proprietary standards, which diverged from those of their competitors. Consumers, in other words, were effectively locked into using one supplier, as the costs associated with switching suppliers were prohibitively high. This offered the computer producers the benefit of having a secure market in which they could charge relatively high prices. This, in turn, facilitated the recuperation of the large R&D investments involved in developing the systems.

Since the mid-1980s, however, an increasing number of computer manufacturers has introduced products in line with non-proprietary standards, despite the apparent disadvantages associated with the introduction of "open" systems. Adherence to non-proprietary standards would not only reduce the costs of switching between one supplier and another, but also lower the entry barriers to the industry, as systems based on standard components involve far lower development costs than those based on proprietary standards. As a result, competitive pressures would increase. The increasing importance of non-proprietary standards in the computer industry, however, can be explained by (1) the influence exercised by the large computer users in business and government, and (2) the advantages that adherence to such standards might yield to computer producers.

User Advantages. Computer consumers have been interested in open standards for the following two reasons. First, with the rise of networks of smaller, yet more powerful computers, the risks associated with using only one supplier have increased. As a CEN standardization officer explains:

> It is not possible any more to be stuck with one manufacturer. The latter would have to anticipate all possible linkages between the hardware and operating systems of different manufacturers (Interview 2;1993).

The need for greater compatibility between products from various manufacturers has thus become more and more apparent. Second, the tighter financial constraints and the need to obtain value for money (see below) has further emphasized the benefits of standardization; non-proprietary products would not only reduce the risk of investing in incompatible products, but would also bring down the total expenditures on computer purchases, as standardized products involve lower development and production costs.

Convinced about the benefits of standardization, large consumers, such as business and governments, have been translating their support for non-proprietary standards into their procurement requirements. The European Community, for example, has adopted a decision stating that the M/S governments should base their public procurement orders for IT on international and/or European "open" IT standards (see Chapter 3). This has had a major impact on the European-owned IT companies, as public procurement, mostly confined to European sources, has been accounting for approximately 20 per cent of all IT spending in the EC, thus constituting a significant source of their demand[23].

Producer Advantages. In addition, computer producers have been interested in standardization as adherence to non-proprietary standards might yield advantages that counterbalance the disadvantages faced by the computer producers[24]. The most apparent motive for participating in standardization is that standardization secures a market share for companies that would otherwise have limited sales' prospects.

In an industry, where producers incur high and growing investments in R&D while these costs need to be recuperated in ever shorter time periods and under severe competitive pressures, securing a market share is of great importance as it creates an opportunity to recoup the costs of investment. As long as the larger manufacturers have a dominant share of the market, set the de facto industry standard, or have a large and growing market share for its proprietary products, the standardization effort will be hampered by difficulties; it is most advantageous for these producers to continue pursuing a strategy of differentiation rather than standardization, as such a strategy would maximize the manufacturer's earnings. IBM, for example, refused to joint the Open Systems Interconnection (OSI) movement prior to 1988.

When the market shares of the main, larger competitors are more or less equal, however, the manufacturers may opt for standardization as a strategy for regulating the market. According to a CENELEC official,

> Standards will not appear before the market shares of the larger companies are roughly equal. Standardization only works if all partners have something equivalent in house (Interview 25;1993).

For example, although the "open systems" movement dates back from the 1970s, it only gained momentum when the large computer manufacturers united behind the OSI standards out of fear that IBM's internal standard for networking and interconnection, the Systems Network Architecture (SNA), would become the de facto industry standard. In the context of SPAG (see Chapter 7), the original 12 IT Roundtable companies proposed European standards based on OSI standards and advocated that the M/S governments require conformance to OSI standards in public procurement (Sandholtz, 1992:202-203).

The standardization of hardware and operating software has contributed to the "commoditization" of microcomputers and, thus, towards the fall in profitability of the processing hardware producing companies. Yet, standardization is not only a cause of the producers' difficulties, but also a consequence. The increased competitive pressures, resulting in falling profitability, have made it even more imperative for the computer producing firms to cooperate in the area of standardization in order to counter the threat of one firm imposing the de facto standard and/or to ensure some return on their investments.

Demand

The impact of standardization on the competitive position of proprietary hardware suppliers would have been limited if consumers would have continued to be willing to pay premium prices for well-known brandnames. Initially, the producers of "clones", i.e. computers compatible with the dominant (IBM) proprietary standard, did not pose any substantial competitive threat; hampered by lack of brandname recognition, the clone producers could only secure a presence in the more mature and/or lower-end segments. Since the late 1980s, however, consumers increasingly have been selecting their hardware on the basis of price, giving preference to the functionally identical, lower priced clones. Currently, clones represent 60 per cent of the PC market (Schöndorff, 4 February 1993:18).

Certain consumer groups perceive the price differentials between the clones and the brandname products as justifying the risk of buying a less reliable computer. Others perceive the clones as yielding the same performance and reliability as the higher priced brandname products (Cane, 17 March 1992:VII; Cane and Kehoe, 20 July 1992:11; Economist, 30 November 1991:17-18). Consequently, consumer brand loyalty in the area of personal computers has proven to be relatively low. As Michel Jalabert, member of Cap Gemini Sogeti's presidium, explains:

> Computer users have all become extremely price conscious. They ask: "how much do I have to pay and what do I get in return" (quoted in Hudson, 26 November 1992:13-14).

The changes in the nature of demand have been aggravated by a reduction in the size of demand. In part, the declining demand for computers in the early 1990s has been caused by the world-wide recession, as it stalled investment decisions by European public and private consumers (Taylor, 23 March 1993:III; Ninean Eadle, President of ICL Europe, in Hudson, 26 November 1992:13,14). In part, the fall in demand has been caused by consumer resistance to buying new equipment while earlier investments have not yet yielded their benefits. Over the 1980s, European companies and governments have been investing large sums of money in computer hardware without due regard for their application. Consequently, the productivity improvements, which the investments were supposed to bring about, did not materialize at all or were disappointing. As author Peter Wil (quoted in Cane, 12 August 1992:16) notes: "What makes managers uneasy about IT is the lack of evidence that previous investments have generated business value".

The European-owned Computer Producers' Plight

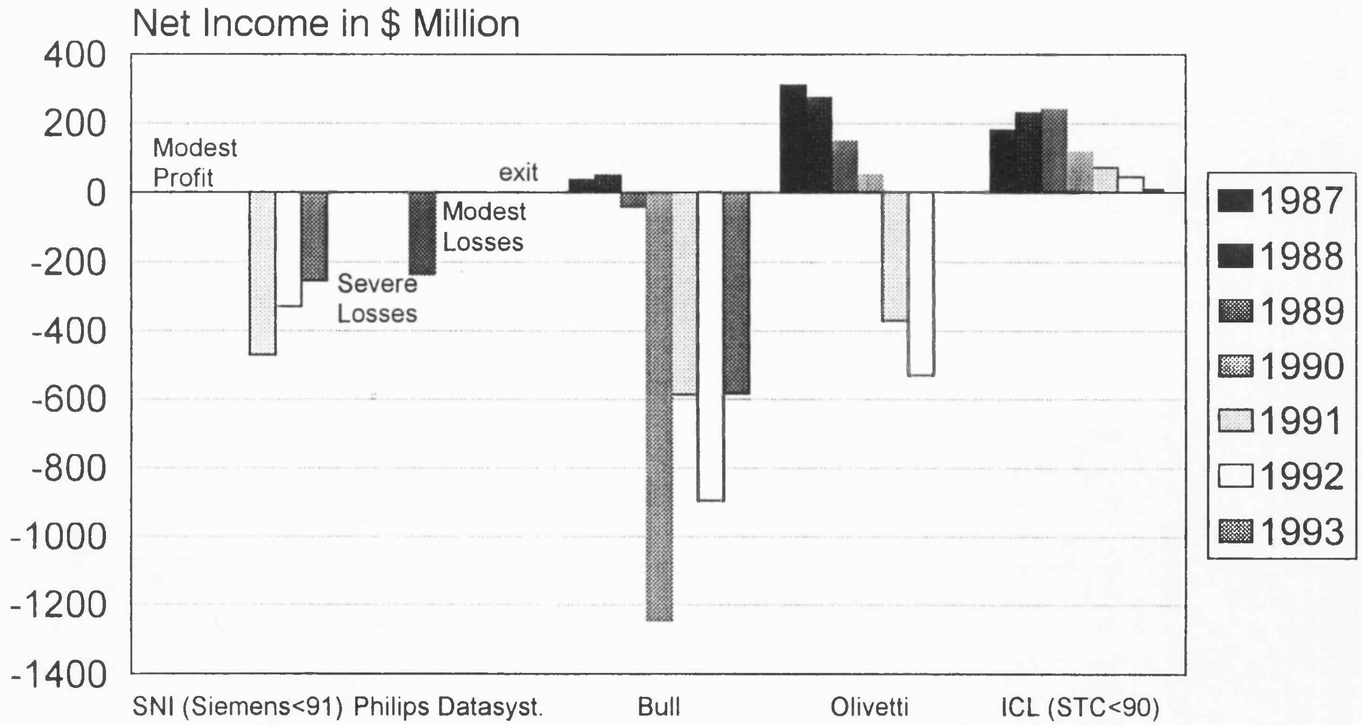
As a result of the above trends, most "traditional" computer producers, i.e. those computer producers displaying a bias towards the production of processing hardware and, even worse, a bias towards the larger processing hardware systems, were facing diminishing profits or rising losses by the late 1980s (Business Week, 23 November 1992:47; Economist, 27 February 1993:4).

The five European-grown computer producers were no exception; in the early 1990s, only ICL's computer operations were profitable (see Figure 5.15). With the exception of ICL, which had rapidly reduced the share of hardware in total dataprocessing over the late 1980s, all companies had been relatively biased towards the production of hardware. Siemens and Bull, moreover, concentrated on the manufacture of the larger processing hardware systems (see Figures 5.16 and 5.18). The implications of this development for the IT Roundtable companies' political influence will be discussed in Chapters 7 and 8.

The reduction in margins of the European-grown computer companies has been further aggravated by region and company-specific factors. Region-specific factors contributing to the fall in profitability, include: the fragmentation of the European market; the comparatively high borrowing rates; the relatively high labour costs; and the relatively high costs of the computer producers' inputs, following the lack of competitiveness of indigenous sources of semiconductors and the high tariffs imposed

Figure 5.15 Performance of the European-Owned Computer MNEs

1987-1993



Sources: SNI (Annual Reports; Parkes, 12 November 1992:28, 15 January 1993:15; Cane, 17 March 1992:VII, 11 March 1991:VIII); Philips (Annual Reports; Metze, 1991:81,300; Schoonbrood, 19 May 1990:33; NRC, 8 April 1992:17); Bull (Annual Reports); Olivetti (Annual Reports); ICL (Annual Reports) . Conversion into $: see Appendix 5.1. Olivetti Data 1993: N/A on imported chips (see also above). Company-specific factors include: adjustment difficulties associated with a merger or full integration of acquisitions, such as the difficulties experienced by Siemens and Nixdorf in their merger (see Appendix 1.1); and a lack of strategic insight and poor management. It has been argued, for instance, that Philips' Data Systems operations were thwarted by organizational problems, lack of supporting software activities, and poor marketing (Cane, 14 May 1992:26; Metze, 1991).

5.2.3 CORPORATE RESPONSES

The loss in profitability and the need to adjust to the changing market conditions have prompted computer multinationals to implement radical restructuring programmes and alter their strategies. Although the responses of the computer companies have been geared towards their specific problems, the following five elements are represented in most corporate restructuring programmes and strategies: (1) reorganization of operations; (2) reduction of labour force; (3) return to core activities; (4) retargeting production from the larger to the smaller systems and diversification into computer software and services; and (5) accelerated internationalization of operations, including the conclusion of mergers, acquisitions and alliances[25]. These actions warrant a further discussion, as they have affected the political influence of the European-owned IT companies and their interest groups (see Chapters 7 to 9).

Reorganizations

One element that the restructuring programmes have in common is the reorganization of corporate operations. In some cases, reorganizations target the corporate managerial and financial organization, focusing on speeding up decision-making, improving interaction, and introducing decentralized profit and loss responsibilities. Philips, for example, has decentralized its managerial responsibilities to lower management levels and altered its financial reporting and accounting system accordingly, thus facilitating the calculation of divisional return on equity. Philips has also introduced "portfolio management" under which activities will be axed if they are not as profitable as their rivals' activities. Siemens has altered its corporate organization following the merger of Siemens' Data and Information Systems Group with Nixdorf and created individual profit centres within SNI. Olivetti has reorganized its group into four operating units, separating core from non-core activities. The resulting organization better reflects Olivetti's emphasis on the government and information systems markets. Bull has reorganized its subsidiaries in order to improve the integration of Zenith Data Systems (ZDS), and has been adopting a new organizational approach based on products rather than regions and on decentralized operational responsibilities. Finally, ICL has been in the process of establishing semi-autonomous businesses within its main business streams.

In other cases, the reorganization has entailed a geographical relocation and/or concentration of operations. Bull, for example, has been concentrating its 13 production and logistics sites into five locations in the context of its Transformation Programme. This type of reorganization opens up possibilities for exploitation of economies of scale at the plantlevel and may stimulate technical integration.

Reduction of Labour Force

The most politically sensitive element that the restructuring programmes of the conventional computer manufacturers have in common is the reduction in direct employment. Excluding indirect job cuts, Philips reduced employment in its 17000-

strong computer division by 50 per cent in the context of Philip's Operation Centurion. Over the period 1991-1993, SNI reduced its workforce by 16.1 per cent (8300 people), Bull by more than 20 per cent[26], and ICL by 10.5 per cent (2800 people). Over 1990-1992, Olivetti reduced its workforce by 24.7 per cent (13278 job losses). Amongst those affected by job losses have been the direct sales representatives; as margins narrowed, direct sales forces have proven to be economically unviable. Rather, computer firms have sought to sell their computers through alternative channels, such as computer super stores, mail-order agencies and retail chains (Cane and Kehoe, 8 November 1991:21). In some cases, whole divisions have been targeted; in order to sell its microcomputer division, for example, Philips had no choice but to cut the excess "fat" in order to make the division more marketable.

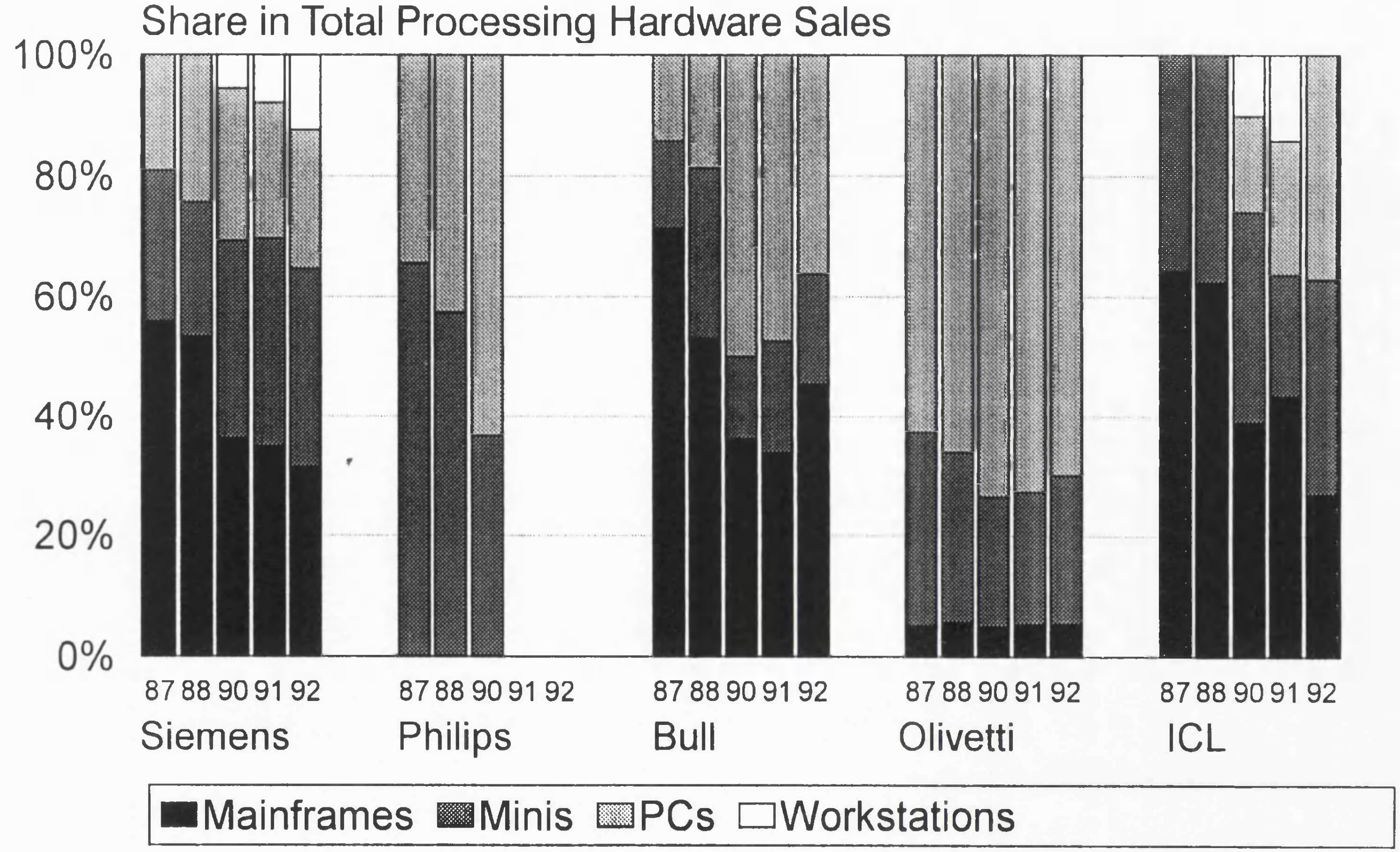
Return to Core Activities

The computer producers have also sought to concentrate on core segments and to hive off the computer activities if they were considered to be non-core operations. Philips, for example, sold its microcomputer operations to Digital Equipment in an attempt to streamline its operations. In 1993, Philips also withdrew from the production of PCs after cuts in operations and changes in the sales strategy adopted[27] failed to bring about substantial improvements in the PC operations' profitability.

Shift towards Smaller Systems and Diversification into Software and Services

Companies, which retained their dataprocessing activities, have sought to shift their operations to segments with greater growth and profitability prospects. Within the processing hardware production, this strategy has resulted in a shift of operations from the larger processing hardware systems to the smaller systems. As Figure 5.16 shows, Siemens, Bull and ICL substantially reduced their presence in mainframes and

Figure 5.16 European-Grown Computer MNEs: Shift from Larger to Smaller Systems, 1987-1992



Source: Appendix 5.11

increased their presence in PCs through both internal growth as well as acquisitions, such as Bull's acquisition of the American PC manufacturer Zenith (ZDS) and ICL's take-over of the Finish micro and mid-range computer producer Nokia Data. Olivetti had already a relatively large presence in microcomputers.

Figure 5.16, however, also shows that Siemens' presence in the mid-range segment increased substantially around 1990. This increase was caused by its acquisition of the German minicomputer producer Nixdorf. The merger provided Siemens with a number of complementary assets: access to Nixdorf's international marketing network, its contacts with small to medium-sized companies, and its technology on UNIX, mid-range, and specialized systems. Yet the criticism that the merger represented "German pressure for a German solution to Nixdorf's problems rather than commercial logic" (Cane, 11 March 1991:VIII) is not totally unfounded if one takes into consideration that the overall trend in the industry had been a move *away* from mainframe and midrange computer production towards the manufacture of smaller systems.

The reduction in profitability of processing hardware, combined with similar trends in the production of peripherals, has prompted the companies to diversify into other IT products, notably software and services (Cane, 11 March 1991:VIII; Sonsino, 23 March 1993:II; Datamation, 15 June 1992:22; 15 June 1990:190; 15 June 1989:158; 15 June 1988:165).

Software, by itself, does not yield profit margins that are consistently higher than those in hardware, according to a study of McKinsey (quoted in the Economist, 2 November 1991:93-94; also 7 November 1992:103). This applies even more so to the production of the relatively low cost, low margin, "packaged" software, which has been accounting for an increasing share in total software production. The share of packaged software increased from 57 per cent in 1987 to 59 per cent in 1991 in the

American market; from 13 per cent in 1987 to 19 per cent in 1992 in the Japanese market; and from 58 per cent in 1987 to 68 per cent in 1992 in the European market (see Brady and Quintas, 1991:118-119).

A producer of hardware, however, can increase its profit margins if it moves higher up the value-added chain through adding customized software and services to its hardware products. The associated services may range from maintenance to consultancy on the selection of hardware and software, training, applications development and systems integration. Provision of customized software and services not only yields high profit margins, it has the additional advantage of influencing consumer satisfaction. Customized software and services may improve the efficacy of the hardware provided, and thus raise the user's return on its hardware investments. Through the provision of software and services which assure the client's satisfaction with the products supplied, the hardware producer can "tie" consumers to its hardware (Cane, 12 August 1992:16; Economist, 2 November 1991:93-94; Kehoe, 23 April 1991:II).

The growing importance attached by consumers to software and services has been reflected in a corresponding rise in demand over the 1980s and early 1990s. The size of the American and European markets for both packaged software as well as customized software and consulting doubled over the period 1987-1992, while the size of the Japanese market nearly quintupled over the years 1987 to 1991 (Brady and Quintas, 1991:118-119). According to Sema Consulting, the European software and services market has been growing at an average annual growth rate of 24 per cent in the late 1980s and early 1990s in comparison to a 10 per cent growth of the hardware market (quoted in Cane, 17 March 1992:VIII).

The higher profit margins in services and software has resulted in a shift from hardware to the more down-stream, customer-oriented IT segments. As is shown in

Figure 5.17, the share of hardware in the world IT market declined over the period 1987-1992, while the shares of software and services increased - a trend also visible in the European market (IDC in Herald Tribune, 14 March 1991:7 and Financial Times, 3 December 1990:VI).

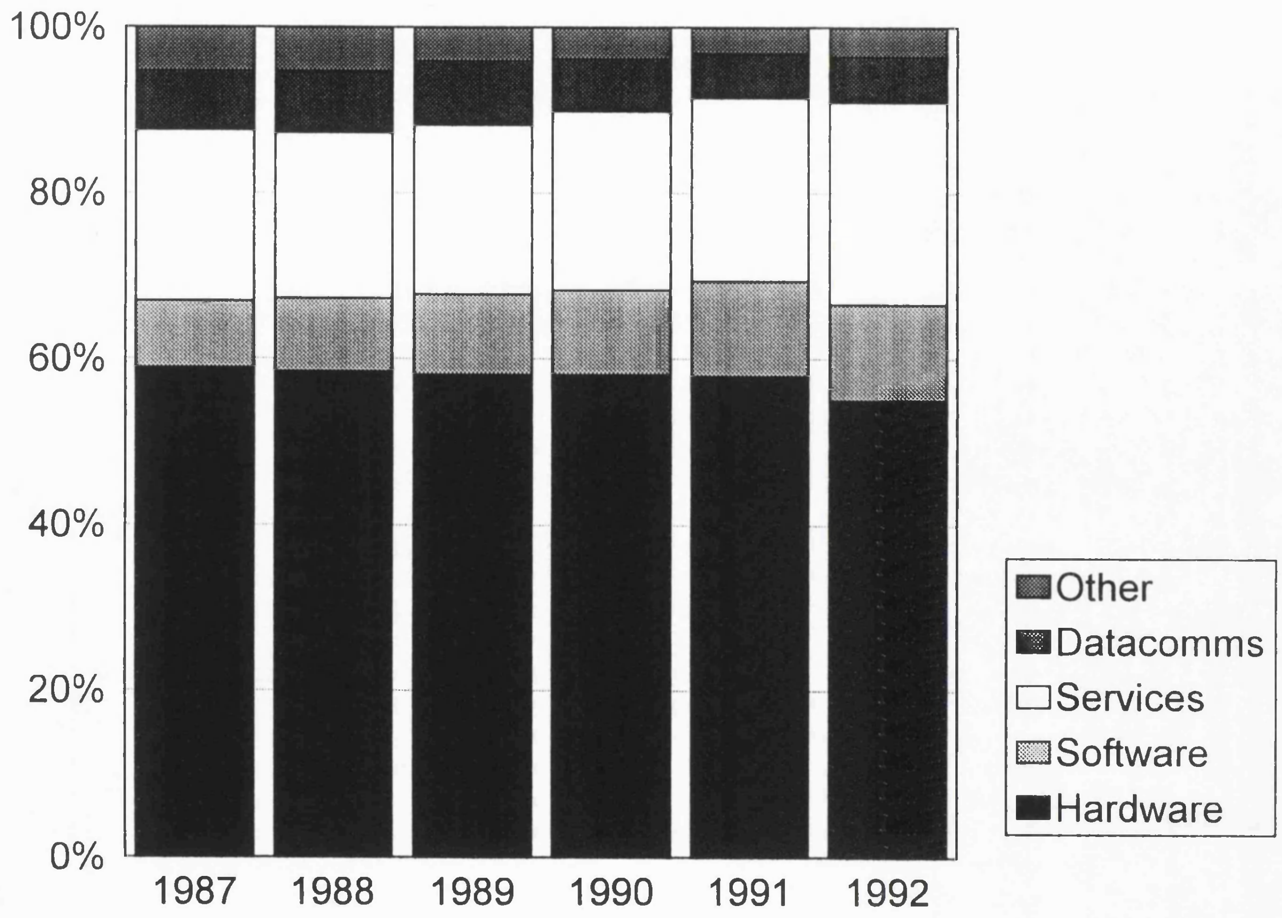
This blurring of boundaries between the IT industry's segments has prompted Renato Riverso, President Director General of IBM Europe, to argue that a definition of a computer company should go beyond the limits of hardware, software and services:

> It requires all of these things - and more. It means a company that provides its customers with a complete solution to their business needs[28].

This transformation from a traditional hardware to a "solutions" producer is visible amongst all large system hardware producers, whether American, Japanese or European. Figure 5.18 summarizes the supply characteristics of Siemens, Philips, Bull, Olivetti and ICL. In 1987, only Siemens earned more than 50 per cent of its dataprocessing revenues from non-hardware operations - a situation which changed in 1990 when it merged with Nixdorf. By 1992, all European-grown computer multinationals, with the exception of SNI, had reduced the share of hardware in their total dataprocessing revenues to less than 50 per cent.

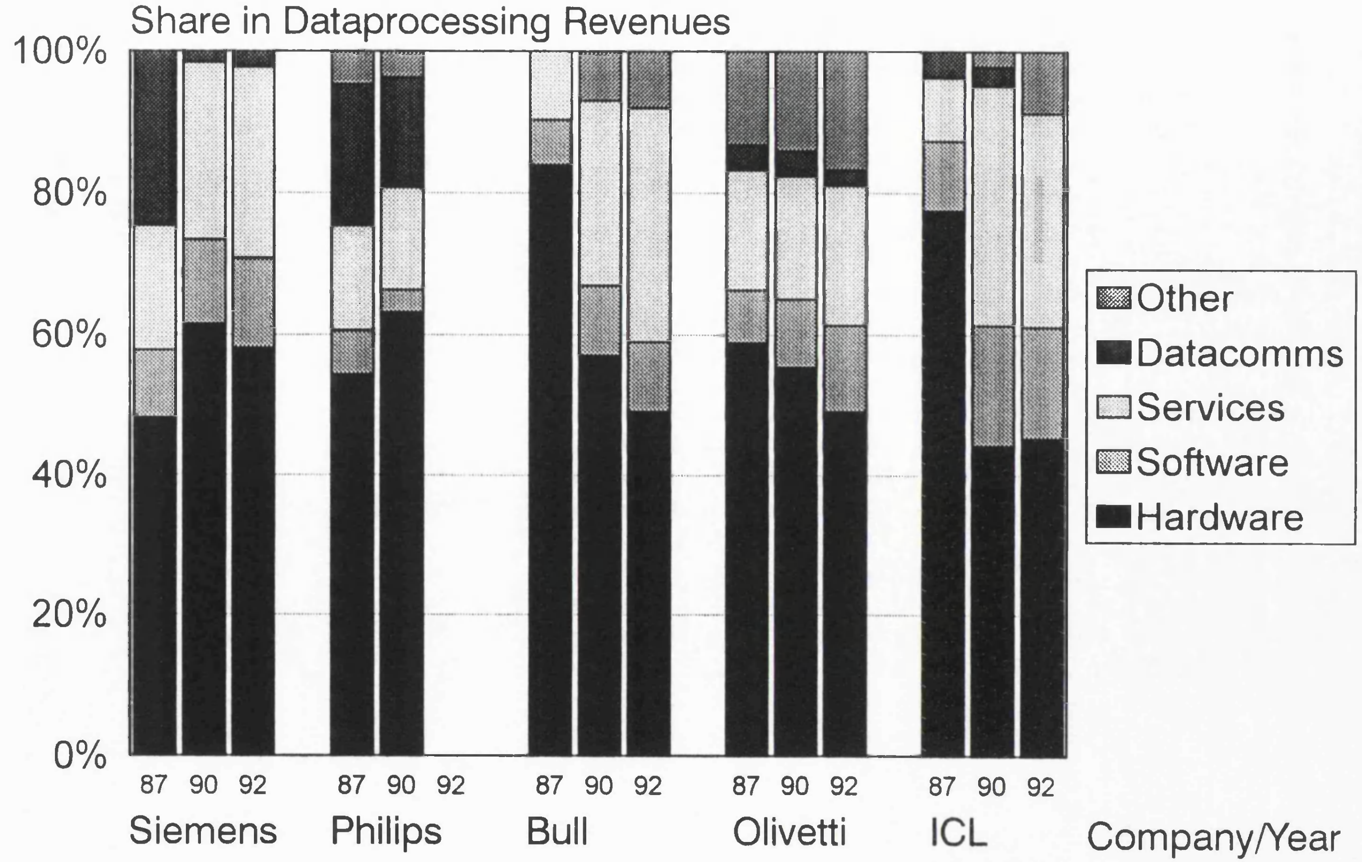
The blurring of boundaries between the various IT segments, however, has brought previously co-existing firms in competition with each other. Computer producers that have shifted their orientations face the competition of not only other computer firms but also software houses (such as Cap Gemini Sogeti of France), large accounting firms (for example, Andersen Consulting), and value-added resellers (Cane, 17 March 1992:VIII; 23 April 1991:I).

Figure 5.17 World Computer Market by Segment, 1987-1992



Source: Appendix 5.12

Figure 5.18 European-Grown Computer MNEs: Shift from Hardware to Software and Services, 1987-1992



Source: Appendix 5.1; Philips Data 1992: N/A

Internationalization, Mergers and Acquisitions, and Alliances

Although microcomputers, as has been described above, can be assembled without substantial investments in technology, companies that seek to stay at the cutting edge of rapidly changing technology, whether as producers of proprietary systems or as manufacturers of clones, have to continue investing in R&D (Taylor, 17 March 1992:III; Francis Lorentz in Bull Annual Report 1991). At the same time, the escalating R&D costs have been increasingly difficult to recuperate. Although microcomputers form the largest growth segment in the processing hardware industry, their production yields at the same time relatively low profit margins, due to increased competition. Even if the producers would be able to sell the large number of microcomputers necessary to recover the R&D costs, they still would have to sell a large number more in order to accumulate the funds needed for future development. As Cane (12 August 1992:16) notes:

> Manufacturers [..] are being forced to accept narrower gross profit margins to the point where there is concern that the resources will not be available to support existing products or develop new ones.

This situation has been aggravated by the fact that the product life cycles of microcomputers have been shortened with the rapid change in technology. This implies that producers have only a limited period of time to obtain the revenues necessary to recover their initial costs. In such an industry, first-mover advantages play an important role (see above).

The need to reduce the surging costs of R&D, improve on the innovation time-span to get first to the market, secure market access and establish a market presence have prompted computer companies of all nationalities to accelerate the internationalization of their operations, and to conclude, as part of that process, cross-border mergers, acquisitions and alliances.

As in the semiconductor industry, computer manufacturers have been adopting internationalization strategies to exploit low production costs and/or to secure market access and presence. According to John Gardner, managing Director of ICL UK, computer manufacturers have been locating their production sites on the basis of market requirements rather than merely cost considerations (Cane, 1 March 1993:7). In particular, this appears to have been the case for the Japanese and American firms investing into the European Community. Although manufacturers located in Europe face the disadvantages of relatively high labour costs, inflexible labour practices and high tariffs on imported computer components (see above), a location close to the market also offers a number of advantages to computer manufacturers over the low cost South East Asian sites. A European location, often made more alluring by the M/S governments through investment incentive schemes, reduces transportation and distribution costs; these are considerably higher in the computer industry than in the semiconductor industry. It also improves the interaction of manufacturers with their European customers. In addition, it allows foreign companies to jump trade barriers and develop a European identity.

American firms have traditionally been well-established in the Community through both R&D and complete manufacturing facilities. In contrast, Japanese firms have confined themselves mostly to investments in original equipment manufacturing arrangements (EC Panorama 1991:12-31; 1993:10-18). The European-grown computer producers, meanwhile, have invested in South East Asia, with the objective of reducing costs, and in North America, in order to improve their market penetration. Despite the acceleration taking place in internationalization, however, the European computer producers continue to be far more "Europeanized" than internationalized; in 1992, for example, about 72 per cent of ICL's net assets remained located in Europe, and about 73 per cent of Bull's assets (Annual Reports ICL and Bull, 1992). In contrast, less than half of the total assets of US computer producers was located in their domestic market;

in 1986, 29 per cent of the total assets of American computer companies was located in Europe, 29 per cent in third countries, and only 42 per cent in the US (Gomes-Casseres, 1993:93).

As part of the process of internationalization, the number of alliances involving computer firms has increased substantially over the late 1980s (Gomes-Casseres, 1993:108). The main motives for such alliances have been outlined in Figure 5.19. The European-grown computer producers have not been an exception; Olivetti, Siemens, Bull, Philips and ICL have engaged in M&A and alliances in order to improve their competitive position vis-à-vis rivals in the world market and, more importantly, in the European market. ICL, for example, stresses that:

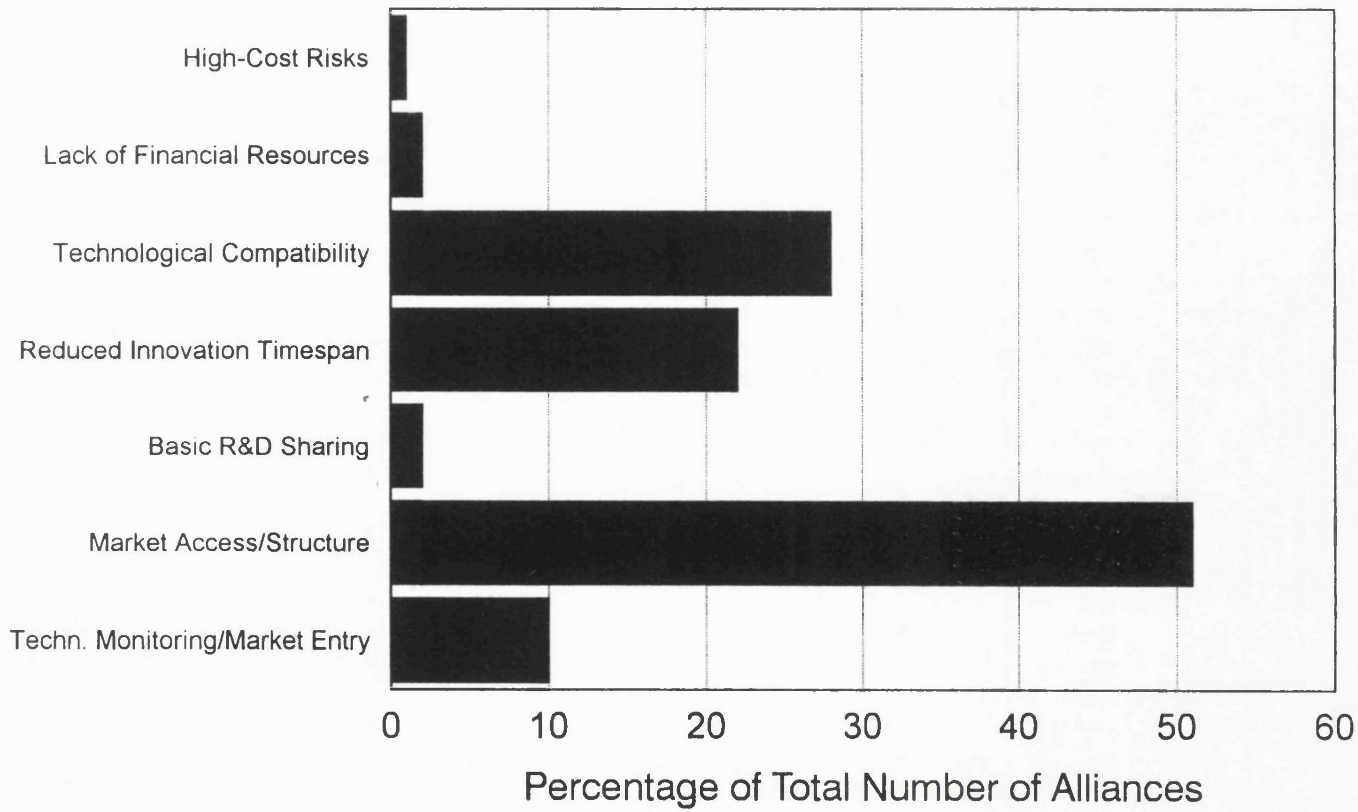
> Europe is ICL's domestic market. ICL plans to be the leading supplier in its chosen markets in Europe in the 1990s. Corporate objectives are to increase turnover and market share with prime focus on Europe, through a policy of acquisitions, mergers, joint ventures and partnerships which fit the business strategy (ICL Annual Report, 1991:14).

ICL's acquisition of Nokia Data, the ninth largest supplier to the European market, proved to be a strategic move in that respect; it increased ICL's presence in continental Europe by 300 per cent.

It is not surprising that the European-grown producers focus on maintaining and improving their position in the *European* market for the following reasons (ICL Annual Report 1991; Olivetti in Electronics, 22 March 1993:11). First, the European-grown computer producers have been heavily dependent on the European market, deriving over 70 per cent of their dataprocessing revenues from European sales (see Figure 5.20). It is estimated that approximately one third to a half of these revenues have been made in the companies' respective national markets[29]. (An exception is Philips which originates from a relatively small market, namely the Netherlands.) Erosion of the computer producers' positions in their core market would have serious negative consequences for their long-term financial position.

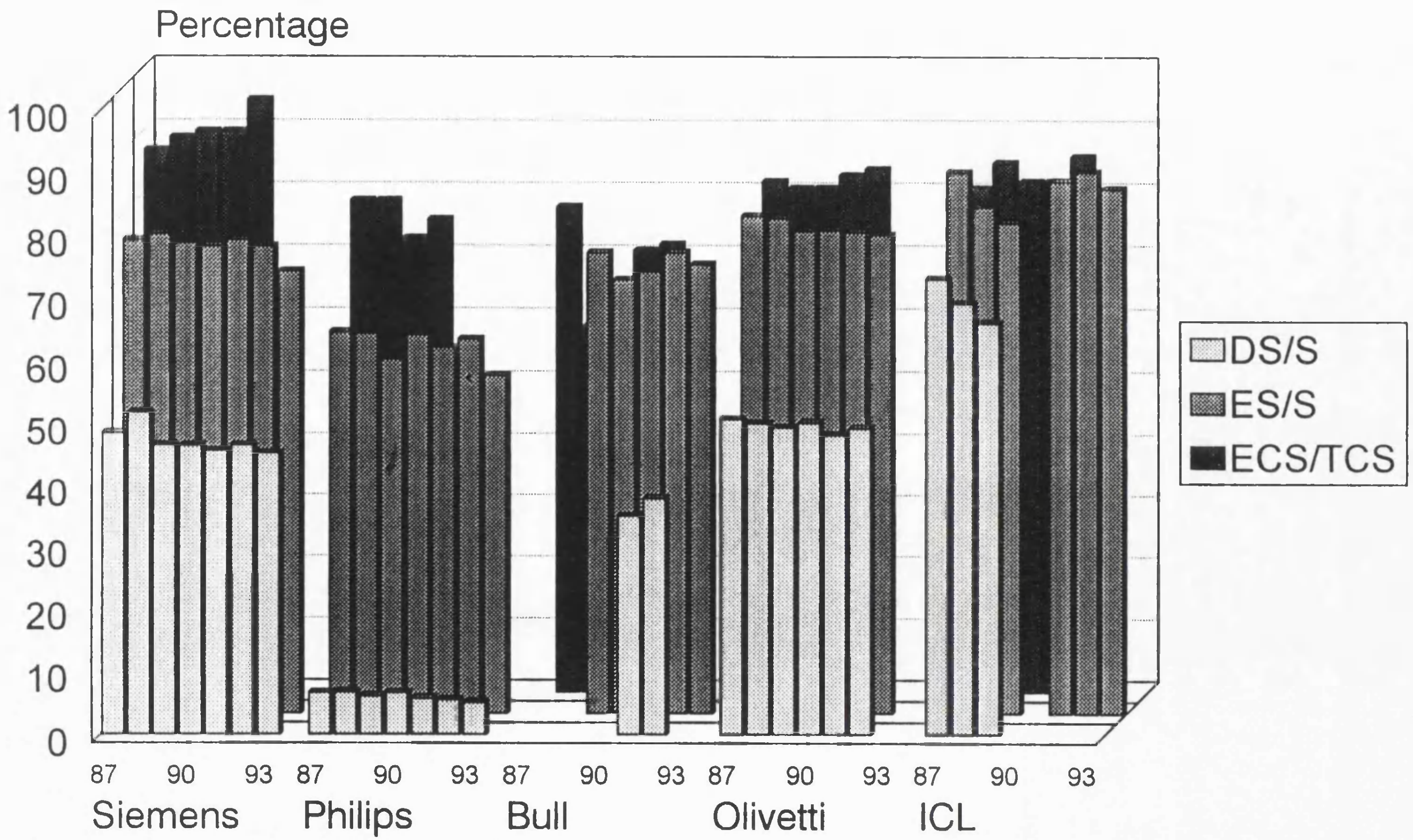
Figure 5.19 Main Motives for Alliances in the Computer Industry

1980-1989: 198 Alliances



Source: Hagedoorn and Schakenraad in The Economist, 27 March 1993

Figure 5.20 European-Grown Computer MNEs: Dependency on the European Market, 1987-1993



Source: Appendix 5.13 DS=Domestic Sales, ES = European Sales, S = Sales, ECS = European Computer Sales, TCS = Total Computer Sales DS/S Data Bull 93, Olivetti 93, ICL 90-93: N/A; ES/S Data Olivetti 93: N/A; ECS/TCS Data Philips 91-93 and Siemens, Olivetti, Bull, ICL 92-93: N/A

Second, international business theory would argue that the computer companies have, at least in principle, a competitive advantage over foreign computer producers in the European market. In contrast to the foreign companies, they would not have to overcome the costs of being "foreign" to the European market; they are aware of the consumers' demands, the local customs and regulations, et cetera. If the companies want to expand their sales, they are most likely to succeed in the European market. Moreover, discriminatory government procurement, constituting a large part of the demand for computers, would provide an additional advantage to the European-owned producers.

Third, a strong position in a unified European market would give the European-grown computer producers the power-base from which to compete and expand internationally. The American and Japanese experience has shown that firms, that can enjoy the economies of scale associated with a large, unfragmented home market, have a competitive advantage (IT Roundtable, November 1992).

Fourth, in the case of ICL, concentration on the European market may follow from coordination between ICL and Fujitsu to limit direct competition between ICL's and Fujitsu's range of products.

Many of the M&A and alliances, involving a European-grown computer multinational, have been on an intra-European basis, as ICL's 1991 acquisition of Nokia Data and Siemens' merger with Nixdorf in 1990 illustrate. During the 1980s, collaboration between the European-grown computer producers increased, both in the context of European cooperative R&D programmes, such as ESPRIT and EUREKA (see Chapter 3), as well as on a private basis (Hagedoorn and Schakenraad (1993:387)[30]. These inter-firm alliances often involve technology and R&D cost sharing agreements. Examples include the European Computer Research Centre (ECRC) for research on fifth generation computing techniques, which is jointly owned by Siemens, Bull and ICL, and collaborative research between SNI, Olivetti and Bull on software methodologies.

However, the five companies have by no means confined themselves to "European" solutions. For example, STC decided to sell a majority stake of ICL to Fujitsu in 1990, after a series of merger negotiations with other European-owned firms failed (Cane, 23 April 1991:III, 25 July 1990; Financial Times, 27 July 1990). Similarly, Bull sold part of its shares to the foreign producers NEC (J) and IBM (US) in 1991-2, after unsuccessful attempts of the French government to come to a "European" solution for Bull's problems, i.e. a mega-merger between Olivetti, Siemens and Bull (Cane, 23 April 1991:III). Moreover, in June 1992, Olivetti sold 10 per cent of its shares to Digital Equipment (US) (Cane, 1 July 1992:28). A year before, Philips and Mannesmann had sold their minicomputer operations to Digital Equipment. According to EC Panorama (1991:12-33), most major M&A, involving a European firm, were international (i.e. European-American) rather than European in nature.

Similarly, the European-grown companies have concluded alliances with non-European firms, such as SNI's extended cooperation with Fujitsu (J) on the supply of mainframe computers and semiconductor manufacturing technology, Bull's agreement with Packard Bell (US) on the development and manufacture of PCs, and Olivetti's alliance with Pyramid Technologies (US) on super minicomputers (Nakamoto, 18 June 1993:23 and 27 March 1992:21; Ridding, 24-25 July 1993:12). In these inter-continental alliances, the European firms have generally sought access to technology and products, while offering market access in return (Gomes-Casseres, 1993:82).

5.3 CONCLUSION

This chapter has focused on the industries in which the European-owned IT multinationals operate; it has discussed the changes in the position, performance and strategies of the European-owned IT companies in the world semiconductor and computer markets.

Despite the existence of government programmes in support of the industry, the European-owned IT producers have always been small actors in the world semiconductor and computer industries. Even in the European market, the majority of demand has not been met by the European-owned IT producers but by foreign firms exporting to or producing in the Community. Moreover, at the end of the 1980s and in the early 1990s, the performance of most European-owned IT producers was weak; the companies barely broke even or made losses on their semiconductor and computer operations.

In the semiconductor industry, the relatively weak corporate performances were caused to a large extent by the European producers' late entry into the more sophisticated IC segments. IC production has been characterized by high initial investments in R&D and capital which have had to be recuperated within a short period of time due to the fact that rapid technological change has led to shortening product life cycles. Recuperation in a short period of time, however, has become increasingly difficult as substantial price-based competition has turned semiconductors into commodities, available in ample supply and at low prices. This has put a downwards pressure on the revenues of the IC producers.

Under these market conditions, first-mover advantages play an important role, as first-movers enjoy cost, pricing and strategic advantages through their lead on the learning curve, their exploitation of economies of scale, and their use of premium pricing. First-movers may even set the industry standard, as has been seen in the case of microprocessors where Intel has established a near-monopoly position.

The European producers, however, have been entering these markets relatively late. In the case of memory production, this has implied that they were disadvantaged in terms of cost, learning and pricing, which has made it very difficult for them to recuperate the high initial costs of investment. In the case of microprocessor production, the entry barriers to the industry in the form of proprietary industry standards, have practically prohibited their entry. The resulting poor performance of the European-owned semiconductor producers has been further aggravated by firm and region-specific factors. In terms of regional factors, it is important to stress the relatively high labour and capital costs in Europe, the fragmentation of the European market, and the weakening of the competitive position of the European consumer electronics industry, the semiconductor producers' largest client.

In the computer industry, the relatively poor corporate performances were mainly a consequence of a transformation taking place in the industry as a whole, although regional and firm-specific factors played a role as well. First, rapid technological change has resulted in the development of increasingly smaller, cheaper and more powerful computers. The greater increase in speed of the smaller systems, combined with their faster decline in price and size, however, has undermined the market for the larger systems to the point where there has been a shift in relative importance in the world's markets from mainframes and minis to PCs and workstations. As smaller computer systems can be produced at little cost, the entry barriers to the computer industry have come down. The subsequent increase in competition has turned PCs and workstations into commodities; they have become both widely available as well as relatively cheap. Albeit a favourable development for consumers, the continuously downwards pressure on the prices has lowered the profit margin of the computer suppliers.

The trend towards the "commoditization" of the smaller systems has been accelerated and exacerbated by the increasing standardization in both hardware and software. The move away from proprietary systems, under pressure of the larger consumers and computer suppliers that saw standardized "open systems" as their chance to undermine IBM's market dominance, has increased the competition in the industry and reduced the producers' profit margins even further.

At the same time, customer demand has become less buoyant and more price-sensitive. The decline in demand under pressure of the world-wide recession, aggravated by factors such as the resistance of consumers to new investments and their inability to absorb ever changing technologies, has prompted manufacturers, competing on the basis of price rather than quality, to cut prices. The price differentials between brandname computers and no-name ones have become so great that certain computer consumer categories have found it justifiable to opt for a cheaper machine, even if the latter's quality could not be guaranteed. Others have been perceiving the no-name machines as yielding the same performance and reliability as the higher-priced brandname products.

The deterioration in the business performances of the European-owned IT producers, resulting from these changes, has forced a response on the side of both European-owned semiconductor and computer suppliers. First, the IT companies have resorted to major reorganization programmes, which have generally been aimed at reducing costs and improving efficiency. Second, as part of the cost-cutting exercise, the companies have reduced their workforce substantially. Third, some of the companies have hived off non-core operations and returned to their core activities. Fourth, the companies have retargeted or diversified their operations into higher growth and/or higher value-added IT products. Finally, the companies have sought to reduce their costs and increase their access to markets and technology through an acceleration of the internationalization of their operations as illustrated by the increase in M&A and alliances concluded.

On the basis of this analysis of the changing economics of the IT industry, one could reiterate the main sets of short-term and structural factors that have affected the political influence of the European-owned IT producers, as will be illustrated in Chapters 7 to 9:

1. One set is formed by the European industry's past and present position as a small actor in the relatively internationalized world IT industry.
2. A second set of factors includes the IT companies' reduced profit margins of the late 1980s and early 1990s, caused by the increasingly globalized and intensified nature of competition in the IT industry.
3. A third set of factors is formed by the responses of the European-owned IT companies to the falling profit margins, including: lay-offs, an acceleration in internationalization of corporate operations, a consolidation of operations through M&As, the conclusion of intra and extra-European alliances, and a refocussing and retargeting of operations. The latter include a shift from mainstream memory chips to ASICs, from larger processing hardware systems to smaller systems, and from hardware to software and services - all indicative for the increasing emphasis on the application and use of IT over the production of IT.

5.4 NOTES

1. For more information about the origins and history of the semiconductor industry, see Braun/MacDonald (1978), Dosi (1983), Malerba (1985), Langlois (1988).

2. Only in the United Kingdom, military demand for semiconductors outstripped the demand of the consumer electronics industry (Malerba, 1985:75).

3. Actual tariffs on ICs fell from 12 per cent in 1977 to 4.2 per cent in 1984. Since 1986, when a bilateral agreement between the US and Japan came into force, Japan's applied import tariff on semiconductors has been zero. Over the early 1970s, Japan also started reducing its barriers to foreign direct investment. Formal restrictions to FDI were phased out by 1978. Structural barriers, however, are still in place (Tyson

and Yoffie, 1993:37; Kostecki, 1989:23; Flamm, 1987:255, Annex D-4 and D-5; Malerba, 1985:207).

4. In 1989, the European producers supplied $ 5443 mn in semiconductors, of which approx. 65 per cent was sold in the European market (see App. 5.3 and 5.4).

5. Estimate based on import penetration alone (see Appendix 5.3).

6. Sources: De Benedetti, 23 September 1993; EECA, European Electronics Components Industry Report 1992:2,20; Kehoe, 25 August 1992:13; Nakamoto, 16 November 1992.

7. Sources: Articles from the Financial Times, Economist, NRC, and the annual reports of Siemens, Thomson-CSF and Philips.

8. According to Mr. Byron Harding of Dataquest, Philips' SRAM sales totalled $ 3 mn in 1989. This compares with Philips' total component sales of approximately $ 4 bn (Electronics, December 1990:32I; Dataquest in Skapinker and van de Krol, 5 September 1990; Stopford, 1992).

9. In 1991, Siemens' total semiconductor sales totalled DM 2.0 bn, of which DM 55 mn came from the sales of 1M DRAMs (Siemens Annual Report 1991:25).

10. See Chapter 4.

11. For more information about the origins and history of the computer industry, see Flamm (1988) and Trainor and Krasnewich (1992).

12. See Flamm (1988:135-171) for a detailed argument as to why the European computer industry, and notably the British industry, remained behind the US industry in technological development and competitiveness over the 1950s and 1960s.

13. In 1968, the EC MFN tariff for automatic dataprocessing equipment was set at 8.2 per cent. This compares with a Japanese tariff rate on central processing units of 15 per cent (Official Journal, L172, 22 July 1968).

14. That is, Burroughs, Univac/Sperry, NCR, Control Data and Honeywell.

15. In 1972, Japan removed its quotas on imports of peripherals, followed in 1975 by the removal of quotas on imports of central processing units and computer parts. Tariff rates on computer hardware were reduced as well. Over the period 1972-1984, for example, actual tariffs on central processing units fell from 13.5 per cent to 4.9 per cent in 1984, while tariffs on peripherals were reduced from 15 per cent to 6 per cent. Finally, over the years 1974 and 1975, the government liberalized inward investments in computers (Flamm, 1987:Annex D-4 and D-5; Kostecki, 1989:22).

16. See Appendix 5.14.

17. In 1991, 66.6 per cent of the European computer market, as proxied by the cumulative dataprocessing revenues of the largest 20 suppliers to the European market, was supplied by American firms, 5.5 per cent by Japanese firms, and 27.9 per cent by European firms (see Appendix 5.9). In the same year, 40.9 per cent of Europe's dataprocessing imports originated in the US, 24.2 per cent in Japan, 18.7 per cent in

Taiwan and Singapore and 16.2 per cent in the rest of the world (EC Panorama 1993:10-16).

18. Over the period 1987-1992, IBM's sales accounted for an average of 22.8 per cent of the cumulative dataprocessing revenues of the largest 100 computer firms (see Appendix 5.9).

19. Bill Gates, President of Microsoft, formulated this expectation in a television interview (Channel 4, UK) in October 1992. Similarly, the Economist (22 December 1990:94) outlined that "received wisdom says that [..] further concentration of the industry is inevitable".

20. Advances in the architecture of the computer, i.e. the way in which the hardware is designed and is connected with software, have improved the organization of the computer's memory and processor and, thus, the computer's performance.

21. Technological progress in computer components, and notably in semiconductors, has decreased the size of the computer and improved the performance/cost ratio of hardware.

22. References: Banks, 23 April 1991:IX; Cane, 23 April 1991:I, 12 August 1992:16, 9 March 1993:11; EITO, 1993:44; IBM Advertisement in the Financial Times, 16 March:7; Schoonbrood, 19 May 1990:33; Sonsino, 23 March 1993:II.

23. Sources: Black, 22 October 1991:VI; Cane, 22 October 1991:VI; De Jonquières, 13 November 1989; Rosario and Schmidt, 1991:190; Taylor, 17 March 1992:III.

24. Sources: CEN, CENELEC, ECMA, EWOS, Interviews 2,22,25,35,38 (1993). See also van Walsum-Stachowicz (1994).

25. Sources: Articles from the Financial Times, Electronics, Economist, NRC, Business Week; EITO (1993); and the annual reports of Siemens, Philips, ICL, Olivetti, and Bull.

26. Bull's labour force fell by 20.9 per cent (9301 people) over 1991-1992.

27. Philips decided to sell its PCs as part of an overall systems package and/or under other companies' brandnames rather than on a stand-alone basis.

28. Quoted in 1999 Now: A European Review, published quarterly by IBM Europe, Autumn 1991: 3.

29. In the case of Bull, Olivetti and ICL, dataprocessing revenues account for all or the majority of their total revenues. This implies that if approximately a third of their total revenues are derived from the domestic market, one can safely assume that a similar percentage of the dataprocessing revenues are derived from the domestic market. This argument does not apply to Philips and Siemens. However, it is well-known that (a) the Netherlands only accounts for a small percentage of Philips' sales; (b) Germany accounts for a large percentage of Siemens' sales (See Appendix 5.15).

30. For more information on the cooperation of the European computer multinationals in both private and cost-sharing alliances, see, for example: Mytelka (1990), Hagedoorn and Schakenraad (1990,1993), and Gomes-Casseres (1993).

Chapter 6

IMPERATIVES FOR CHANGE:
THE CHANGING POLITICS OF THE EUROPEAN COMMUNITY

The political economy within which both policy-makers as well as companies operate has not only been transformed by economic dynamics (see Chapter 5), but also by political imperatives. This chapter focuses on the changes in the policy-supply arrangements, which govern what policies are supplied, how, on what terms, by which government, and at which level. In particular, this chapter seeks to analyze the changing policy-supply conditions in the European Community (see Chapter 1). The first section focuses on the impact of the transformation of the international system (see Chapter 2) on the Community as a policy supplier. The second section discusses the impact of the EC's deepening on its policy-supplying capabilities, while the third section focuses on the impact of the Community's enlargement (see Chapter 2).

6.1 TRANSFORMATION OF THE INTERNATIONAL SYSTEM: IMPACT ON THE EC AS A SUPPLIER OF POLICIES

For four decades after the second world war, the international system was characterized by polarization into two rival camps, contesting each other on the basis of their military capabilities: the United States and its allies on the one hand, and the USSR and its satellite states on the other. When the Warsaw Pact was abolished in 1991, this bipolar system fell formally apart. The stability in the international system provided by the balance of power between the United States and the USSR almost instantaneously dissipated and new security problems arose. Yet, at the same time, a window of opportunity was created for what James Baker, then US Secretary of State, dubbed: "a new architecture for a new era" (Economist, 8 December 1990).

The new world order, which has been developing, has been described as a multipolar system, i.e. a system with multiple power centres of variable strength. In this system, national or regional economic capabilities, as expressed in terms of market size, GDP, share in domestic and export markets and other indicators, have become increasingly important as determinants of power. This has prompted some authors to argue that geopolitics has been and will be yielding to geoeconomics - a strategy under which capital and market penetration replace the projection of military power (Stewart, 1993:123).

6.1.1 BIPOLAR INTERNATIONAL SYSTEM

In the bipolar international system where military capability and foreign and security policies had primacy over economic wealth and economic policies, the European Community, as a predominantly economic organization[1], was relatively unimportant. Politically, the EC was not even close to becoming a "third voice" bridging the Eastern and Western antipoles (Swann, 1992:2).

Far more important were the individual Member States, as each of them maintained a national military capability, developed national foreign and security policies, and cooperated in *inter-governmental* arrangements for information exchange, foreign and security policy coordination and formulation, such as the Western European Union (WEU), the North Atlantic Treaty Organization (NATO), and the (Davignon) Political Cooperation Procedure. In comparison to the USSR and the US, however, even Europe's largest military powers, i.e. Britain, France and Germany, were only small actors.

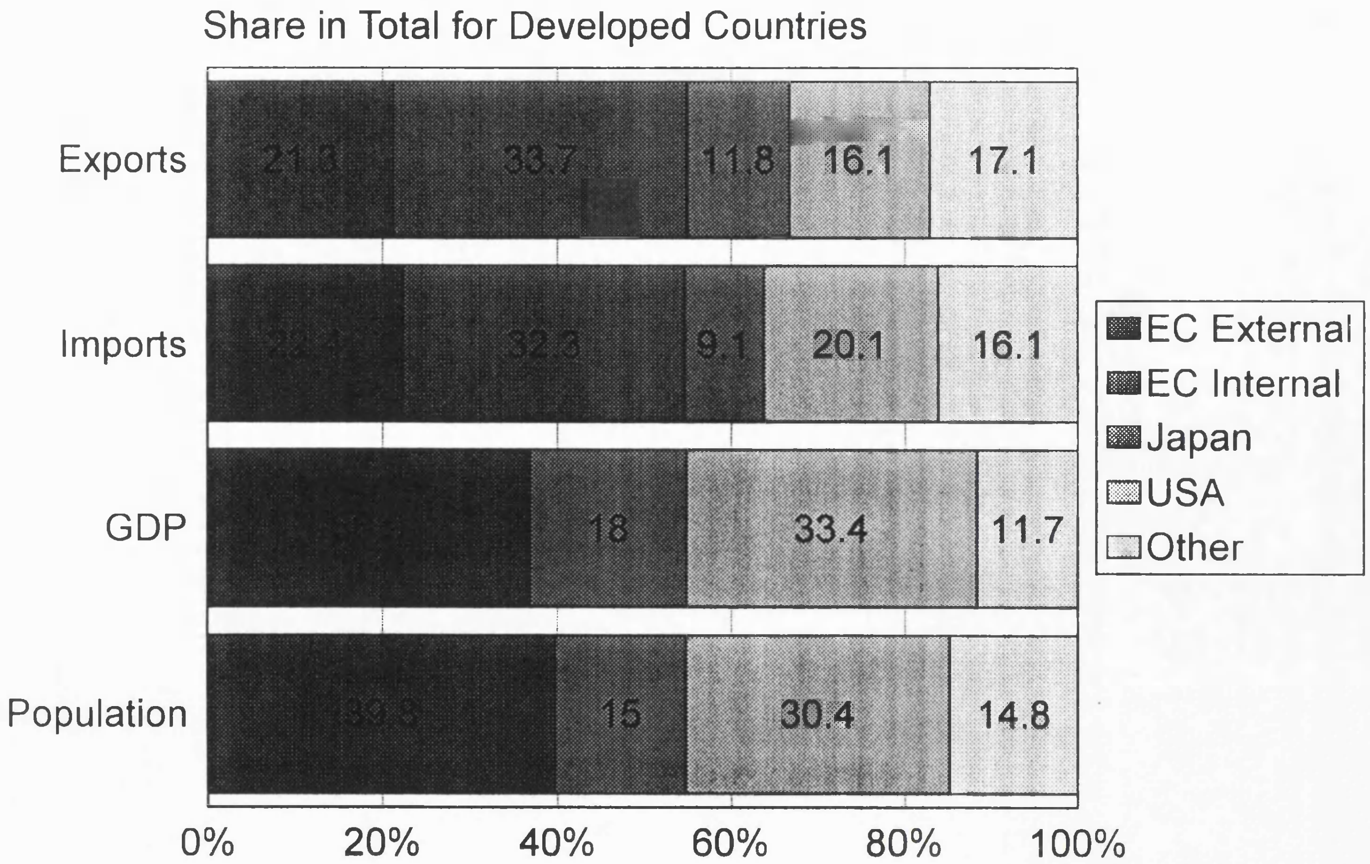
As a consequence, the general line of political action undertaken by the Community and its Member States was largely determined by their position as allies of the United States within NATO. External economic policies, set at the EC level, as well as the national and inter-governmental foreign and security policies were dictated by the principles of geopolitics.

6.1.2 MULTIPOLAR INTERNATIONAL SYSTEM

The new world order's shift in emphasis from geopolitics to economics, however, has changed the EC's position within the international system in the following four ways. First, the collapse of communism in Eastern Europe and the former Soviet Union, has allowed the EC to develop alternative policy lines in international politics, independent from the American point of view. In fact, the American concern about the rise of diverging European policies following the end of the Cold War was one of the driving forces behind the Bush administration's proposals for new institutional links between the EC and the US, which eventually culminated into the signing of the EC-US Transatlantic Declaration in November 1990. The Declaration sets out mechanisms for bilateral consultations on matters of common interest, both economic and political, and pledges cooperation in trade, arms control and other areas. Sofar, however, the Declaration has proven to be more a statement of intent rather than one of action; it has been unable to contain transatlantic differences on economic issues or security concerns - the handling of the Bosnian Crisis being a case in point.

Second, the increased emphasis on economic power in the international system has elevated the EC to the level of an economic superpower. Figure 6.1 illustrates the economic position of the European Community in comparison to Japan and the United State. In 1990, the EC accounted for 36.9 per cent of the total Gross Domestic Product of the developed world, while Japan and the United States accounted for respectively

Figure 6.1 Triad Powers: Comparison, 1990



Source: Appendix 6.1

18.0 and 33.4 per cent. Its market size proxied 328 mn consumers in that year, in comparison to 250 mn for the United States and 124 mn for Japan. The EC also accounted for a substantial share of total exports and imports amongst the industrialized countries (see Figure 6.1). This economic position as one of the three large economic powers has allowed the EC to be, *in principle*, a credible opponent to the American and Japanese governments in bi- and multi-lateral negotiations. Whether or not this latent power has been translated into real power in the case of international negotiations on IT-related issues will be shown in Chapter 9.

Third, the end of the Cold War has led to substantial cuts in government expenditures on defence equipment, resulting in a dramatic increase in competition for shrinking markets (Thomson-CSF 1992 Annual Report; Siemens 1992 Annual Report). The fall in government demand has forced the producers of military or military-related equipment, including non-civilian IT products, to restructure, consolidate and diversify their operations. Siemens, for example, has introduced a rationalization programme in its defence electronics sector while Thomson-CSF, the French owner of SGS-Thomson, has strengthened its position in the defence markets through the conclusion of joint ventures and other cooperation agreements. Philips, meanwhile, has sold its defence interests in Western Europe altogether (Philips Annual Report 1991:42).

Fourth, the liberalization of trading relations between Eastern and Western Europe has allowed the Community's IT companies to exploit new market opportunities. Economic reforms, combined with a relatively immature market, have led to IT hardware spending growth rates far exceeding the 1.7 per cent compound annual growth rate for Western Europe. While Eastern Europe's average growth rate totalled 8.8 per cent per annum, Poland's growth rate totalled even 16.9 per cent (EITO, 1993:144). The potential of the Eastern European markets for IT products has been further boosted by customs reform, including the phasing out of most COCOM constraints on exports of dual-use technologies and products to the Eastern European countries (Dunne, 31 March 1994; Economist, 9 April 1994).

6.2 EC DEEPENING: IMPACT ON ITS POLICY-SUPPLYING CAPABILITIES

Since the establishment of the European Economic Community in 1958, the EC Member States have been involved in an ongoing process of regional integration. Over time, the EC has developed into an institution with an extensive range of competencies that affects nearly all policy areas (Mazey and Richardson, 1993b:2). This section will discuss, first, the impact of deeper regional integration on the Community as a policy supplier and, second, the impact of the deepening process on the EC's policy-supplying capabilities.

6.2.1 THE RESULTS OF DEEPENING: COMPETENCIES, DECISION-MAKING PROCEDURES AND VOTING RULES

Over time, the legal scope of the original EEC Treaty has been expanded under influence of two international agreements: the Single European Act (SEA), signed in February 1986, and the Maastricht Treaty (Treaty on European Union), signed in February 1992. The SEA, which became operational in 1987, amended the original EEC Treaty on the following three points: (1) it formalized the EC's commitment to complete its common market and imposed a deadline on the elimination of the remaining barriers; (2) it endorsed the EC with new responsibilities; and (3) it introduced institutional reforms, altering the EC decision-making process (Nicoll and Salmon, 1994:48-52; Urwin, 1991:230-235). The Maastricht Treaty, which entered into force in November 1993, introduced further amendments to the EEC Treaty: (1) it provided for the creation of Economic and Monetary Union (EMU), (2) it endorsed the Community with greater competencies in both new and existing areas, and (3) it introduced institutional changes (Nicoll and Salmon, 1994:276-289; Financial Times, 12 December 1991). The resulting EC Treaty, moreover, was incorporated into a wider, partly intergovernmental framework.

For our purposes, it is now important to determine what these two landmark agreements have meant for the supply of IT and IT-related policies at the EC level over the 1980s and early 1990s. What has been the impact of the increase in EC competencies and the reforms in EC institutions on the supply of IT and IT-related policies?

EC Competencies

The SEA and the Maastricht Treaty have endowed the Community with greater competencies in the area of IT and IT-related policies, increasing the necessity to lobby the EC. Over the late 1980s and early 1990s, the EC acquired new powers in three areas of importance to this thesis: Research and Technological Development, Trans-European Networks and Industrial Policy.

The SEA wrote the establishment of multiannual R&TD Framework Programmes and specific R&TD programmes, like ESPRIT (EEC Treaty (87):Art.130f-q), into the EEC Treaty, while the Maastricht Treaty amended the specific provisions in this area (EC Treaty (93):Title XV, XIII). The Maastricht Treaty also gave a legal basis to EC actions regarding Trans-European Networks (TENs) (EC Treaty (93):Title XII) and the Community's industries (EC Treaty (93):Title XIII) (see Chapter 4).

Legal provisions for the Community's trade policies, including those affecting the European IT industry (see Chapters 3,4), were already included in the original EEC Treaty (58:Art.110-116). In fact, so were the legal provisions for the completion of the

Single European Market and for those policies necessary to make the market function properly (EEC Treaty (58):Art.3;9-37;48-73;85-102). As Urwin (1991:231) argues, "in that sense, the SEA was not a revolutionary document". The SEA, however, played an important role in giving a new impetus to the process of market liberalization within the EC (see Chapter 3).

Decision-Making Procedures and Voting Rules

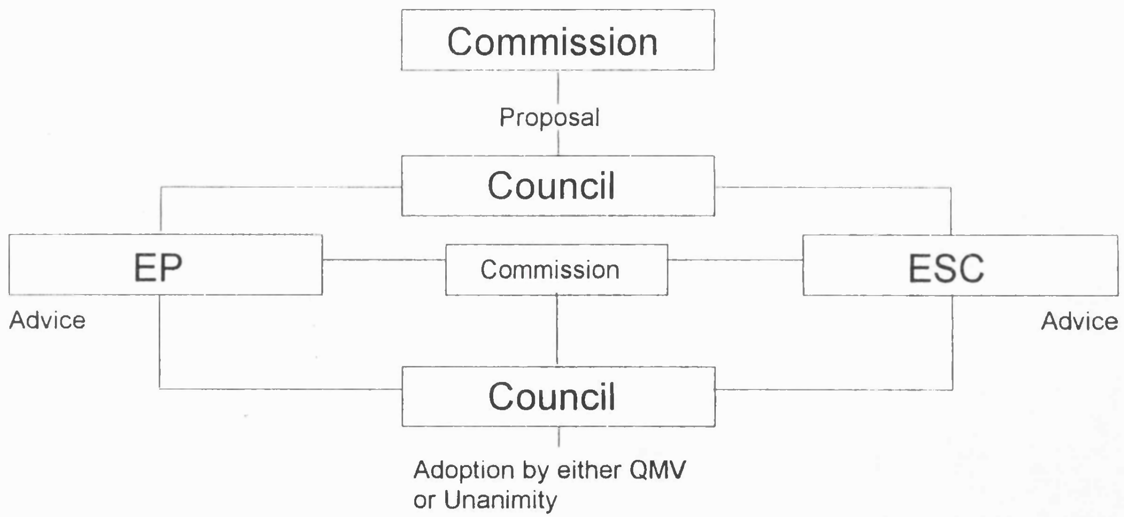
The decisions of the Member State governments to endow the Community with more competencies, however, has not constituted an outright transfer of sovereignty from the national to the EC level. Rather, these decisions have led the Member States to "pool sovereignty" (Keohane and Hoffmann, 1991:8). Not only have the national governments continued to play an important role in EC policy formulation and implementation (see Chapters 1,7), also they have never transferred their authority to take decisions on the proposed EC policies to a supranational body. Decision-making at the EC level has remained an inter-governmental affair (see Chapter 7).

Since November 1993, three decision-making procedures have been used: (1) the consultation procedure, which was outlined in the original EEC Treaty; (2) the cooperation procedure, which was established under the Single European Act; and (3) the co-decision procedure, which has been applicable to a range of areas since the Maastricht Treaty came into force (see Figure 6.2). Although all three procedures have built-in mechanisms to safeguard the national interest, they could be spread out along a spectrum representing an increasing infringement on the individual countries' powers.

At the one end of the spectrum, one could position the consultation procedure, under which the rights of the individual Member States are well-protected and the role of the European Parliament, as representative of the European people, is minimal; the latter can only suggest non-binding amendments. At the other end of the spectrum, one

Figure 6.2 EC Decision-Making Procedures and Voting Rules

Consultation Procedure

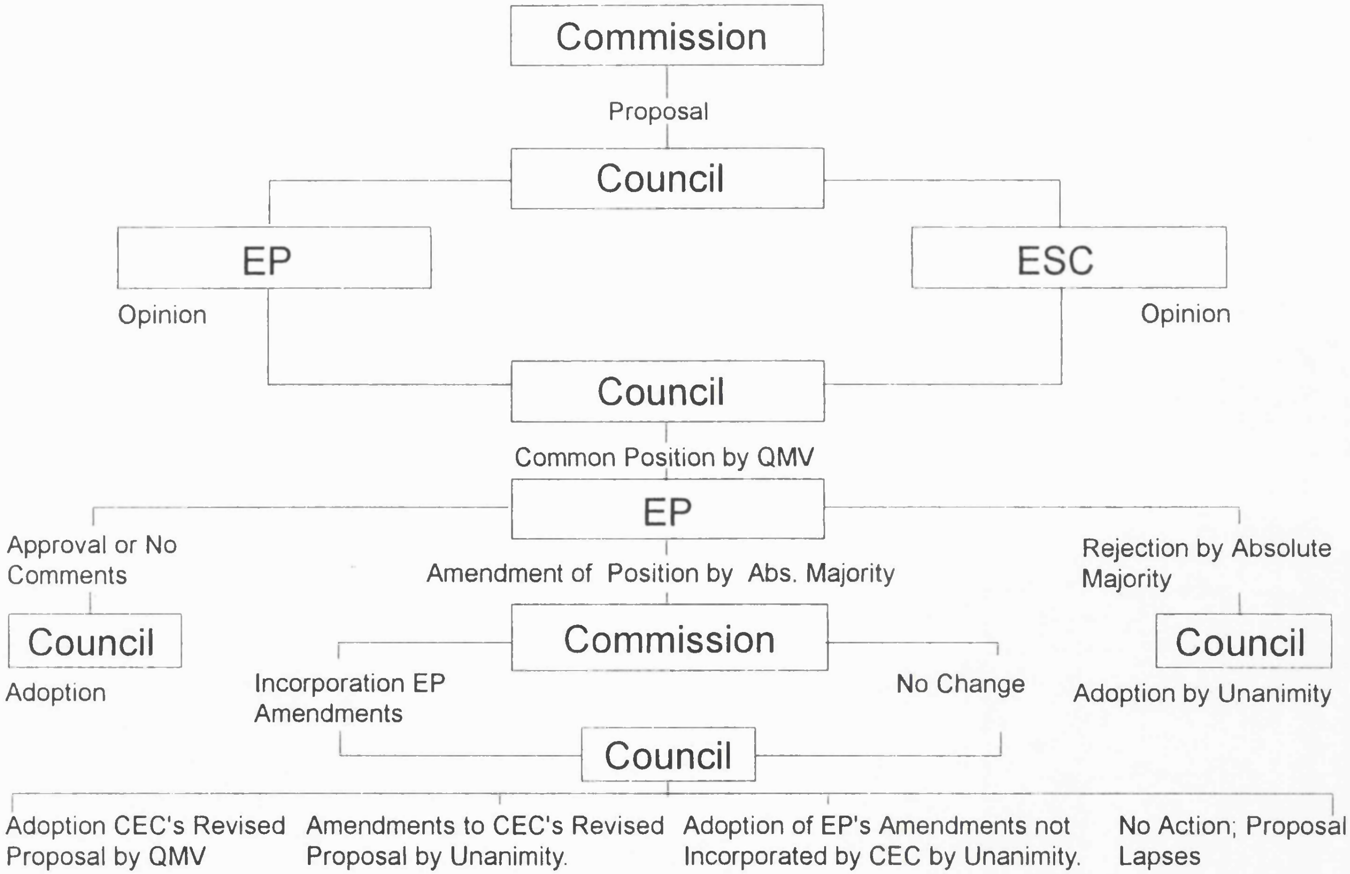


Applicable to:

After SEA: All areas not covered by Cooperation Procedure

After Maastricht: All areas not covered by Cooperation and Co-decison procedure

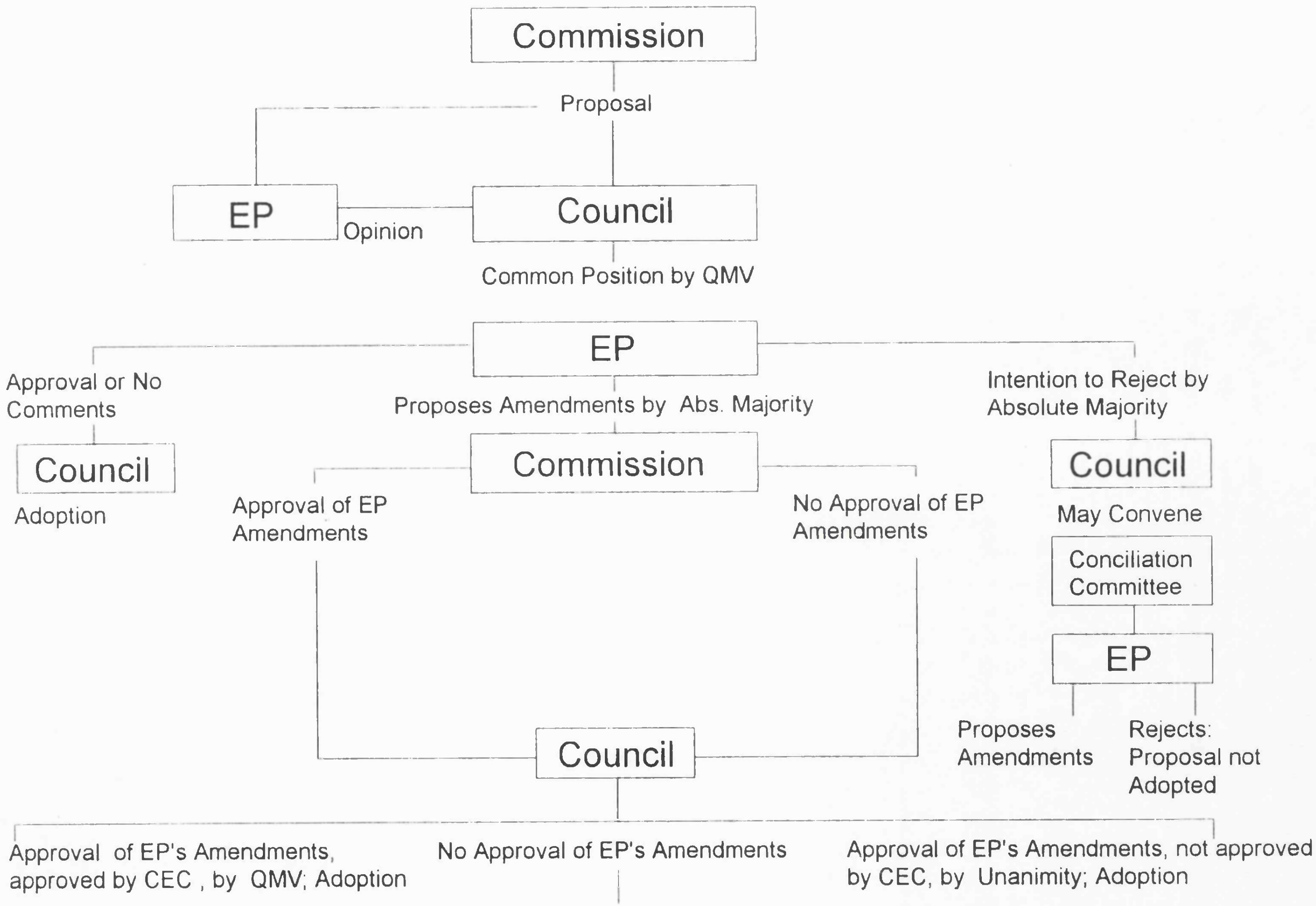
Cooperation Procedure

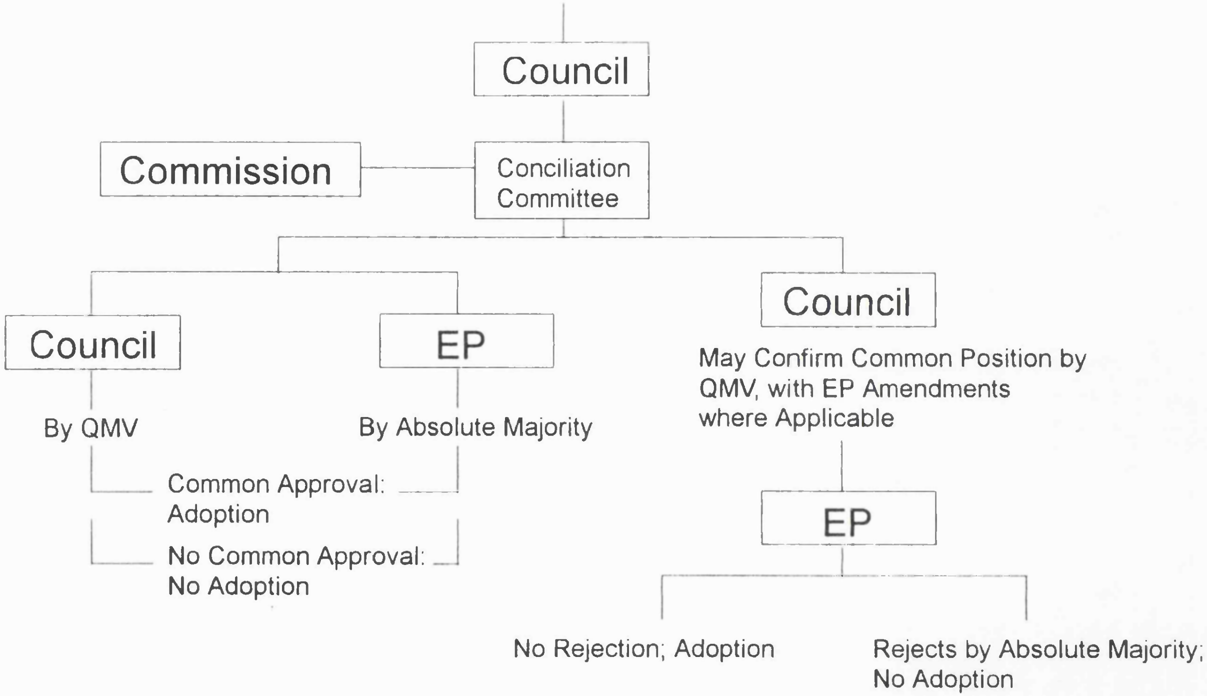


Applicable to:

After SEA: Art. 100a,b; 118a; 7; 49; 54(2); 56(2); 57; 130q(2) (k,l,m,n,p)(R&TD); 130e
After Maastricht: Art. 6; 75; 103; 104a,b; 105a; 125; 127; 129d (TENs); 130o(2) (j,k,l) (R&TD); 130s; 130w; Soc.Prot, 2.2

Co-Decision Procedure





Applicable to:

After Maastricht: Art. 49; 54(2); 56(2); 57(2); 100a,b; 126; 128; 129; 130i (R&TD); 130s could position the co-decision procedure under which the rights of the Member States are least protected; the EP can approve, reject and amend legislative proposals that the Council cannot simply overrule by unanimous voting. Despite its greater democratic accountability, however, this procedure can be considerably more time-consuming than, for example, the cooperation and consultation procedure (see Figure 6.2).

Dependent on the decision-making procedure, the various EC institutions thus have more or less powers. This, in turn, may have affected the lobbying strategies of the European-owned IT companies and their interest groups; it has altered the importance of the various EC institutions within corporate lobbying strategies (see Chapter 7).

As Figure 6.2 shows, within the three decision-making procedures, Council voting may take place on the basis of unanimity, a simple majority (SMV) or a qualified majority (QMV). In the case of voting by unanimity[2], each individual government maintains the negative power to block any decision. Although governments lose this ability in the case of simple majority voting[3] or qualified majority voting[4], it is doubtful whether policies will be pushed through in the face of adamant opposition of a minority, especially if this minority involves one of the three largest Member States. Not only may the latter threaten to invoke the Luxembourg Compromise[5], also, without sufficient backing, a policy decision is unlikely to work in practice.

Nevertheless, the changes in the voting rules applicable to EC IT policies may have affected the lobbying strategies of the European-owned IT companies and their interest groups; the introduction of majority voting, for example, may have made it more imperative to coordinate lobbying strategies and lobby other national governments beyond the home government (see Chapter 7). The upcoming enlargement of the Community and the associated changes in voting rules are expected to reinforce this trend. Although a "reasonable" delay will be offered to the Member States if a decision is opposed by a number between 23 and 27 votes, the new blocking minority of 27 would imply that the opposition of two large countries and one small one is not any longer sufficient to block an EC decision (Barber, 28 March 1994:1; Barber, Gardner and Brown, 23 March 1994:1).

R&TD. During the early 1980s, decisions on R&TD-related legislative proposals were taken on the basis of Article 235, which implied that unanimous Council approval in accordance with the consultation procedure was required (see Chapter 3). Alternative decision-making procedures and more lenient voting rules, however, were introduced by the Single European Act.

Under the amendments introduced by the SEA, the adoption of the R&TD Framework Programmes remained subject to unanimous approval of the Council in accordance with the consultation procedure (EEC Treaty (87):Art.130q). Decisions about the R&TD Framework's overall budget and distribution of funding over the various categories of activities, including IT, thus continued to be highly politicized. This contributes to an explanation of the delays incurred in the adoption of, for example, the second phase of ESPRIT. Decisions on the implementation of the Framework Programmes, however, could be taken on the basis of a qualified majority, using the cooperation procedure. This included decisions on the specific programmes including ESPRIT, the supplementary programmes, and provisions for cooperation with third countries or Community participation in projects. The only exception was the establishment of joint undertakings and other structures necessary for an efficient execution of the programmes; these were made subject to unanimous approval in the context of the consultation procedure (EEC Treaty (87):Art.130q).

The ratification of the Maastricht Treaty further changed the Community's R&TD decision-making procedures. The adoption of the R&TD Framework

Programmes became subject to the co-decision procedure, granting the EP a greater political say (EC Treaty (93):Art.i). The Maastricht Treaty, however, also outlined that decisions on the specific programmes designed to implement the Framework Programmes, could only be taken on the basis of a qualified majority using the consultation procedure - giving the national governments more influence than they had under the SEA. Decisions on the establishment of joint undertakings and other structures remained subject to the consultation procedure and, thus, to unanimous approval (EC Treaty (93):Art.130i.4,o). Other decisions concerning the implementation, such as the decisions covering the rules for participation in the programmes or the establishment of supplementary programmes, continued to be subject to the cooperation procedure (EC Treaty (93):Art.130o).

TENs. The Maastricht Treaty also outlined the procedures and rules for decisions on Trans European Networks. The approval of the guidelines on TENs should be subject to the co-decision procedure - indicative for the lack of national sensitivity in this area. However, decisions concerning the financial support by the Community and the adoption of measures necessary to ensure the networks' interoperability were made subject to the cooperation procedure, giving the M/S governments a greater political say (EC Treaty (93):Art.129d).

EC Industrial Policy. The Member States' concern about the form and shape of a common "industrial policy" is clearly reflected in their choice of decision-making procedure and voting rules applying to Title XIII of the Maastricht Treaty, securing optimal protection of the national interest. Decisions regarding an "industrial policy" at the Community level were made applicable to the consultation procedure: "The Council, acting unanimously on a proposal from the Commission, after consulting the European Parliament and the Economic and Social Committee, may decide on specific measures [..]" (EC Treaty (93):Art.130.3).

Trade and SEM. The consultation procedure has also been applying to trade-related decisions as well as various decisions regarding the operation of the Single European Market. Some clauses on the free movement of workers and their right of establishment, however, have been made subject to the cooperation procedure and, when the Maastricht Treaty entered into force, to the co-decision procedure (see Figure 6.2).

6.2.2 THE PROCESS OF DEEPENING: IDENTITY-BUILDING AND TERMS OF CO-EXISTENCE

The transfer of competencies to the EC level and the introduction of institutional changes, both integral parts of a deepening process driven by economic and political imperatives[6], has been fostered by active "identity-building" by the European Commission and, to a lesser extent, the European Parliament. As argued by an executive of the Brussels-based industry organization ORGALIME:

> Both the Commission and the European Parliament are very new institutions. As a new level of power, the Commission and the Parliament had to try to sell themselves. Nobody would go initially to Brussels. So the Commission and the European Parliament were very keen to talk to any industry group. In order to get more power, they had to make sure that they would be open to pressure groups (Interview;1993).

Identity-Building

Since its inception, the Commission has actively encouraged the formation of interest groups and their participation in the EC policy-making processes for two reasons (Streeck and Schmitter, 1991:137). First of all, interest groups have been perceived as a source of legitimation. By drawing interested societal parties into the Community policy network, the Commission would be able to get support for its policies at a level below that of its main partners: the national governments. The national governments would subsequently face pressures to adopt a certain proposal from two sides: top-down from the Commission and bottom-up from the interested parties. As such, the involvement of the interest groups could advance the integration process (Butt Philip, 1985:44,45). Second, interest groups have been perceived as sources of information. The data provided by these societal groups could reduce the Commission's dependency on the national governments and their willingness to provide information (Mazey and Richardson, 1993b:10).

The Commission's preference has been to deal with the representative, European-wide sectoral groups. In those cases where the Commission felt it necessary to have the relevant sectors' input, the groups may even have been formed on invitation of the Commission (Sidjanski, 1972:402). Due to their operational shortcomings (see Chapter 7), however, the Commission has also encouraged the formation of elite associations of companies - the IT Roundtable being a case in point. Additionally, the Commission has invited representatives of societal interests to sit on consultative committees, which are organized and funded by the EC Commission (Nugent, 1991:75).

Similarly, the European Parliament has actively sought the input of societal interests, particularly since 1979. The EP's committees organize approximately 30 hearings a year. Through these hearings, MEPs may receive independent and expert advice, hear the policy preferences and views of interested parties, and establish a dialogue (EP sources, Interview 21;1993; Jacobs, Corbett and Schackleton, 1992:250-251).

Over time, the EC institutions' drive to mobilize interest groups and interact with them at the EC level has fostered the establishment of the EC as a locus of public decision-making and a target of political activity in co-existence with the national governments. However, despite the fact that the EC has become more established and more influential over time, the terms of co-existence between the EC institutions and the national governments have continued to be subject of debate.

Terms of Co-Existence

The scale of deepening and the terms on which transfers of competencies and institutional change have been taking place, have been determined, to a large extent, by the ideologies of the constituent members and their inclination (whether ideologically, economically or politically based) to defend, maximize and prioritize national over regional interests through insistence upon subsidiarity, repli sur soi and juste retour.

Ideological Convergence. The degree of ideological convergence amongst the Member States has determined, to a certain degree, the range of competencies transferred from the national to the EC level, the type of policy instruments established, and the nature of policy implementation, as these constitute ideologically sensitive issues.

Traditionally, one could position the United Kingdom, Germany, the Netherlands, and other Northern European Member States towards the liberal end of the ideological spectrum, while France, Italy and the remaining Southern European countries could be allocated towards the interventionist end. Over the early 1990s, however, the ideological stances of the national governments appear to have converged slightly - a development which could, in principle, have facilitated IT consensus-building and decision-making at the EC level (see Chapters 7,9). This is particularly the case for France and the United Kingdom, which traditionally could be located at the opposite ends of the ideological spectrum (DTI and DG 3 sources, Interviews 3,40,41;1993).

In April 1993, Michael Heseltine, the British Secretary of Trade and Industry, announced a new industrial strategy. Two elements deserve particular attention as they deviate from the "hands-off" approach upheld by the previous UK government. First, the strategy envisaged an explicit role for the government in promoting the international competitiveness of British companies. Although government intervention should be limited and refrain from direct subsidies to companies, the government should work as a "catalyst for elements of national self-interest", notably in the area of innovation and exportation (Cassell, 26 April 1993:8). Second, the plan sought to rebuild the mutual partnership between the government and British firms. The Department of Trade and Industry (DTI) has been given the explicit mandate to advance the interests of industry within the British government and abroad. In order to stimulate the information exchange between the private sector and the government and reduce the insulation of DTI from private sector inputs, Heseltine has sought to increase the number of DTI employees that are on secondment from industry[7].

While the British government has moved a step away from orthodox liberalism, the French government has shown some signs of departing from its interventionist tradition. In May 1993, the new conservative Balladur government announced the privatisation of 21 companies, including Bull and Thomson. Non-EC companies would be limited to a maximum share of 20 per cent in the initial issue, but they could subsequently buy shares on the open market. In that context, one should note that in 1991, the then Socialist government had already relaxed its restrictions on participation of privately-owned, foreign firms in state companies. In addition to its privatisation plans, the Balladur government also indicated that it would be more stringent about injecting new capital into loss-making state companies than its predecessor. The government's intention, however, has not deterred it from injecting an additional FF 7 bn into the loss-making company Bull. This injection, however, could be seen as a first step towards less public involvement in Bull, if one accepts the claim that the funds are aimed at preparing the company for privatisation[8].

The slight convergence in the ideological stances of France and the UK has been caused, in part, by the change of guards in the French and British governments. In France, the conservatives regained power after a decade dominated by socialist rule (with the exception of a short spell between 1986 and 1988). In the United Kingdom, the conservatives stayed in power, but the Major government appears to have broken with the Thatcherite tradition of undervaluing the industrial base[9]. The trend towards ideological convergence, however, has also been driven by economic realities. Beyond the limits imposed on government intervention by budgetary constraints (see below), world market conditions have affected the attitudes of the national governments. According to a DTI official, the UK government had to recognize that some form of intervention constitutes a sheer necessity in a world market that is not a level playing field, while the French government had to accept the limits of protectionism in an increasingly internationalized industry where industrial partnerships are a precondition to survival (Interview 40;1993).

Subsidiarity. The terms of co-existence, particularly after 1986, have also been affected by the inclinations of the Member States to defend their national interests through clinging to the principle of subsidiarity - a tendency which, ironically, has been caused by the process of deepening. Initially, the issue was raised by the German Länder, fearing that the new areas of Community action as provided for in the SEA would extend into their areas of exclusive competence and, thus, undermine the German federal constitution. Fear of losing sovereignty in the wake of a more widespread use of majority voting following the ratification of the SEA and concerns that the EC was already responsible for policy-making and execution in more areas than it could handle, subsequently prompted the Member States to increase their emphasis on subsidiarity (Wilke and Wallace, 1990:3-4).

Two questions, in particular, have been central to the debate on subsidiarity, namely:

> First, whether the powers and competence of the EC should be extended and thus shift some powers away from Member States; and secondly and equally importantly, how to share powers between the EC and the Member States in the cases of conchorent powers, where competence as such is not the issue but the choice of the "appropriate" level at which to act (Wilke and Wallace, 1990:4).

In response to these concerns, the Maastricht Treaty sought to outline the guiding principle for allocating competencies to the various levels of government and for selecting the level at which to act. The result has been the incorporation of an ill-defined clause on subsidiarity into the Treaty; responsibilities should be allocated at the lowest appropriate governmental level[10]. The debate on subsidiarity, however, did not stop with the signing of the Maastricht Treaty and the inclusion of the subsidiarity clause.

In June 1992, the Danish people rejected the Maastricht Treaty (see Table 6.1). Not only did this rejection, combined with the German constitutional court case challenge and the British government's decision to tie the timing of its vote to the second Danish referendum, delay the ratification of the Maastricht Treaty substantially, it also started a period of wide-spread, public debate about the desirability of the Maastricht Treaty. This debate was further fuelled by the weak approval of the Treaty in the French referendum, the vocal British opposition, and the de facto collapse of the European Exchange Rate Mechanism (ERM) which called into question the viability of Economic and Monetary Union altogether. The ratification debates of the various Member States were dominated, in particular, by concerns about the loss of national sovereignty, both politically as well as economically; the democratic deficit of a stronger, European Union; and the desirability of a European army, EC citizenship, and

Table 6.1

RATIFICATION PROCESS OF THE MAASTRICHT TREATY

Country	Date	Process	Result
Belgium	17.07.92	MPs	146 in favour; 33 against; 3 abstentions
	04.11.92	Senate	115 in favour; 26 against; 1 abstention
Denmark	02.06.92	Referendum	50.3% against
	18.05.93	Referendum	56.8% in favour
France	20.09.92	Referendum	51% in favour
Germany	02.12.92	MPs	543 in favour; 17 against; 8 abstentions
	18.12.92	Senate	100% in favour
	12.10.93	Court	Win for all, clearing the way for ratification
Greece	31.07.92	MPs	286 in favour; 8 against; 1 abstention
Ireland	18.06.92	Referendum	68% in favour
Italy	17.09.92	Senate	176 in favour; 16 against; 1 abstention
	29.10.92	MPs	403 in favour; 46 against; 18 abstentions
Luxembourg	02.07.92	MPs	51 in favour; 6 against
Netherlands	12.11.92	MPs	138 in favour; 12 against
	15.12.92	Senate	67 in favour; 8 against
Spain	29.10.92	MPs	314 in favour; 3 against; 8 abstentions
	25.11.92	Senate	22 in favour; 3 abstentions
Portugal	10.12.92	MPs	217 in favour; 22 against; 1 abstention
U.Kingdom	20.06.93	MPs	180 majority in favour
	20.07.93	Senate	112 majority in favour
	03.08.93	Court	Abandonment of legal challenge, clearing the way for ratification

a single European currency[11].

Combined with recession-triggered changes in governmental attitudes (see below), this public reassessment of European integration further fuelled the Member States' insistence on subsidiarity. As Chapter 9 will illustrate, the increased insistence of the M/S governments on the application of this principle has hampered the development and, more importantly, the adoption and implementation of IT policies at the Community level in the late 1980s and early 1990s.

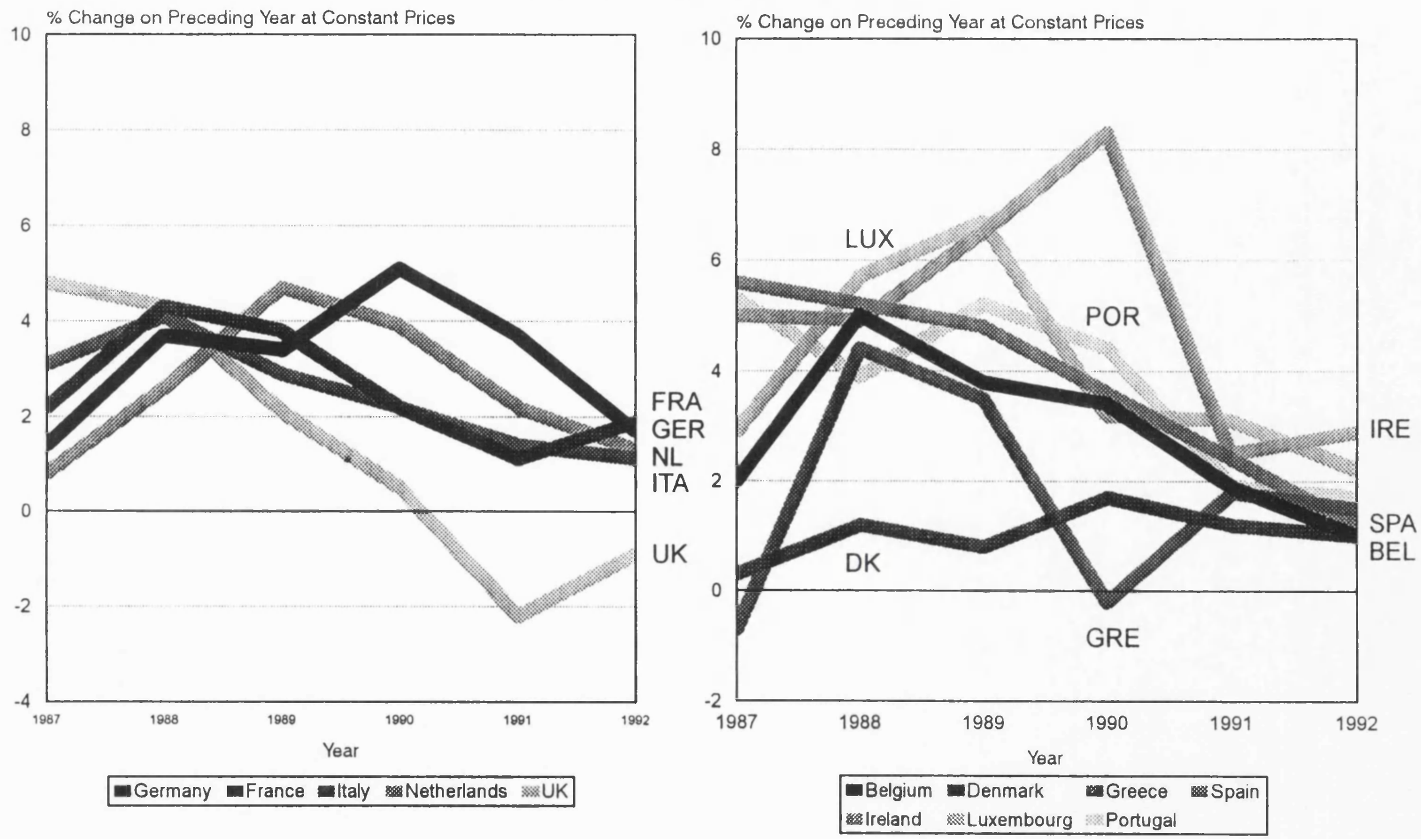
Repli sur Soi. Additionally, the terms of co-existence have been affected by the recession-triggered priority placed by the M/S governments on national solutions over European ones. Figure 6.3 shows that over the early 1990s, most European economies faced low and declining growth rates and that the British economy even contracted. In the face of these economic problems, the M/S governments have had the tendency to go back to short-term national solutions to economic problems serving their perceived national interests, rather than to opt for longer-term European solutions. As a DG 3 official dubbed it, the Member States have adopted "repli sur soi" attitudes towards their economic problems (Interview 3;1993).

As Chapter 9 will illustrate, the consequence of such attitudes has been that it has reduced the political will on the side of the Member States to implement EC-wide policy schemes, let alone to transfer any further competencies or resources to the EC level.

Juste Retour. Finally, the terms of co-existence have been affected by the recession-triggered insistence of the M/S governments to obtain a just return on their financial contributions; the funds that national companies, regions or other actors receive from the EC should be in line with the contributions that the home governments have made to the EC budget. Adherence to the principle of juste retour, which dates back to the British Terms of Accession renegotiations in 1975 (Taylor,

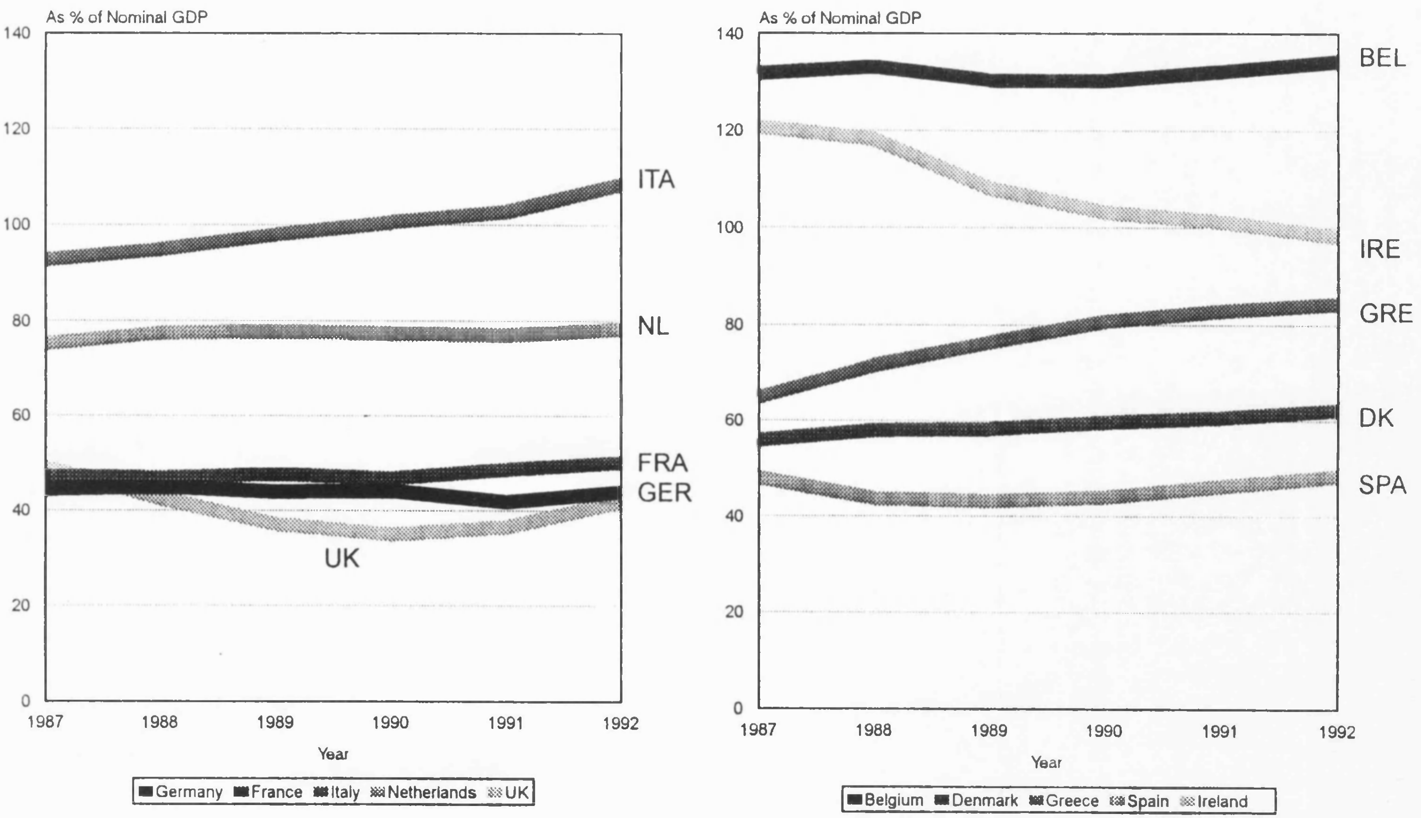
Figure 6.3 EC Member States: Financial Performance Criteria, 1987-1992

Growth in GDP



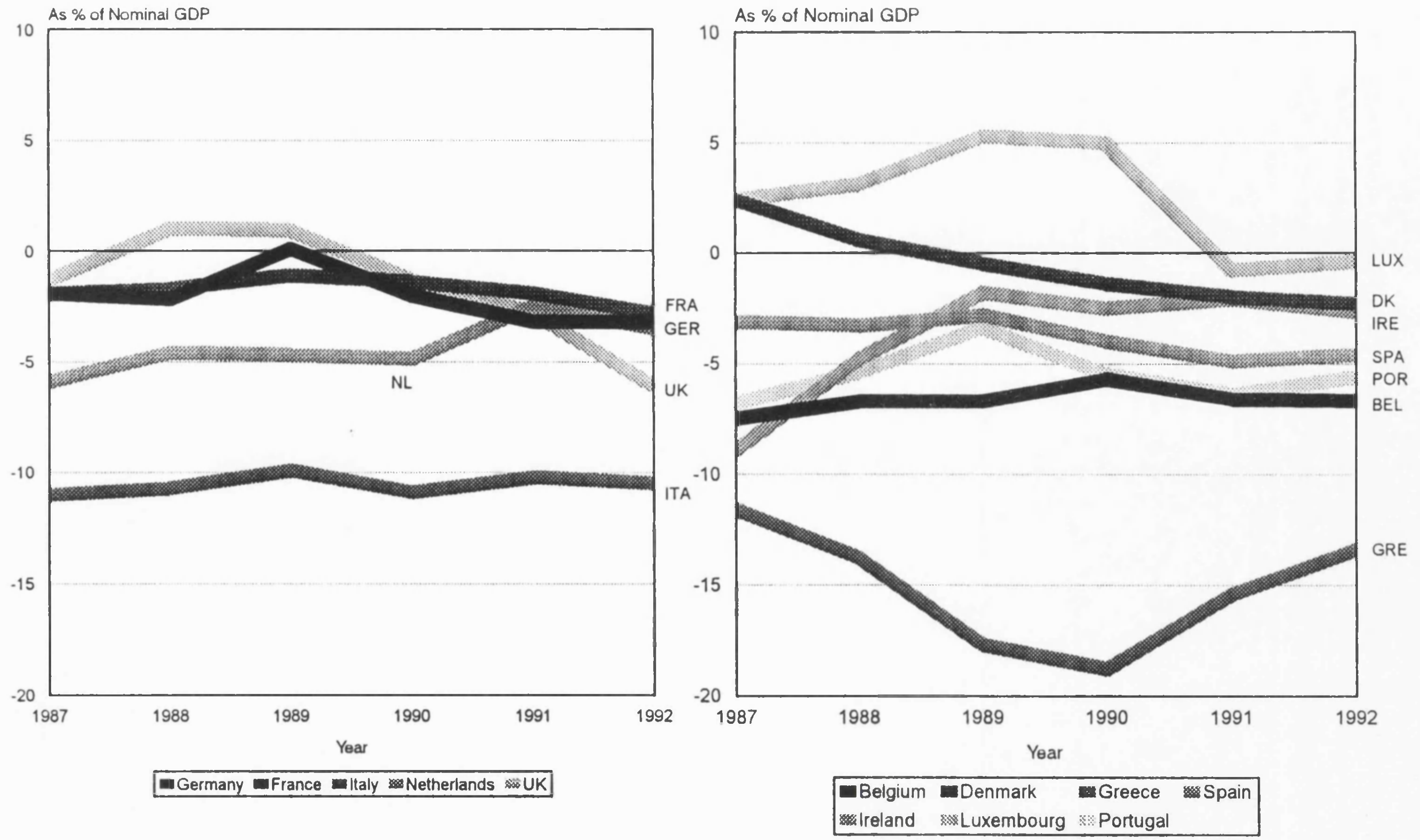
Source: Appendix 6.2

Gross Public Debt



Source: Appendix 6.2

Budget Balances



Appendix 6.2

1983:36), disregards the longer-term, non-monetary benefits that national companies, regions, or other national actors may derive from participating in EC programmes/funds. Moreover, application of the principle of juste retour may result in policies which work against the European interest; a strict adherence to this political concept of fair distribution may undermine the objectives of EC programmes (CEC sources, Interviews 6,24,26;1993).

The current insistence on juste retour has been fuelled by the recession of the early 1990s. As Scott (1993:88) explains: "With the decline in economic activity, higher public spending is triggered automatically as unemployment mounts while government revenue accruing from taxes falls." With the exception of Ireland and Germany, the countries' ratio of public debt to Gross Domestic Product (GDP) increased over the late 1980s and early 1990s - symptomatic for cyclical downturns[12] (see Figure 6.3). At the same time, budget surpluses declined while budget deficits increased, leading most European governments to record a deterioration in their financial position. The tighter financial conditions and the need to reduce government spending have made national governments far more insistent on obtaining a just return.

Overall, since the late 1980s, the terms of co-existence have been under increasing pressure. As one DG 3 source contemplated:

> The Commission is in a weak political situation at the moment [to initiate and implement further IT policies], due to the difficulties associated with the ratification of the Maastricht Treaty, the emphasis on subsidiarity and the economic crisis. The general attitude towards integration, Europe and the Commission has become less favourable (Interview 3;1993).

6.3 EC ENLARGEMENT: IMPACT ON ITS POLICY-SUPPLYING CAPABILITIES

Over time, the geographical scope of the European Community has increased.

In 1973, the United Kingdom, Denmark and Ireland acceded to the EC. In 1981, Greece became the Community's 10th member. In 1986, Portugal and Spain joined the EC, bringing the Community's membership to twelve. Provided that national approval will be secured, Austria, Sweden, Finland and Norway are expected to join the EC by 1995. A fifth wave of enlargement may include the Eastern European countries. Other outstanding applications include Malta, Turkey and Cyprus.

Beyond the impact of widening on the EC's voting rules (see above), the widening of the European Community in Southern direction in the early and mid-1980s has influenced the supply of EC IT and IT-related policies over the 1980s and early 1990s in two areas: (1) the increasing priority attached to cohesion within the Community, and (2) the role of regional support measures, including national incentives to FDI.

6.3.1 COHESION

The Southern enlargement of the 1980s, which has led to the accession of three countries with an economic performance below the Community's average, has changed the type of issues prevailing on the EC agenda. In the mid-1980s, these countries expressed, together with Ireland, their concerns about the prospects of deeper integration; they feared that further economic and monetary integration might impose disproportionally large costs on the economically weaker Member States (Nicoll and Salmon, 1994: 150,236,267,270,274; Pinder, 1993:63).

Their argument has been that the adjustment costs associated with greater economic and monetary integration, such as corporate relocations, lay-offs, and close-downs, would be concentrated in the economically weak regions. Although the move towards a common market and economic and monetary union would lead to a greater wealth of the Community as a whole, it would not necessarily lead to greater wealth of each individual Member State. The four Member States therefore argued that economic and monetary integration should be associated with instruments which would eliminate regional economic and social disparities and bring about a greater cohesion amongst the Member States.

The principle of cohesion was written into the original EEC Treaty by the Single European Act ((87):Art.130a-e) and further amended by the Maastricht Treaty (EC Treaty (93):Art.130a-e). Over the late 1980s and the early 1990s, this commitment to greater economic and social cohesion, strongly supported by the three new Southern Member States and Ireland, has led to a rapid increase in the Community's structural funds and to the creation of a cohesion fund (Gardner, 14 December 1992:2).

Moreover, it has given the Southern Member States a legal basis to view EC policies, such as ESPRIT and other EC R&TD programmes, from the perspective of their impact on cohesion. First of all, this has diluted EC-wide support for policies that mainly benefit the Northern countries and led to demands for policies that target the Southern countries. The Southern M/S, for example, are relatively well-represented in BRITE - an EC R&TD programme aimed at upgrading the technological base of existing industries through the application of new technologies (Sharp, 1993:210; 1990:60). Second, this has led to demands for greater participation in policies that currently mainly benefit the Northern countries; with their insistence on the principle of juste retour, for example, the Southern Member States have sought to increase their share in ESPRIT.

6.3.2 REGIONAL SUPPORT MEASURES

The need to bring about cohesion, not only between the Southern Member

States and the Northern ones but also within the "richer" Member States, has also prompted the national governments to introduce a wide range of regional support measures, including incentives to invest in economically weak regions.

Although such incentives have been allowed under the EC's competition legislation, as outlined in Chapter 4, the IT Roundtable and EECA have claimed that these incentives have distorted competition at their expense and to the benefit of foreign-owned new-comers investing in the relevant regions. However, the chances that an EC-wide consensus will be reached on introducing controls on such incentives are relatively small; too many Member States, including Northern ones like the reunified Germany, have a vested interest in companies investing in their peripheral regions (see Chapter 9).

6.4 CONCLUSION

This chapter has focused on the European Community as a supplier of public policies; it has discussed the changes in the EC's policy-supplying capabilities following the transformation of the international system and the Community's deepening and widening. As we will see in the following three chapters, these changes have affected the political activity of the European-owned IT multinationals, the weight attached to corporate policy preferences by the EC and its Member States and the extent to which the EC has been able to meet corporate policy demands.

In the late 1980s and early 1990s, the EC's position as a supplier of policies was affected by three factors: (1) the transformation of the international system; (2) the deepening of the Community; and (3) the enlargement of the EC. First, the transformation of the bipolar system into a multipolar one has lifted the constraints imposed by the Cold War on the Community's political freedom of action and elevated the Community to the status of an economic superpower with substantial latent economic bargaining power. At the micro-level, the end of the Cold War has led to substantial cuts in defence-related expenditures, thus structurally reducing the size of military procurement markets. At the same time, however, the relaxation of COCOM constraints imposed on the exports of dual-use technologies and products, has opened up new opportunities for the European-owned IT companies in the rapidly growing Eastern European markets.

Second, the Single European Act and the Maastricht Treaty have shifted new policy competencies to the Community level and altered decision-making procedures and voting rules. EC IT policies have obtained a legal basis, albeit subject to procedures and rules that vary according to the Member States' sensitivity to the specific issue in question. Active identity-building on the side of the Commission and, to a lesser extent, the European Parliament, has fostered the establishment of the EC as a locus of public decision-making and a target of political activity in co-existence with the national governments; the involvement of interest groups in the EC policy-making process has been stimulated by the EC institutions for both legitimation as well as information purposes.

However, despite the fact that, by the late 1980s and early 1990s, the EC was more established and more influential than ever before, the terms of co-existence between the EC and its M/S governments have continued to be subject of debate. Beyond the degree of ideological convergence amongst the Member States which has influenced the Community's range of competencies, type of policy instruments, and nature of policy implementation at any given point in the history of the EC, the terms of co-existence during the late 1980s and early 1990s have been affected by the Member States' inclination to defend, prioritize and maximize their national interests. The process of deepening the Community combined with the recession of the early

1990s has prompted the M/S governments to insist on adherence to the principles of subsidiarity and juste retour and to opt for national solutions over European ones.

Third, the Southern enlargement of the EC has led to the inclusion of three Member States with a below Community average economic performance and with political priorities diverging from those of the richer, Northern states. Their insistence on cohesion has diluted EC-wide support for policies that mainly benefit the Northern countries, such as IT policies. Moreover, it has made greater control on national incentives to companies willing to invest in peripheral regions less likely.

On the basis of this analysis of the changing politics of the European Community, one could reiterate the main sets of short-term and structural factors that have affected the political influence of the European-owned IT companies, as will be illustrated in Chapters 7 to 9:

1. One set of factors is formed by the EC's position within the international system, and the change therein following the transformation of the military power based, bipolar system into an economic power based, multipolar system.
2. A second set of factors is formed by the deepening the European Community, under which competencies have been transferred from the national to the Community level and EC decision-making processes and voting rules have been altered. This process has been fostered by active identity-building on the side of the EC institutions. The ideologies of the individual Member States and their inclination to adhere to subsidiarity, repli sur soi and juste retour, however, have continued to test the terms of co-existence.
3. A final set of factors is formed by the Southern enlargement of the Community and the associated emphasis on cohesion and regional development.

The following three chapters will seek to explain, on the basis of these short-term and structural factors as well as those outlined in Chapter 5, why the European-owned IT companies, as represented in the IT Roundtable were, politically, less influential in the late 1980s and early 1990s than in the early and mid-1980s. Chapters 7 to 9 will discuss the impact of these changes in the IT industry and in Community politics on respectively (1) the political activity undertaken by the IT Roundtable and its members, (2) the political weight attached by the EC and the M/S governments to the companies' policy preferences, and (3) the extent to which the EC and the M/S governments have been able to realize these preferences.

6.5 NOTES

1. For a historical overview of Europe's efforts in the area of foreign and security policies, see, for instance, Nicoll and Salmon (1994: Chpts.1,10); Rummell and Schmidt (1990); Pryce (1987: Chpts.1,2); Urwin (1991: Chpts.2,5,8,11,15).

2. Unanimity voting is applied to those proposals initiating a new policy or modifying and further developing an existing policy framework. Unanimity is also required when the Council seeks to amend a Commission proposal, against the wishes of the Commission. Under unanimity, all Member States have to be in favour of a proposal. This implies that one country could block a proposal. Abstentions, however, count as neither a positive nor a negative vote. It is thus possible to reach unanimity even if there are abstentions, provided that a minimum of six members do vote (Lodge, 1993:16; Nugent, 1991:118).

3. Simple majority voting usually applies to procedural votes. In contrast to QMV, simple majority voting is not based on a weighted majority; rather, each Member State has one vote each. A simple majority requires more than 50 per cent of the votes in favour of a certain proposal (Nugent, 1991:118).

4. Qualified majority voting has been applying to those proposals designed to implement and clarify established policy guidelines. Additionally, qualified majority voting applies to those areas subject to the co-operation procedure, as introduced by the Single European Act and reiterated by the Maastricht Treaty. A qualified majority constitutes of a weighted majority of 54 votes out of the 76 votes in favour of a certain proposal. A proposal can be blocked by a minority of 23 votes. Abstentions count as de facto negative votes, as abstaining does not reduce the majority requirements. These voting rules imply that two large states cannot form a blocking minority without the support of any other country, and that the five largest Member States cannot outvote the seven smaller ones. The votes have been distributed as follows over the Member States: (1) Germany, France, Italy and the UK have ten votes each; (2) Spain has eight votes; (3) Belgium, Greece, the Netherlands and Portugal have each five; (4) Denmark and Luxembourg have three votes each, while (5) Luxembourg has two votes (Lodge, 1993:16; Nugent, 1991:118).

5. The Luxembourg Compromise of January 1966 has come to be interpreted as a mechanism under which each Member State retains the right to veto proposals which affect vital national interests, even when decisions are taken by majority voting (Nugent, 1991:119-120). The introduction of qualified majority voting by the Single European Act has not undermined the applicability of the Luxembourg Compromise.

6. For a full account of the historical development of the European Community and the economic and political imperatives behind periods of relative stagnation and progress in the widening and deepening of the Community, see, for instance, El-Agraa (1990:Ch.2); Nicoll and Salmon (1994:Chpts.1-3); Nugent (1991:Chpts.1,2;1992); Swann (1992:Chpts.1-2); Tsoukalis (1991:Ch.1); Urwin (1991); Wallace (1990:Ch.3). For the reasons behind the introduction of an IT policy at the Community level and the subsequent expansion of its scope, see Chapters 3 and 4.

7. Sources: DTI sources, Interviews 10,40,41 (1993); Cassell, 26 April 1993:8; Gourlay, 1 February 1994:14.

8. Sources: Dawkins, 11 April 1991:3, 8 April 1991:16, and 29 January 1992; Rawsthorn, 6 July 1993:25, 3 February 1994:20; Rawsthorn and Buchan, 1993:23; Rawsthorn and Thornhill, 24 August 1993:2: Ridding, 24-25 July 1993:12; Ridding and Buchan, 2 March 1994:3.

9. In an interview with The Independent on 3 March 1993, John Major argued that he disagreed with the Thatcherite economic philosophy of emphasizing the service sector. He outlined that a "different attitude" to industry and commerce was needed and argued that the United Kingdom would "not grow and thrive throughout the 90s" if it would not remain at the leading edge of technology (Atkins, 4 March 1993:8). See also Goodhart, 26 May 1994:10.

10. Maastricht Treaty, Art. 3(b): "The Community shall act within the limits of the powers conferred upon it by this Treaty and of the objectives assigned to it therein. In areas which do not fall within its exclusive competence, the Community shall take action, in accordance with the principle of subsidiarity, only if and in so far as the objectives of the proposed action cannot be sufficiently achieved by the Member States and can therefore, by reason of the scale or effects of the proposed action, be better achieved by the Community."

11. Sources: Financial Times, 21 September 1992:1-4; 20 June 1992:2; 4 June 1992; 9 June 1992:3; 19 May 1993; 18 May 93:2; Economist, 23 May 1992:54; 6 June 1992; 20 June 1992; 26 September 1992:15-16, 25-30; 3 October 1992:15-16,49; 17 October 1992:50-51; 19 December 1992:32-33; 13 March 1993:46; 15 May 1993:25-26; 22 May 1993:33-34.

12. In a number of countries, notably Italy, Greece and Belgium, the financial problems have not been just cyclical but structural.

Chapter 7

POLITICAL ACTIVITY

Corporate political activity is, as Chapter 2 outlined, a necessary precondition for influencing the Community. As discussed in Chapter 4, the IT Roundtable did meet this condition; the Roundtable and its members formulated and voiced their preferences. However, while in the early and mid-1980s the IT Roundtable and its member companies merely lobbied for subsidies for precompetitive, collaborative R&TD, by the early 1990s the scope of their policy preferences had broadened considerably following the 1989 decision of the IT Roundtable companies to discuss and present their positions on a wider range of issues (see Chapter 1).

In the early 1990s, the IT Roundtable and its members lobbied, first of all, for a second generation of R&TD projects, which would be closer to the market and better funded, and which would preferably be combined with measures to foster vertical ties. Second, the Roundtable pressed for transitional protective arrangements to secure a balanced opening of third country markets and for controls on national incentives to inward investment. Third, the Roundtable advocated a relaxation of the Community's anti-trust policy and preferential treatment of the European-owned IT companies in the implementation of TENs (see Table 4.1). To a large extent, these specific policy preferences appear to have been a product of the increasingly internationalized nature of the IT industry, the absence of a level playing field in the world markets, and the crisis developing in the IT industry in the early 1990s (see Chapter 4).

As the IT Roundtable and its members did articulate their preferences, the loss of political influence in the early 1990s cannot be explained by the absence of liaising activities. However, were these activities adequate to bring across the IT Roundtable's policy preferences? Were there changes in the intensity, methods, targets and timing of the European-owned IT companies' political activity that may have undermined the success of their efforts in the early 1990s?

This chapter seeks to explain the IT Roundtable's loss in political influence in the late 1980s and early 1990s, in comparison to the early and mid-1980s, by analyzing the changes in the political activity undertaken by the IT Roundtable members, both individually and as a group. In accordance with the framework outlined in Chapter 2, the first section focuses on the effort that the companies have put into lobbying. The second section outlines the channels of the companies' lobbying activities. The third section discusses the lobbying targets. In particular, this section pays attention to the "openness" of the Community's political systems and how the different systems affect the opportunities of the IT Roundtable members' to articulate their policy preferences. The fourth section focuses on the timing of the companies' lobbying activities.

7.1 EFFORT PUT INTO POLITICAL ACTIVITY

Although the plight of the IT industry, combined with the increasing legislative powers of the EC (see Chapters 5,6), might have prompted the companies to increase their corporate political activity at the Community level, this thesis expected otherwise. Chapter 2 outlined the expectation that, in the early 1990s, the disappointing corporate profit margins, symptomatic for the structural changes in the IT industry and the recession, would have reduced the companies' resources and led to cut-backs in their lobbying efforts.

Measuring the effort put into political activity, however, has proven to be a difficult task as most of the necessary information is not generally in the public domain. At the level of the individual firm, indicators could include the number of man-hours that have been billed to political activity, the stature of the people involved, and the frequency at which interaction with government officials has been taking place.

Similarly, one could look at the company's membership fees for industry and other interest groups and, if legally allowed, its donations to political parties or action committees. At the level of the interest group, indicators could include the group's budget, its number of employees, its activity agendas, and the frequency at which representations have been made to the EC. As the time and work involved in operationalizing these indicators would warrant a separate research project, this thesis bases its general impression of the effort put into corporate lobbying in the early 1990s on the perception of the representatives of the IT Roundtable and its members (Interviews 5,8,14,15,16,29,36;1993; Cane, 9 December 1991).

This thesis has found that, in contrast to expectations, the economic difficulties of the early 1990s do not appear to have led to any reduction in the IT Roundtable's lobbying efforts. To the contrary, as a representative, speaking on behalf of the IT Roundtable, argued: "we have reinforced our activities, because we feel that the Commission should do something in times like these. The harder the times, the more we press the Commission for developing solutions" (Communication 36;1994).

Measured by the number of manhours devoted to liaising the Community, the representatives of Siemens, Thomson, Olivetti and ICL noted an increase in the effort put into lobbying the Community since the late 1980s, while Bull maintained its effort at the same level. As an Olivetti executive illustrated:

> Olivetti has invested more resources into lobbying the EC. We have done more. We believed in this approach and invested quite a lot of time in developing ideas, and in interacting with the EC (Interview;1993).

The only exception appears to have been Philips, which substantially cut down its resources put into lobbying. Prompted by its financial crisis, Philips "put little effort in EC-related activities" and "adopted a more inward-looking strategy" (Philips sources, Interview;1993). Moreover, in the context of Operation Centurion (see Appendix 1.1), Philips made redundant a large number of its older employees - those that were extremely suitable for EC-related work due to their experience and intimate knowledge of the company (Philips sources, Interview;1993). By the end of 1993, however, Philips had returned to the European political scene with calls for a "constructive European industrial scenario" and greater "cooperation" between the EC, the national governments, the scientific community and industry in order to improve Europe's technological competitiveness (NRC, 30 September 1993:22; Hill, 12 November 1993:2). In February 1994, moreover, Philips' President Timmer was appointed, together with his colleagues from ICL, Olivetti, Siemens and IBM Europe, as a member of the "Bangemann Group", formed to prepare specific policy recommendations in the field of new information technologies (Presse 4426/94; Communications 5,15;1994).

With the exception of Philips, the reduced corporate profit margins thus do not appear to have undermined the companies' political activity in the early 1990s. Yet, this hypothesis was not without justification, as evidence from the field of standardization will show. European standardization bodies, like CEN, CENELEC, ETSI, ECMA and EWOS, operate on the basis of voluntary contributions; whenever a company sends out its specialists, either directly or via the national standardization bodies, it is responsible for the experts' wages and overhead costs. In recent years, however,

> The number of man-hours made available by member companies has definitely become less. Companies withdraw from participation or offer less man-hours, and the people that they offer are more squeezed for time (EWOS sources, Interview 38;1993).

> The companies can no longer afford that some people work only part-time for them and part-time for us, while they pay their full-time wages (CENELEC sources, Interview 25;1993).

Consequently, it has not been easy for the standardization bodies to tap into the expertise they need to formulate European standards - an exercise vital for the establishment of a level playing field within the Community's Single European Market (see Chapter 3).

Considering this evidence, why have the EC lobbying activities of the European IT companies largely escaped the negative impact of the tighter financial conditions under which the companies have been operating since the late 1980s? A first explanation might lie in the size and degree of diversification of the companies in question. Large, diversified companies, like Siemens and Thomson, appear to have been less sensitive to the impact of the changes in the IT industry, as unsatisfactory performances in the IT business segments could be compensated by other, more profitable activities. As a Siemens executive argued:

> Although we have to reduce costs, we have less need to reduce expenditures in areas where Siemens thinks it is important to keep a presence (Interview;1993).

In the case of Philips, however, this argument does not apply. By the early 1990s, the financial performance had deteriorated to such a degree that the company was unable to compensate for its loss-making activities, forcing it to cut expenditures across the board.

A second explanation could be offered by changes in the responsibility/manhour ratios. Although ICL, for example, tripled its "manpower" on EC-related affairs since the late 1980s, the range of responsibilities that the executives in question had to deal with increased as well (Communication;1994).

A third explanation might be found in the basis on which the representative offices have been financed. Siemens' liaison office, for example, is not being paid out of an overhead. Rather, the office finances itself through selling its services to Siemens' business units. If the units do not perceive the Liaison Office's work as paying off, they will not pay for the services provided (Interview;1993).

7.2 CHANNELS OF POLITICAL ACTIVITY

Considering the fact that the loss of political influence of the IT Roundtable cannot be explained by a drastic reduction in the effort put into lobbying, one could question, as Chapter 2 did, whether the loss of political influence in the early 1990s has been due to a growing ineffectiveness of the IT Roundtable as a channel of political activity.

7.2.1 EFFECTIVENESS OF THE IT ROUNDTABLE AS A CHANNEL OF POLITICAL ACTIVITY

The IT Roundtable, which brings together the largest, European-owned IT and telecommunications (equipment) producers into a private club, can be considered an "association of companies" (see Figure 7.1). As Chapter 2 outlined, the small number of companies involved and their direct line of representation should help overcome the problems of free-riding and compromised interests that hamper many industry federations. Moreover, political actions, collectively undertaken by these large companies, should confer semi-representativeness on them and increase their political clout. Despite these advantages, however, the IT Roundtable's effectiveness as a channel for political activity appears to have been undermined.

On the basis of the interviews, three factors were mentioned that, in the perception of the interviewees, hampered the IT Roundtable's effectiveness: (1) the declining representativeness of the IT Roundtable, following the structural changes taking place in the industry; (2) the outdated structure of the Roundtable, suitable for articulating preferences in the area of R&TD but inappropriate for voicing broader preferences on industrial policy; and (3) the lack of internal coherence within the IT

Figure 7.1 The European-Grown IT Companies: Channels of Corporate Political Activity

	Individual	Collective
Indirect	**Indirect Corporate Representations on an Individual Basis** **Professional Lobbyists**	**National Industry Associations/ European Industry Federations** **EUROBIT** **EECA** **ORGALIME** **UNICE**
Direct	**Direct Corporate Representations on an Individual Basis** **Brussels Office** **Shuttle Diplomacy**	**Associations of Companies** **EITIRT** **ERT** **BOS**

Roundtable caused by the diverging interests of its members.

The IT Roundtable: Representativeness

When the IT Roundtable companies were invited by Commissioner Davignon for roundtable discussions, the twelve member companies were perceived as representative for the industry. By the early 1990s, however, this perception had changed - at least in the eyes of national government and EC officials (Interviews 3,33,39;1993). As one DG 3 official argued, "they are less and less representative of the electronics industry" (Interview 3;1993).

This change in perception was not so much a consequence of the reduction in the IT Roundtable's membership, as one might expect. Although the take-overs of Plessey and Nixdorf and the expulsion of ICL from the IT Roundtable did lead to a reduction in the Roundtable's membership-base from twelve to nine companies (see Table 7.1), these nine companies continued to account for the majority of the European Community's *indigenous* supply of computers and semiconductors (Appendices 5.4 and 5.9). As one IT Roundtable representative argued, "we consider ourselves as representing about 70 per cent of IT industry, in terms of personnel and turnover" (Communication 36;1994). Rather, the perception that the Roundtable had become less representative of the IT industry, appeared to be the result of two structural changes taking place in the IT industry.

First, while the IT industry has been shifting away from the production of computer hardware towards the production of software and services (see Chapter 5), the IT Roundtable has remained largely a group of hardware producers. Although the individual Roundtable members have been retargeting their operations towards software and services, the Roundtable as a group has not been representing an "important part of the European-owned software and services industry" (DG 3 sources, Interview

Table 7.1

IT ROUNDTABLE: PROFILE

EITIRT	**European Information Technology Industry Roundtable (IT Roundtable)**
Formed	1979/80
Location	Brussels
Members	Largest European-owned IT and telecommunications (equipment) companies. Initially, the membership of the IT Roundtable comprised the Group of Twelve, i.e.: General Electric Company (UK), ICL (UK), Plessey (UK), Thomson (F), Bull (F), CIT-Alcatel (CGE) (F), Siemens (G), AEG (G), Nixdorf (G), Olivetti (I), STET (I) and Philips (NL). After expulsion of ICL and the take-overs of Nixdorf by Siemens, Plessey by GEC and Siemens, and AEG by Daimler-Benz, the IT Roundtable's membership base has been reduced to nine companies: GEC Marconi (UK), Thomson (F), Bull (F), Alcatel (F), Siemens (G), Daimler-Benz (G), Olivetti (I), STET (I) and Philips (NL).
Structure	(1) *Top-level Meetings:* Semi-annual meetings of the CEOs of the member companies, led by rotating presidency. At these meetings the Roundtable's policy-line is set. Also: participation of CEOs in ad-hoc special meetings, for example with Commissioners. (2) *Strategic Committee:* Executives responsible for the long-term strategic planning in IT in their respective companies. The Strategic Committee, which meets about 10 times a year, identifies the areas of action, prepares the decisions of the CEOs at the Top-level Meetings, and executes the decisions taken. This Committee is responsible for the day-to-day affairs of the IT Roundtable. (3) *Working Groups:* Groups, consisting of representatives of the member companies, dealing with specific issues, such as R&TD and ENS, and reporting to the Strategic Committee. (4) *Industrial Office:* Secretariat. Additionally, IT Roundtable members (R&D executives) participate in the *ESPRIT/IT Steering Committee*, which gives scientific advice on EC R&TD programmes.
Decision	Consensus.
Objective	Representation of the European-owned IT industry's interests to the EC, with the ultimate aim of improving the European IT industry's international competitiveness.
Issues	*(1) IT Research and Development:* Collaborative R&TD in the context of the EC's Framework Programmes: (a) ESPRIT; (b) new generation IT R&TD programme. *(2) Industrial Policy in the area of IT:* Industrial policy; completion of the Single European Market; programmes for Central and Eastern Europe; industrial (re)structuring; international trading conditions; demand stimulating projects, et cetera.
Sources	IT Roundtable sources (Interview 36;1993; Communications 29,36;1994); IT Roundtable manifestos, opinions and papers; Cane, 11 March 1991; De Jonquières and Thomson, 5 February 1991; Peterson (1992:231-232); Sharp (1993:206); Sharp and Shearman (1987:49-50).

3;1993). The software and services producers Cap Gemini Sogeti[1] (F), Finsiel (I) and the Sema Group (UK), for example, have no membership in the IT Roundtable (see Table 7.1) while these companies did belong to the 10 largest European-grown dataprocessing companies in 1992 (See Appendices 5.9 and 5.11).

Second, with the greater focus on the use of information technology rather than its supply, it has become increasingly important for government officials to get the policy input of IT *users* (see Chapter 4). The IT Roundtable, however, is mostly seen as an association of IT (and telecommunications equipment) suppliers. Although this criticism is not totally justified, as the IT Roundtable members are simultaneously large consumers of IT, the Roundtable does not represent large IT users in industries other than IT and telecommunications equipment - with the notable exception of Daimler-Benz, which took over AEG (see Table 7.1).

As a consequence of the perceived decline in representativeness of the IT Roundtable, the Commission does not "follow in the footsteps of the Big 12" any more, as was the case in the early and mid-1980s (EZ sources, Interview 19;1993). As Chapter 4 illustrated in the case of the Community's second generation IT R&TD programme, by the early 1990s, "the Roundtable's monopoly on industry-input into the Commission", had come to an end (Business Europe, 15 February 1991:6; Communication 30;1993).

Although the IT Roundtable remains one of the main sources of policy inputs into the Commission, computer software and services companies and IT users have begun to compete with the IT Roundtable in providing policy inputs. Additionally, SMEs and foreign companies - neither of which have ever been represented by the IT Roundtable - appear to have become increasingly involved in EC policy formulation.

The wider range of parties consulted in EC IT policy-making resulted, in part, from a conscious Commission policy to widen the scope of its consultations to include parties of which the contributions, for various reasons, have been perceived as important. This has been applying very clearly to the effort of the Commission to involve users in the development of the Community's new IT R&TD programme (see Chapter 4). Similarly, the increased consultation of SMEs can be interpreted as an EC-initiated, top-down initiative, which appears to have been driven by a political lobby, convinced about the benefits that SMEs, as a group, may yield (CEC and industry sources, Interviews 4,21; Communication 28;1994). The attention paid to foreign-owned companies and their policy positions, meanwhile, can be seen as reflecting a growing recognition on the side of the Community and its Member States of the value of the contribution of foreign, and particularly, American companies to the Community's economy - a recognition displayed by Ireland, for example, in the Council discussion on the 1991 White Paper (see Chapter 4).

The broader scope of consultation, however, has also been a consequence of an increase in political activity undertaken by the competing interested parties, following their recognition of the increasing importance of the EC as a policy-supplier (see Chapter 6)[2]. As one national government official argued:

> When ESPRIT started shaping up according to plan, the large users became interested as well. They told the EC to pay more attention to the demand-side. They argued that it was no use to continue supporting the supply of a technology, if the users were not ready to apply it. This was a clear movement towards the end of the 1980s, which has brought the users together. They subsequently started formulating their needs (EZ sources, Interview 19;1993).

Not only users, but also the academic world and SMEs started to organize themselves and to attune their policy stances on the Community's IT policies; "Brussels got more information and faced more lobbies, more pressure from different sides" (EZ sources, Interview 19;1993).

Indicative for an increase in political activity of competing interest groups has been, amongst others, the establishment of the Group of Six in 1991, an association of six European-owned computer software and services companies[3]. The Group of Six seeks to give the computing services industry a "European voice" and to counterbalance the influence of the main European hardware manufacturers, i.e. the IT Roundtable, in EC policy formulation (Cane and Taylor, 13 March 1992:2). Similarly, foreign-owned companies have stepped up their political activities. In 1985, for example, the American Chamber of Commerce established its "EC Committee", which acts as the voice of companies like IBM, Digital Equipment, Intel, Motorola, Texas Instruments, Unisys and Sun Microsystems. In 1991, the American Electronics Association founded a European affiliate, representing over 80 European electronics companies of American parentage to the Community and the M/S governments (Communication 46;1994).

The IT Roundtable: Alignment of Structure and Function

It has also been argued that the effectiveness of the IT Roundtable as a channel of political activity has been hampered by the mismatch between the IT Roundtable's structure and its current functions; while the IT Roundtable was designed to meet the objective of providing policy input into the Commission on EC IT R&TD policies, the IT Roundtable's structure was arguably not adequate to provide policy input on a wider range of industrial policies. As one DG 3 official argued:

> The representatives of the participating companies are R&D people. They are not geared towards broad topics relevant to the strategy of the company. Such issues can only be discussed at the CEO level. The structure is not geared towards industrial policy making (Interview 3;1993).

Although such a perception is bound to have affected the degree to which the official in question has been receptive to the IT Roundtable's policy preferences, the perception is not totally justified. Albeit true for the IT Roundtable members present in the IT (ESPRIT) Steering Committee, this assertion does not fully hold for the IT

Roundtable's Strategic Committee. This Committee, which plays together with the Working Groups an important role in preparing the IT Roundtable's positions (see Table 7.1), consists of the executives responsible for long-term IT planning in their respective companies. In Spring 1993, the Strategic Committee included not only Technical Directors, but also Assistants to the Board of Management and Vice Presidents (Membership list;April 1993). Although the responsibilities of the latter may certainly include IT research and development, generally their position covers a wider range of issues. As an IT Roundtable representative argued, "they are not only dealing with R&D. They deal with IT in general" (Communication 36;1994).

IT Roundtable: Internal Coherence

A third factor allegedly hampering the effectiveness of the IT Roundtable has been the occasional lack of internal coherence within the association. Despite the fact that the Roundtable consists of a small group of selected companies, which implies that it is more homogeneous than most interest groups (see Chapter 2), it has been argued by IT company sources that the Roundtable's set-up does merely "accommodate and not solve" the member companies' divergent interests (Interview 15;1993).

One faultline has divided the telecommunications (equipment) producers and the IT firms - although, obviously, some companies belong to both camps (IT company sources, Interviews 5,15;1993). While the telecommunications firms, mostly profitable, have been operating in a highly regulated and nationally protected environment, the IT companies, mostly loss-making, have been operating in a relatively deregulated and globalized industry (see Chapter 5) - leading to differences in their attitude towards public ownership and intervention. While the telecommunications producers have been serving a relatively small number of clients predominantly within the home market, the IT companies have been serving hundreds of customers across the world - resulting in "different views of how the market develops" (IT company sources, Interview 15;1993). These different conditions of operation have led to divergencies of interests on a "regular" basis (IT company sources, Interview 15;1993).

Even within the IT camp, interests have been split, notably between the semiconductor producers and the computer companies (see Chapters 3,4). Beyond the divergent opinions on the EC semiconductor tariff, anti-dumping duties and price undertakings, the semiconductor and computer producers also have differed on the allocation of EC R&TD funds. While the semiconductor producers allegedly pleaded for more funds, an executive from a computer producing company commented:

> Our view is that any ECU invested in semiconductors is wasted. It is too late. They can maintain their position in ASICs, niches or RISCs, but Europe will not recover the gap in the larger volume semiconductors (Interview 5;1993).

Although the advantage of the IT Roundtable, at least in the perception of one participant, has been that the companies "talk to each other, know each other, and know each other's positions" (Interview 8;1993), understanding each other has not been sufficient to reach consensus on sensitive policy issues that risk dividing the membership base along the lines outlined above. Lack of consensus, meanwhile, has led to none or very general statements on the policy issues in question, such as: "the EC should adopt a sector by sector approach to the reduction of tariffs" or "anti-dumping procedures" should be "reinforced" (IT Roundtable sources, 1991). As a consequence, it is only in those broad areas that affect all Roundtable members, such as unfair trade and market access in general (see Chapter 4), that the IT Roundtable has been able to build the consensus to formulate and sustain common positions. As an IT company executive commented about the Roundtable:

> If you have very divergent interests, you cannot have a very strong position. Then it becomes a forum. And when it is a forum, it has no influence (Interview 29;1993).

IT Roundtable: Effectiveness

Although the IT Roundtable was regarded as a highly effective channel of political activity in the early and mid-1980s, by the early 1990s, this appeared not to be the case. In the perception of government officials, the reduced representativeness of the IT Roundtable and their rightly or wrongly attributed "R&D" image have hampered the effectiveness of the Roundtable as a channel for articulating policy preferences (CEC and national government sources, Interviews 3,19,33,39;1993; Communication 30;1993).

In the perception of corporate executives, the lack of internal coherence has undermined the IT Roundtable's effectiveness (IT company sources, Interviews 5,8,15,29). As one executive concluded on the basis of his experience:

> I am not impressed by the results, given the amount of time invested. [..] I am not overly impressed by the coherence of the IT Roundtable and the impact that we have had on EC policies. As a group, we have not gotten very far (Interview 5;1993).

7.2.2 ALTERNATIVE CHANNELS OF POLITICAL ACTIVITY

In Chapter 2, the expectation was outlined that doubts about the effectiveness of the IT Roundtable as a vehicle for articulating policy preferences may have prompted the European-owned IT companies to opt for alternative channels of political activity. This thesis, however, found that, although the IT Roundtable "is not necessarily as good as any of the participating companies would like it to be" (IT company sources, Interview 5;1993), the European-owned IT companies have continued to use the Roundtable as a channel of political activity. It was felt that, *if* consensus could be reached, collective actions through the IT Roundtable could add greater political clout to the policy preferences brought forward. As one IT company executive argued, "one should always try to use [the IT Roundtable] to bring the message to the Commission" (Interview 29;1993).

In certain cases, however, the companies have used alternative channels, which appear more appropriate to articulate the companies' preferences on specific issues than the IT Roundtable. The alternative IT-related channels of political activity, and their membership, have been outlined in Table 7.2. Appendix 7.1 summarizes the membership of the main European-level interest groups, their decision-making requirements, objectives and range of issue areas. The cases in which the European-owned IT companies as well as ICL have opted for alternative channels include: trade; TENs and software; and standardization.

Trade-Related Issues: EECA and EUROBIT

The European IT companies have opted to pursue their trade-related policy preferences through EECA and EUROBIT. The two European industry federations represent respectively the European component industry and the European business machines, IT and telecommunications terminal equipment industries (see Appendix 7.1).

The European IT companies have not been directly represented in these industry federations; rather, they have been represented via their membership of national industry associations (see Table 7.2). This indirect line of representation implies that the companies may formally be represented by their national associations in EECA or EUROBIT without actively contributing to the formulation of the national associations' policy stances. Olivetti, for example, has been a member of ANIE, which represents, amongst others, the interests of Italian component manufacturers in EECA. Olivetti has had an interest in participating in ANIE/EECA related activities via its control of Technicom, a Printer Circuit Board (PCB) producer. In a cost-reduction exercise

Table 7.2

CHANNELS OF POLITICAL ACTIVITY: CORPORATE MEMBERSHIP

Companies	**Brussels** Office	**Prof.** Lobbyist	**Associations** *ERT*	*ITRT*	*BOS*	**European Industry Federations** *UNICE*	*ORGALIME*	*EECA*	*EUROBIT*
						Representation via national associations only. Membership of national associations does not necessarily imply involvement.			
Siemens/SNI	●		▲*a*	●	●	● BPA/BDI	● ZVEI	● ZVEI	● VDMA/ZVEI
Philips	●		●	●		● VNO/NCW	● FME	● FAPEL	
Bull	«		●	●	●	● CNPF	● FIEE	● SYCEP-SIT.	● SFIB
Olivetti	●		●	●	●	● Confind.	● ANIE	● ANIE	● ASSINFORM
Thomson	●	▲*b*	▲*c*	●		● CNPF	● FIEE	● SYCEP-SIT.	● SFIB
ICL	●/«			▲*d*		● CBI	BEAME	● ECIF	● EEA

Sources: Interviews with corporate executives, 1993; European Round Table list of members, November 1992; Communications with ANIE, SFIB, BEAMA, SYCEP-SITELESC, FIEE, EUROBIT, March 1994; Appendix 7.1.

Notes

● Member
▲ Former Member/Use
« Shuttle Diplomacy
a Karlheinz Kaske, President and Chief Executive Officer, used to be vice president of the ERT
b From ca.1990-1993: use of consultant to lobby the EP only
c Alain Gomez, chairman and chief executive officer of Thomson-CSF, used to be a member of the ERT
d ICL was expelled from the IT Roundtable after its take-over by Fujitsu

around 1993, however, Olivetti (Technicom) left ANIE in this *particular* sector. Although still a member of ANIE in different areas, Olivetti has not been involved in electronics component-related ANIE activities since 1993 (ANIE sources, Communication 44;1993).

The preference of the European IT companies to handle their trade-related issues through EECA and EUROBIT can be explained by the inability of the IT Roundtable to accommodate the array of interests amongst its members. Despite their broad membership base (see Appendix 7.1), EECA and EUROBIT have obviously been sufficiently homogeneous to come up with specific positions. In that context, it is interesting to note that, despite the membership of foreign-owned companies in EECA's member associations, no foreign companies have been allowed to participate in EECA's Semiconductor Product Committee which prepares EECA's policy stance on semiconductors (Interview 31;1993; Appendix 7.1). The additional advantage of operating through EECA and EUROBIT has been that it has conferred de facto representativeness on the IT companies, as illustrated in the semiconductor anti-dumping cases (see Chapter 3).

TENs and Software: BOS

In 1991, the IT Roundtable's remaining indigenous European computer companies, i.e. Bull, Olivetti and SNI, chose to concentrate their forces and to jointly pursue their interests on two very specific issues, namely TENs and software. The three companies, facing similar problems and challenges, formed a new association: BOS. BOS is as much a cooperative alliance as it is an "interest" group. The BOS initiative seeks to provide for joint responses to Community calls for public procurement tenders relating to IT Trans European Networks; joint definition of a common computer platform which will secure the interoperability of the companies' products and joint development of software; and, finally, joint promotion of the companies' case to the EC and national governments (IT company sources, Interviews;1993; Appendix 7.1).

Even the formula adopted by BOS, however, does not shield the association from the "coherence" problems faced by the IT Roundtable. The interests of the BOS companies allegedly have been diverging along two lines: (1) public versus private ownership, pitting Bull against Olivetti and Siemens Nixdorf, on actions that might involve closer ties between the three partners; and (2) mainframe versus PC production, pitting Bull and Siemens Nixdorf against Olivetti, on the timing of actions that might affect mainframe sales.

Standardization: CEN, CENELEC, ETSI, ECMA, EWOS, AND SPAG

Standardization-related issues have mostly been pursued through the European standardization bodies. These include both the formal European organizations CEN, CENELEC, and ETSI, and the standardization associations ECMA and EWOS (see Table 7.3).

While ETSI allows for direct corporate membership, CEN and CENELEC consist of nationally organized standardization organizations (see Appendix 7.1). CEN and CENELEC's indirect lines of representation prevent any direct company membership. Nevertheless, it has occurred that employees of one European-owned IT company were sent out as the "national representatives" of multiple EC countries (CENELEC sources, Interview 25;1993). In particular, this may occur when the company in question is the only one with a significant expertise in the area under discussion and when this company has sufficient interest in the standardization process to be willing to assign its specialists to the standardization effort. The exercise of such a "monopoly of legitimate expertise" is particularly preponderant in the area of

Table 7.3

STANDARDIZATION BODIES: CORPORATE MEMBERSHIP

Companies	Associations			European Industry Federations		Mixed[e]
	ECMA	*EWOS*	*SPAG*	*CEN*	*CENELEC*	*ETSI*
				Representation via national associations only. Membership of national associations, however, does not necessarily imply involvement.		
Siemens/SNI	●	●	▲a	● DIN	● DKE	●
Philips	●	▲b	▲a	● NNI	● NEC	●
Bull	●	●	▲a	● AFNOR	● UTE	●
Olivetti	▲c	●	▲a	● UNI	● CEI	●
Thomson	▲d		▲a	● AFNOR	● UTE	●
ICL	●	●	▲a	● BSI	● BEC	●

Sources: Interviews with corporate executives, 1993; ECMA Memento 1993; EWOS, Interview 38;1993; EEA information brochure; ETSI, Communication 45;1994; SPAG, Communication 47;1994; Schneider, 1992:57; Communications with ETSI, UNI, CEI; June 1994; Communications with AFNOR, UNI, CEI, UTE, June 1994; Appendix 7.1.

Notes

● Member
▲ Former Member
a SPAG S.A. has not been in existence since December 1993
b Philips reduced its involvement following its decision to withdraw from microcomputer production
c Olivetti was a member of ECMA according to ECMA Memento 1991, quoted in Schneider (1992:57)
d Thomson-CSF was a member of ECMA according to ECMA Memento 1992
e Direct membership for companies and other interested parties, but approval of ETSI standards by national standardization bodies

standardization, although it may also occur in the case of detailed R&TD proposals. Most industrial policy issues, however, affect a broader base of interested parties with adequate expertise.

In contrast to CEN and CENELEC, EWOS and ECMA are associations of companies. While effective participation in CEN and CENELEC requires that the European IT companies successfully lobby the national standard bodies, EWOS and ECMA allow the producers to participate directly. This implies that the manufacturers have a direct influence over the formulation of the draft standard. EWOS and ECMA, however, cannot endorse European standards; the draft standards will subsequently have to be put up for adoption by CEN, CENELEC or ETSI, or by the international standardization bodies.

During the 1980s, a third standardization association was operational, namely the Standard Promotion and Application Group (SPAG). Comprising the Big Twelve companies, SPAG was "a major promoter of a mechanism where organizations could participate directly in the standardization process" (EWOS sources, Interview 38;1993; Pannenborg, 1986:27). Established in 1984, SPAG initially sought to develop functional standards (OSI profiles) and to promote the use of these standards in public procurement. In 1987, however, SPAG's mission was altered dramatically - as "negotiating as a club, as the Twelve amongst each other, did not work any more" (SPAG sources, Interview 35;1993). Realizing the importance of users, SPAG co-founded EWOS which took over the task of developing profiles. SPAG, meanwhile, decided to concentrate on the conformance testing of standards, while SPAG Services, a 1986 offspring, would commercialize the testing tools. The economic difficulties in the IT industry in the early 1990s, however, prompted the participants to end their cooperation in SPAG. In December 1993, SPAG formally stopped its operations. By that time, SPAG Services had already been out of business for some time (SPAG sources, Communication 47;1994).

Individual Corporate Representations

In the face of the growing importance of lobbying the Community (see Chapter 6) and the shortcomings associated with indirect representations, the European IT companies appear to have put increasing emphasis on direct, individual representations - a conclusion underscored by the establishment of liaison offices in Brussels. Since the late 1980s/early 1990s, all European-grown IT companies, with the exception of Bull, have established a base in Brussels, responsible for informing the headquarters and corporate divisions on EC-related issues and for liaising with the EC institutions and the national delegations to the Community (see Table 7.2).

Siemens opened its Liaison Office to the EC in 1989. In addition to the eight-strong permanent staff (1993), the Brussels office also uses specialists dispatched from the headquarters. Philips has had an office in Brussels since the 1960s. Initially, the office merely consisted of a secretary and was not actively representing Philips' views to the EC. Only when "Europe became an issue", the company decided to staff the office with more employees, and of a higher stature. Currently, the office is manned by one executive, one assistant and one secretary. Olivetti set up its European Affairs Division in 1992 and employed six people in this division by 1993. Thomson-CSF has been operating a one-man office in Brussels since 1990. The office, which is solely responsible for liaising with the Commission, has been supplemented by various other specialists responsible for issue areas, such as the EC's R&TD Framework Programme. Additionally, until recently, a full-time, Paris-based consultant was responsible for liaising with the EP. Like Bull, ICL has been pursuing its relations with the EC through a regular shuttle diplomacy by the responsible, London-based manager. In respectively 1990 and 1992, however, ICL also decided to appoint two Brussels-based employees to work on EC-related issues (IT company sources, Interviews 5,8,15,16,29;1993; Communications 5,8,14,15,16,29;1994).

As Table 7.2 shows, the establishment of a Brussels office and/or shuttle diplomacy between the headquarters and Brussels have made the need for representations via independent intermediaries, such as consultants or professional lobbyists, largely unnecessary. Lobbying via such organizations has been perceived as more expensive and less effective. In fact, one corporate executive felt that lobbying through any intermediary, whether this would be a professional lobbyist, an association of companies or an industry federation, was not as effective as lobbying the Community directly and on an individual basis;

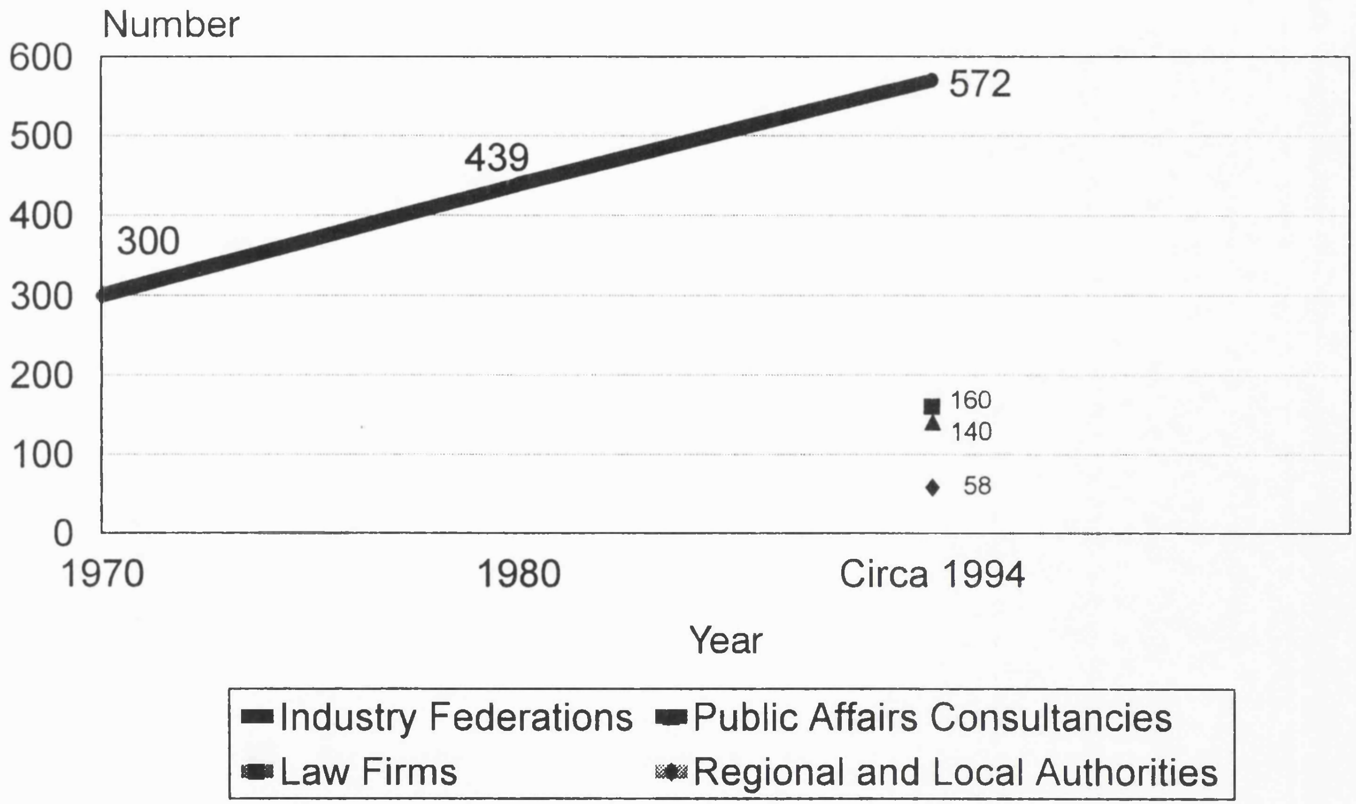
> Individual companies are more effective in the lobbying of both the Member States as well as the Commission than were they to operate through any organization. The European Round Table, for example, is not ineffective, but it is not as effective as individual firms (Interview 5;1993).

7.3 LOBBYING TARGETS

Over time, the EC has developed into a more mature supplier of public policies; issues that were formerly decided by the national governments, are now decided in Brussels (see Chapter 6). With the shift in competencies, the European Community has become increasingly important as a corporate lobbying target, as Figure 7.2 illustrates.

The EC comprises a network of institutions, including the European Commission, the European Parliament (EP), the Economic and Social Committee (ESC), and the Council of Ministers, which vary in their importance as lobbying targets. The Commission has been the primary lobbying target, due to its role in the EC policy-making processes (see Chapter 6). The European-grown IT multinationals

Figure 7.2 Proliferation of Interest Groups Operating at the EC Level, 1970-1994



Sources: Andersen & Eliassen, 1991:174; Butt Philip (1987:282); Financial Times, 26 May 1994:4

have been particularly interested in the Commission's mandate to draft legislative proposals and communications on issues of concern - an interest justified by the fact that approximately 80 per cent of an initial Commission proposal is retained in the final version adopted by the Council (Hull, 1993:83; Green, 2 April 1992:8). As one IT company executive explained:

> It is essential to lobby the Commission because it is when proposals are being discussed at the Commission level, that you can influence them. If you are too late, you cannot change them any more (Interview 29;1993).

Additionally, the European-grown IT companies have been interested in the Commission's own executive powers, notably those in the area of competition policy, commercial policy and the administration of funds, as the Commission's actions in these areas have affected the companies' operations and the playing field in which they operate.

The European Parliament also constitutes a lobbying target of the European IT companies, albeit of secondary importance to the Commission. However, since the introduction of the cooperation and co-decision procedures which confer greater political leverage on the EP (see Chapter 6), the importance of the European Parliament as a lobby target has increased substantially (Andersen and Eliassen, 1991:181). As one IT Roundtable member illustrated:

> Lobbying the European Parliament has become more important since the Single European Act. The fact is that the European Parliament could introduce political amendments. For example, we were afraid that the European Parliament would do so in the case of HDTV. The Commission had come up with an interesting proposal. There was the risk that the European Parliament would change it or amend it in the wrong way. It was thus important to persuade them to support our case (Interview;1993).

The ESC, as a mainly consultative body on selected legislative proposals, does not "really play a key role in influencing and deciding on EC policies" (UNICE sources, Interview 4;1993). Consequently, the ESC's ranking as a lobbying target has been low.

Finally, the Council of Ministers, responsible for the final approval of legislative proposals, is targeted "at home, not via the IT Roundtable" (IT Roundtable sources, Interview 36;1993). The individual IT Roundtable members target their respective home governments, as "the government is the last defender of your interest in the Council, in the case that you have not succeeded in convincing the Commission" (IT company sources, Interview 29;1993). Additionally, efforts have been undertaken by the individual companies to lobby other M/S governments as the introduction of QMV on various IT-related policy-issues has made it imperative to get the support of either a winning majority or a blocking minority (IT company sources, Interviews 5,8,29; see below).

As the Council, its subordinate bodies, and expert committees advising the Commission consist of national government officials (see Chapter 1), lobbying the M/S governments remains a vital ingredient for successfully influencing EC policies (Andersen and Eliassen, 1991:181; Butt Philip, 1987:283; 1985:56). The Community's increasing importance as a lobbying target has thus not led to a shift in corporate political activity *away* from the national governments. Rather, lobbying the Community appears to have been complementary to lobbying the national governments.

As Chapter 2 outlined, the success of any political activity aimed at the Community depends in part on the "openness" of the political system targeted. It is, therefore, possible that the IT Roundtable's loss of political influence over the EC's IT policies in the early 1990s, caused in part by its intrinsic shortcomings, may have been aggravated by a reduction in the openness of the EC and its Member States to corporate lobbying. The following sections will discuss the openness of the European Community in terms of: (1) the degree of fragmentation of EC policy-making and implementation, (2) the extent of insulation of the policy-making and implementing bureaucracy, (3) its legitimacy, (4) its need for information, notably on technical issues; and (5) its attitude towards corporate demands, based on ideology and past experiences. The openness of the national governments will be discussed in more general terms.

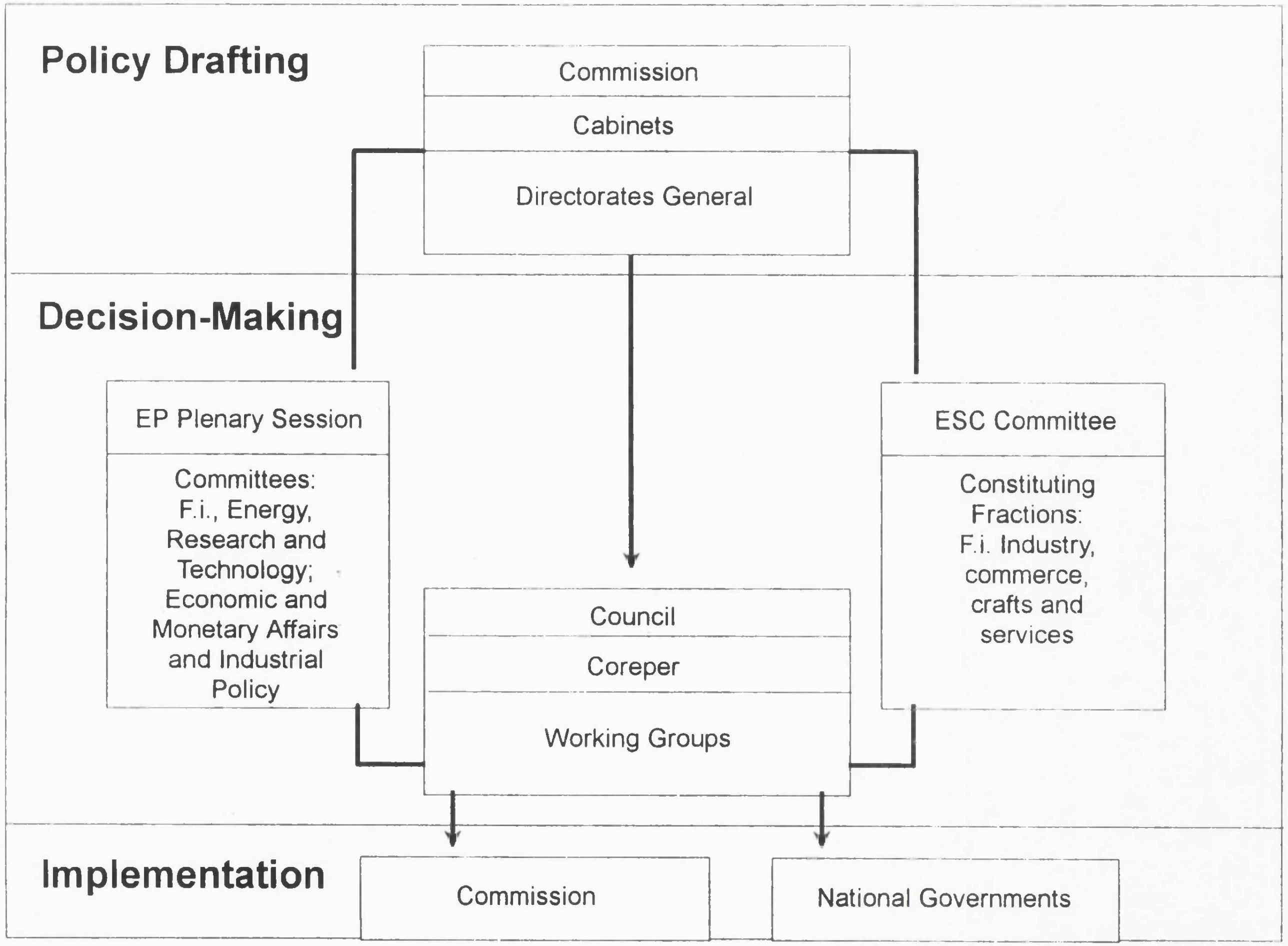
7.3.1 FRAGMENTATION OF EC POLICY-MAKING

As Chapter 6 has shown, the decision-making at the EC level has been relatively fragmented, involving the Commission proposing policies, the European Parliament submitting opinions and proposing amendments, the Economic and Social Committee voicing opinions, and the Council of Ministers taking the final decisions (Figure 6.2). Additionally, the policy-making and implementing processes have been fragmented within each institution, as Figure 7.3 illustrates.

Within the Commission, the drafting process has been divided into four stages, involving different levels of the Commission hierarchy. First, a proposal is initiated by one or more officers within the responsible DG, i.e. DG 3 and 13 for IT-related policy proposals (see Chapter 4), and drafted in close consultation with interested governmental and societal parties. Second, once drafted, the proposal is subject to formal procedures for inter-DG consultation, which may be extremely contentious as the DG 4-DG 13 antagonisms in the case of the 1991 White Paper have illustrated (see Chapter 4). Third, prior to its discussion by the Commission, the draft proposal is being evaluated by the Commissioners' cabinets. Finally, the draft is subject to approval by the Commission. Once approved, the proposal will be send for perusal to the Council of Ministers, EP and ESC.

The ESC develops its draft opinions within the ESC's sectorally-organized fractions and, subsequently, adopts these by the 189-strong committee (see Figure 7.3). The EP develops its opinions and amendments, which are approved by the MEPs

Figure 7.3 EC Institutions



Sources: Nicoll and Salmon, 1994:61; Noel, 1988 during the plenary sessions of Parliament, in parliamentary committees (see Figure 7.3). Two committees, in particular, have been working on IT-related issues, namely: the Committee on Economic and Monetary Affairs and Industrial Policy, which prepared the EP's position on the Bangemann communication on an EC industrial policy (see Chapter 4, OJ C240, 1991) and the January 1994 Resolution on the IT industry (see Chapter 10), and the Committee on Energy, Research and Technology, which has been involved in the Fourth Framework's legislative process (EP sources, Interview 21;1993; Chapter 4).

The European Parliament and the ESC feed their input on legislative proposals into the Council Working Groups and the Committee for Permanent Representatives (COREPER). These organizations, which are subordinate to the Council of Ministers, are responsible for the preparatory negotiations on the legislative proposals which will eventually be discussed in the Council meetings (see Figure 7.3).

Once a policy proposal has been adopted by the Council, these policies will be implemented by either the national governments or by the Commission. As the implementation of the 1991 White Paper has illustrated, this may also be a fragmented affair; not only DG 3, but also DG 1 (external trade) and DG 5 (training), for example, have been involved (DG 3 sources, Interviews 3,11;1993).

In conclusion, EC policy-making has been very fragmented. As outlined in Chapter 2, such a fragmented policy-making structure opens up an array of opportunities for companies to articulate their policy preferences and, thus, contributes to the openness of the EC towards corporate political activity. Yet, one notion of caution is warranted. Although a fragmented policy-making organization opens up many opportunities to influence, convincing all decision-making points to adhere to a coherent policy line may be a difficult and time-consuming process. As one industry representative argued: "As long as there is not a more integrated European political system, we will not get a coherent European IT policy" (Interview 31;1993). This has been illustrated, for example, by the lack of coherence between the Community's commercial policies, aimed at protecting the European semiconductor producers against foreign competition, and the regional policies, offering incentives to foreign competitors to directly invest in what could be considered the European-owned semiconductor producers' "back-yard" (see Chapter 4).

7.3.2 INSULATION OF EC INSTITUTIONS

Not only has EC policy-making been relatively fragmented, also the Commission, the Parliament and the national governments constituting the Council of Ministers, have been relatively exposed to corporate interests (see Chapter 2). The following section will not discuss the exposure of the ESC, because of its limited importance as a lobbying target.

The Commission

Due to its "open door" policy, the Commission has encouraged the input of the European-owned IT companies. As an IT Roundtable representative argued:

> The receptiveness of the Commission is not to be blamed. There are regular meetings. I have the impression of an "open ear": they invite us to give our opinions (Interview 36;1993).

As Chapter 4 has illustrated, the IT Roundtable companies were able to express their policy preferences on a new IT policy approach, later outlined in the 1991 White Paper, during a formal meeting in July 1990 and, subsequently, through informal interaction. Even when the proposal had moved up the Commission hierarchy to the rather insulated top-levels (Spence, 1993:5), the IT Roundtable companies used their ability to get direct access to the Commissioners to voice their preferences - the

February 1991 letter to Commissioner Bangemann being a case in point (IT Roundtable sources, Interviews 15,36;1993; Chapter 4). Similarly, the IT Roundtable companies have been able to express their policy preferences on the formulation of the new IT R&TD programme and on the TENs (see Chapter 4).

When comparing the formulation of the EC's 1991 White Paper, the new IT R&TD programme and the TENs with the formulation of ESPRIT, however, it becomes clear that - although the IT Roundtable was involved in the drafting process - the Roundtable and its members had clearly lost their monopoly on policy input into the Commission (see Chapter 4). In the case of the 1991 White Paper, for example, they were not the only party to be consulted; informal interaction took place with, for example, EECA and EUROBIT (see Chapter 4). The same applies to the formulation of the new IT R&TD programme and the TENs.

The European Parliament

Like the Commission, the European Parliament has been exposed to the policy input of the European-owned IT companies. Although it has been considered "useless to influence the EP in its plenary session" and "even useless to distribute papers amongst MEPs as they receive large amounts of information" (IT company sources, Interview 8;1993), the IT Roundtable companies have been able to express their views in two manners.

First, the companies, either operating as the IT Roundtable or in smaller groups, have had meetings with the parliamentary Committee on Energy, Research and Technology and the Committee on Economic and Monetary Affairs and Industrial Policy (EP sources, Interviews 1,21). These meetings, however, appear to have been rather ad-hoc and irregular. As one EP source argued: "The IT Roundtable and the Committee [on Economic and Monetary Affairs and Industrial Policy] meet about once a year or once in the two years" (Interview 1;1993).

Second, the IT Roundtable companies, operating on an individual basis, have had "personal contacts with the members of Parliament" (EP sources, Interview 1;1993; IT company sources, Interview 5,8). As argued by two IT Roundtable members:

> The EP and the Commission have a different method of working. For lobbying the Parliament, you need to know all different influential people in the commissions, the political parties, and so on (Interview 29;1993).

> It is important that you target a few people and on a continuous basis; to keep them informed. These people are interested" (Interview 8;1993).

Overall, however, as one EP source argued, the contacts between the EP, on the one hand, and the IT Roundtable and its members on the other, have been "limited and very formal". As one IT company executive admitted:

> We are not very happy yet about our own performance. It is a question of time and resources to build up relations. [..] We have to concentrate and spend more time and effort on liaising with the Parliament (Interview 8;1993).

The Council of Ministers

In order to expose the Council to the interests of the IT Roundtable companies, it has been imperative to win over one or more national governments (see above). However, how open and how receptive have the national governments been to the policy preferences articulated by their former national champions? Moreover, has it been sufficient to "capture" only the respective home governments?

France. Despite France's reputation of being a strong, centralized state, able to act autonomously from corporate interests (Zysman, 1984:265;1983:300-301), Milner (1987a:274-288) argues that during the 1980s, the French policy-making process has allowed for significant business involvement, especially of the larger companies. Milner (1987a:274-288) and others[4] have particularly pointed to the following three aspects of the French policy-making process: (1) the multiple channels of access for business into the government, indicative of the latter's fragmentation; (2) the exposure of French bureaucrats to corporate inputs following the high degree of labour mobility from government to business, the close working relationships existing between high-level government officials and corporate executives, and their common educational background as alumni of an elite group of institutions; and (3) a long-standing tradition of interaction between government and industry, characterized by *negotiations* rather than by pure dirigisme.

As expected on the basis of Milner's work, it was felt by various interviewees that there had been substantial interaction between the French government and its IT champions Bull and Thomson. Although a SERICS official argued that "each country is listening to the demands of its own companies, but not always will a country totally and fully support these firms" (Interview 18;1993), the relationship between the government and its companies has been described as "very close" (Interview 18;1993). As one EC official argued:

> With respect to the French government, it is difficult to distinguish between its position as a Member State advising the EC on R&TD policy and as the owner of [Bull and Thomson]. It is only natural that the interests coincide (Interview 6;1993).

The United Kingdom. In comparison to France, policy-making in the United Kingdom has been relatively devoid of business involvement. During the Thatcher years, access of manufacturing companies to the government was thwarted by: (1) the discrediting of "industrial" policies; (2) the demise of corporatist relations; (3) the preference for macro over micro-economic policies, and (4) the emphasis on services rather than manufacturing. The British government's relatively cohesive administration, combined with a general lack of mobility between the private and public sector and the absence of strong alumni networks, has further hampered the openness of the British government to corporate political activity[5]. As an ICL source argued: "The

Commission is a relatively open bureaucracy - unlike the British civil service which is relatively closed" (Interview;1993).

Under Michael Heseltine as the Director of the Board of Trade, however, DTI has sought to create a high-level, two-way dialogue between government and industry[6]. This improvement in government openness to political activity does not imply that the UK government will in the future be easily "captured" by the interests of ICL. To the contrary, as one DTI official argued:

> The UK is willing to fight for any firm located in the United Kingdom, provided the firm has a good case [e.g. distortions to competition]. There is no one firm that has a monopoly on policy influence, and ICL definitely has not (Interview 10;1993).

This has led one EC official to conclude that "the position of the British government is practically independent from industry" (Interview 6;1993).

Germany. The German government has had a long-standing, cooperative relationship with business, albeit mainly in setting the regulatory framework within which companies operate. Due to its federal nature, the structure of policy-making in Germany has been fragmented; the German government's position on the Fourth Framework Programme, for example, had to be coordinated not only with the federal ministries involved but also with the governments of the German Länder (BMFT sources, Interview 33;1993). The government's recognition of its role as a catalyst for change and the administration's partnership approach in industrial policy-making have further contributed to the openness of the German government to corporate lobbying[7].

Although the German government has been seeking to involve a wide range of partners in its formal and informal policy consultation mechanisms, Siemens' policy input has been considered of importance; "Siemens' interests are built into our procedures, objectives and strategies" (BMFT sources, Interview 33;1993).

The Netherlands. Judging by recent criticisms, the Dutch government has not been exceedingly receptive to corporate interests. The Dutch government has allegedly been focusing one-sidedly on services and has been neglecting manufacturing interests since the early 1980s - following the failure of the industrial policies of the 1970s and the rise of a free-market, pro-consumer oriented political philosophy (Ruigrok and van Tulder, 16 November 1992:9; Philips sources, Interview;1993).

This overall criticism, however, belies the close relationship that exists between Philips and the Dutch government (EC and national government sources, Interviews 6,10,33,39;1993). Philips' access to the Dutch government has been largely a consequence of the structure of the Dutch electronics industry. Characterized by a large group of SMEs, a small category of medium-sized companies, and one very large multinational, this structure has implied that Philips is the government's main partner in its dialogue with business on IT policies. As an EZ official argued:

> Philips is the largest company. It would be strange if we would not look at Philips. [..] We attune our policy stances to Philips" (Interview 19;1993).

Italy. The Italian government has been relatively open to corporate policy inputs. Its decentralized decision-making structure, particularly in the area of R&D, its dirigiste-inclined but weak bureaucracy, and its triangular bargaining approach involving government, business and labour, have implied that companies, notably the large ones, have easy access to the Italian government[8].

Perceived in this light, it is not surprising that Olivetti has a relatively close relationship with its home government. Yet, at the same time, Olivetti's access to the Italian policy-making mechanism is not as favourable as it could have been if Olivetti would have been a government-owned company. As an Olivetti executive argued:

> Olivetti has less chance to influence the Italian government. It has many contacts with the Italian government and its delegation, but there are Italian companies more powerful than Olivetti, especially in the government-owned segment. Private companies in Italy face some disadvantages (Interview;1993).

From the above, one can conclude that, with the exception of the UK, the national governments have been open to the policy inputs of their former national champions and have taken these policy inputs into account. In the case of the UK, however, one should note that, on specific issues, such as ICL's expulsion from JESSI, the UK government did rally behind ICL (DTI sources, Interview 12;1993).

Impact of Qualified Majority Voting on Corporate Lobbying Strategy

Winning over the home governments, however, has not been sufficient in the European political arena, following the application of majority voting to various IT-related policy areas (see Chapter 6). The need to secure either a blocking minority or a winning majority has made it imperative for the companies to either directly lobby third governments or to coordinate their policy stances.

Direct lobbying may not be a realistic option, as the national governments from other Member States may not see any direct benefit in supporting the company's cause, particularly if the company's presence in the countries in question is small or declining. As one IT company executive argued, "[our company] also lobbies other Member State governments, but with our relocations [to South East Asia] that has become less important". With the shift of manufacturing operations offshore, the company felt that it was losing in political influence (Interview 5;1993). A similar experience was noted by another IT company in its attempt to lobby for an EC HDTV standard:

> We have become isolated. We are one of the few remaining companies and originate from a small country. Because [we] have become so isolated, [we] do not have any political clout any more (Interview;1993).

Coordinating policy stances appears to be a more realistic option. As an ORGALIME representative exemplified, it was only when qualified majority voting was introduced, that the national industry associations understood that they had to coordinate their positions in order to convince a sufficiently large number of national governments to block the proposals in question. Prior to 1987, the national associations would simply ask their respective home governments to veto unwanted EC proposals (ORGALIME sources, Interview 23;1993). Similarly, although not all national governments need to be convinced any more, coordination is still necessary to reach a winning majority.

This example illustrates that associations, like the IT Roundtable, have an extremely important role to play in that respect; they offer companies at least the possibility to exchange views, test the waters for political support, and attune their policy stances.

7.3.3 QUEST FOR LEGITIMACY

The lack of insulation of the EC institutions, and the Commission in particular, has been caused, in part, by the EC's quest for legitimacy. According to Peterson (1992:244), this need for legitimacy was one of the factors behind the IT Roundtable's powerful voice in EC R&TD decision-making in the early and mid-1980s; the Commission "realized that Europe's IT champions formed a powerful constituency for lobbying national governments to expand the EC's technology role".

In contrast to the expectation outlined in Chapter 2, the EC's increasing importance as a lobbying target (see Figure 7.2) did not reduce the Community's need for legitimation. To the contrary, the national governments' leeriness about the Community's powers, fuelled by fears about the EC's democratic deficit in the wake of the Maastricht Treaty ratification, the costs of participating in the ERM, and the recession (see Chapter 6), have only increased the Commission's need to find a wide-spread support for its proposals;

> The EC needs the support of industry. Subsidiarity will apply very strongly vis-à-vis the private sector. It is up to the private sector to come up with initiatives. They are the main players.

> If firms are in agreement with our plans of an information infrastructure policy, they should organize themselves. They should make clear and known what they want, and have the right people in the commissions, and develop strategies in line with what the Commission wants (DG 3 sources, Interview 3;1993).

The rise in the numbers of interest groups lobbying the EC, however, did reduce the Community's dependency on the IT Roundtable for legitimation; especially the large users appear to have become an increasingly powerful lobby in support of EC policies (see Chapters 4,8). Nevertheless, the Commission would benefit if the European-owned IT producers would support their plans, considering the access of the latter to their respective home governments and their continued importance as IT suppliers (see above); "If they want to be active and give industrial support, that would be appreciated" (DG 3 sources, Interview 3;1993). This support is of particular importance if a trade-off is at stake between the IT sector and other (high-tech) sectors, such as biotechnology - as has been the case for the allocation of funds for ITC within the EC's Fourth Framework Programme (see Chapters 4,8,9).

7.3.4 NEED FOR INFORMATION

The lack of insulation of the EC institutions, and the Commission in particular, has also been caused by the EC's quest for technical information. As Chapters 3 and 4 have illustrated, the Commission has relied on the European IT companies, as sources of legitimate expertise, to provide it with policy input on R&TD - an issue area in which the Commission has no expertise. However, while the Commission relied predominantly on the IT Roundtable in the pilot and first phase of ESPRIT, by the early 1990s, the Commission had started to tap alternative sources of information. As Chapter 4 illustrated, the input of users has become more important in the Community's new IT R&TD programme following the shift in the Commission's objective from technology push to demand pull.

7.3.5 IDEOLOGY AND NATURE OF INTERACTION

The exposure of the EC's bureaucracy and decision-makers to corporate policy preferences may have been further facilitated if the officials or politicians in question, on the basis of their ideological affiliation or past experiences, recognize a role for companies in policy-making (see Chapter 2). On the basis of their ideological orientation, for example, one might expect that DG 13 within the Commission, the Socialist Group within the EP, and France, Italy and the Southern Member States within the Council, would have been relatively open towards political activity undertaken by the IT companies.

Prior to 1993, IT-related affairs were the responsibility of DG 13 within the Commission. Not only had DG 13 the reputation of being ideologically more inclined to intervene on behalf of industry, its mission also had been "to promote [the IT] sector, develop a new technology, strengthen the industrial base" from the very beginning (IT company sources, Interview 29;1993). Towards the late 1980s, however, DG 13's relationship with selected IT Roundtable members, already under strain[9], further deteriorated when Commissioner Pandolfi was unable to deliver upon a promise made to the IT firms to fund 25 per cent of the JESSI projects (see Chapter 3). When this became apparent, the companies decided to go public and expose the Commission's broken promise (Castle, 1 November 1991). This turned out to be a PR disaster, partly due to its timing; Philips had just withdrawn from JESSI while ICL had been expelled. The refusal of the EC to fund the problem-ridden JESSI projects, despite the insistence of the companies, created the impression to the general public that JESSI was obviously not worth investing in. This incident casted a long shadow over the relationship between the EC and the IT multinationals. As one observer concluded:

> Pandolfi had certain problems with industry. He had to defend his position as he promised money to JESSI. He blamed industry and they blamed him. This was the end of it. Pandolfi subsequently lost the lobby of the IT firms.
>
> This does not mean that the Commission and the IT firms have lost their co-operative relationship; rather, they are not mutually supportive any more (Interview 11;1993).

Within the Parliament, the Socialist Group and, indeed, most EP parties have been relatively open to the political activity undertaken by the IT Roundtable companies. In the early 1990s, however, some EP sources regarded what they saw as a lack of corporate leadership in times of crisis, as hampering a supportive relationship:

> We asked the [European-grown IT] companies: what are your needs? Do you need more money for R&D or a general framework to prepare for the future? There answer was: "No, we do not need anything. The situation is good" (Interview 1;1993).

Within the Council, France and Italy have indeed been open to the lobbying activities of their respective national champions, but so have Germany and the Netherlands - countries which are normally categorized as less interventionist-inclined (see Chapter 6 and above). Rather than based on ideological differences, the openness of the Member States to the political activities undertaken by the IT Roundtable companies appears to have been determined by the presence or absence of an IT Roundtable member (see above). In that respect, the Southern enlargement of the Community may not have benefitted the European-owned IT companies, as it has increased the number of countries without an indigenous IT MNE (see Chapters 6,8 and 9).

7.3.6 OPENNESS OF THE EUROPEAN COMMUNITY

Overall, the European Community has been very open towards the lobbying of the IT Roundtable and its members - implying that the loss in political influence of the IT Roundtable cannot be explained by a sudden "closure" of the EC towards corporate political activity. The EC's fragmented policy-making procedure has been sustaining many alternative avenues for corporate lobbying. Driven by a need for information and a quest for legitimacy, the EC's policy-formulating bureaucracy, notably the Commission, has been exposed to the interests of the European-owned IT companies in the formulation of its IT policies in the early 1990s - despite occasional frictions in the interaction between the companies and the EC institutions. Yet, it should be stressed that the EC has not only been open to the IT Roundtable companies, but also to competing interested parties. As Figure 7.2 has illustrated, the EC has been open to a myriad of IT and non-IT related interest groups.

7.4 TIMING

The EC's openness should have been an advantage to the IT Roundtable, provided that the Roundtable and its companies timed their political activity correctly. As expected in Chapter 2, the IT Roundtable's formal and informal interaction with the Commission over the course of 1990/1991 (see Chapter 4), appear to have been timed rightly to affect the Commission's drafting process. Similarly, the pressure exerted by the IT Roundtable companies on the Commission and the national governments in the period immediately following the Council's endorsement of the White Paper seem to have been timed rightly to press for a more aggressive implementation of the White Paper - particularly since the Council called upon the Commission to propose policy measures in close consultation with a high-level working party (see Chapter 4). Finally, the IT Roundtable appears to have voiced its policy preferences on IT R&TD and TENs correctly; they coincided with the drafting of the Fourth Framework and the attempts to realize the provisions outlined in the Maastricht Treaty on TENs (see Chapter 4).

However, albeit timed rightly to affect the policy-making process, the realization of these policy preferences has been seriously hampered by the economic and political conditions at the times that the preferences were articulated (see Chapter 9).

7.5 CONCLUSION

This chapter has sought to explain the loss in political influence of the IT Roundtable, an association comprising the largest European-owned IT companies, in the early 1990s in comparison to the 1980s, by analyzing changes in the political activity undertaken by the IT Roundtable and its members. The following conclusions can be drawn.

First, the loss in political influence in the early 1990s cannot be explained by the absence of any liaising activities on the side of the IT Roundtable and its members, as the companies did undertake political activity and timed these efforts rightly. The preferences that the IT Roundtable articulated, however, were broader and more far-reaching in scope than those articulated in the 1980s.

Neither can the loss in political influence be explained by a reduction in the effort put into lobbying by the IT Roundtable and its members. Despite the tight financial conditions, the IT Roundtable companies have increased their efforts put into lobbying or maintained them at a stable level, with the notable exception of the crisis-ridden Philips. While, in certain cases, the companies' size and degree of diversification may have made these companies less susceptible to the crisis in the IT industry, in other cases, the size of the funding required, the way in which the funding has been arranged, and the pay-off of the funding in terms of duties assigned to the lobbying staff has allowed the companies to reinforce rather than cut their lobbying efforts.

The intensification of corporate political activity at the EC level reflects the shift in competencies from the national governments to the European Community. While the Commission has been a primary lobbying target of the IT Roundtable companies, the EP has become more important as a target following the Single European Act. Due to the national governments' role in EC policy-making, the Member States have remained important as lobbying targets; lobbying the Community thus cannot serve as a substitute for lobbying the national governments.

With the exception of the UK government, the home governments have been both open to lobbying of the IT Roundtable companies as well as susceptible to their arguments. However, following the introduction of majority voting on certain IT-related issues and the emphasis on cohesion, it has become increasingly important for the IT Roundtable companies not only to lobby the home government, but also to target other M/S governments, either directly or through coordination of their policy stances.

Over the 1980s and early 1990s, the Community has been very open to the lobbying of the European-owned IT companies due to the fragmentation of its policy-making processes, its lack of insulation, and its continued need for legitimation and information - undermining the validity of the argument that the IT Roundtable's loss of influence might have been caused by the reduction in the openness of the Community to corporate political activity. The EC, however, has not only been open to the policy input of the IT Roundtable companies on IT-related policy issues, but also to those of competing interested parties, including software and services companies, IT users, IT SMEs and foreign-owned IT companies; notably the large IT users have become credible alternative sources of legitimation and expertise. Additionally, the EC has been open to non-IT related interests, such as biotechnology companies.

From the above, it follows that the loss of the IT Roundtable's political influence cannot be explained by (1) the absence of any political activity or the wrong timing thereof; (2) a drastic reduction in effort put into lobbying; or (3) a decline in the openness of the Community and its Member States. Rather, the main explanatory variable of the loss in political influence appears to have been that, in the early 1990s, the effectiveness of the IT Roundtable as a channel of political activity had been undermined by the following three factors: (1) the declining representativeness of the IT Roundtable, following the structural changes taking place in the IT industry; (2) the perception that the Roundtable has been suitable for articulating preferences in the area of R&TD but inappropriate for voicing broader preferences on industrial policy; and (3) the lack of internal coherence within the IT Roundtable caused by the diverging interests of its members.

Despite the growing ineffectiveness of the IT Roundtable, the European-owned IT companies have continued to use this channel. However, in specific cases, such as trade-related issues, public procurement and standardization, the IT Roundtable companies have preferred to use alternative channels, more appropriate to the IT companies' cause. Moreover, in the face of the growing importance of the Community as a lobbying target and the shortcomings associated with indirect and/or collective representations, the companies appear to have put more emphasis on direct, individual representations to the EC, giving substance to the hypothesis that individual representations may be relatively effective, if not the most effective form of corporate lobbying.

7.6 NOTES

1. As part of an alliance concluded between Daimler-Benz and CGS in 1991, Daimler - an IT Roundtable company since its take-over of AEG - has a minority stake of 34 per cent in CGS and an option to take majority control of CGS in 1995, should CGS's founder and largest shareholder agree thereto (Economist, 10 October 1992; 24 February 1994; Dawkins, 24 July 1991).

2. Sources: National government and industry sources, Interviews 19,39;1993, Communication 30;1993.

3. The Group of Six, whose membership has been limited to one firm per EC Member State, comprised at its inception: Sema Group (UK/F), Logica (UK), Cap Gemini Sogeti (F), Finsiel (I), Eritel (Sp), Debis (G), and Volmac (NL). In 1991, CGS and Debis, the software arm of Daimler-Benz, set up a joint venture in which CGS had a 49 per cent stake, as part of an alliance between CGS and Daimler-Benz. In 1992, Volmac merged with CGS' Benelux operations (Cane and Taylor, 13 March 1992:2; NRC, 7 May 1992; Economist, 26 February 1994; Dawkins, 24 July 1991).

4. Cawson, Holmes and Stevens (1987:15,27-28,33); Coleman (1990:234); Dawkins, 16 March 1993:21; Dyson (1993:93); Holmes and Sharp (1989:9-13); Ridding, 10 February 1994:21; Sally (1992:135,149,168-169); Safarian (1993:208); Wilks and Wright (1987:287).

5. Sources: Bamber and Lansbury (1987:47,50); Grant (1987:17); Grant and Streeck (1985:167); Holmes and Sharp (1989:4-5,9-15); Porter (1990:504-506).

6. Sources: Tim Sainsbury, Minister of Trade and Industry, Channel 4 News, 4 March 1993; DTI Sources, Interviews 40,41;1993.

7. Sources: BMFT sources, Interview 33;1993; Coleman (1990:234-235); Grant and Streeck (1985:167); Turner and Hodges (1993:138).

8. Sources: Bamber and Lansbury (1987:125-137); Dyson (1993:95); Porter (1990:447-449), and Turner and Hodges (1993:141).

9. EC and national government sources, Interviews 10,11,12;1993; MacKenzie, 2 January 1993.

Chapter 8

POLITICAL WEIGHT

Chapter 7 has argued that the loss of the IT Roundtable's political influence can be explained by the growing ineffectiveness of the Roundtable as a channel of political activity. However, to the extent that the IT Roundtable articulated its policy preferences, one could question whether these preferences carried sufficient political weight (see Chapter 2). This chapter seeks to explain the IT Roundtable's loss in political influence in the late 1980s and early 1990s, in comparison to the early and mid-1980s, by analyzing the changes in the political weight of the IT Roundtable's policy preferences.

As explained in Chapter 2, the weight attached by governments to corporate policy preferences can be perceived as a function of the governments' real and perceived value of the assets that companies control - a value created by the dependency of governments on corporate assets for the realization of their objectives. The first section focuses on the Community's long-term, strategic objectives, while the second section addresses the EC's short-term, economic objectives. Each section seeks to outline (a) to what extent the European-owned IT companies and alternative sources of corporate assets have been perceived as contributing to the realization of these objectives, and (b) whether or not these perceptions have been justifiable in real terms.

8.1 THE EUROPEAN-OWNED IT INDUSTRY: STRATEGIC IMPORTANCE AT BAY

In the early 1980s, the EC and its M/S governments considered an indigenous IT production capability as a necessary prerequisite for maintaining control over Europe's economic future and its political autonomy and security (see Chapter 3). The importance attached by the EC and its Member States to an *indigenous* capability contributed to the European-owned IT companies' influence over EC policies in the early 1980s. As one government official observed, the perception was that if the IT Roundtable companies "would shout loud enough that they were strategic, they would get what ever they wanted" (Interview 12;1993).

In the late 1980s, however, it became clear that this was not the case any more - an indication of the IT Roundtable's declining political influence (DTI sources, Interview 12;1993; see Chapter 4). Considering the source of the IT Roundtable's political weight in the early 1980s, one could question whether the decline in political influence was caused by any reduction in the importance attached to information technology and/or an *indigenous* IT production capability (see Chapter 2).

Overall, the interviews conducted with EC and national government officials[1] over the course of 1993 have pointed out that the European Community and its Member States have continued to perceive information technology as an economically and militarily strategic technology. In contrast to the hypothesis outlined in Chapter 2, neither the transformation of the international system nor changes in the supply conditions of semiconductors and computers (see Chapters 5,6) appear to have affected the EC's and national governments' perception of the strategic value of IT. In fact, the increased importance attached to economic power following the changes in the international system seems to have increased the strategic value of IT.

It is, however, important to make a distinction between the strategic value of the technology and the necessity of an indigenous IT production capability. While some government officials, notably those of France, Germany and the Netherlands[2], argued that a European IT production capability, and in particular a semiconductor capability, was an absolute requirement for capturing the benefits of IT, other officials, notably those representing the UK[3], have questioned this. As a DTI official commented:

> We do support the technology, which affects not only the IT industry, but industries across the board. However, we do not support the IT industry as such. (Interview 40;1993).

Although this argument could be perceived as a peculiar British view, caused by the UK government's non-interventionist ideological orientation and the large share of foreign ownership in the UK-located IT industry (see Chapters 1,6), two developments appear to indicate that this argument is justifiable in certain cases: (1) the growing recognition that it is the application of IT that matters; and (2) the alleviation of concerns regarding the security of IT supply.

8.1.1 THE SUPPLY VERSUS THE APPLICATION OF IT

As outlined in Chapter 3, in the early and mid-1980s, the EC sought to strengthen the European-owned IT companies, as indigenous sources of IT, through R&D subsidies. Underlying this push strategy was the notion that the value that society derives from information technology is intrinsic to the technology; the mere production of IT would lead to benefits. By the early 1990s, however, it had become clear that stimulating the supply of IT as such would not necessarily yield the expected societal benefits. Beyond the EC's failure to bring about a general improvement in the competitiveness of Europe's indigenous suppliers, a general understanding had developed that IT would only generate business value if the technology would be applied by companies. It became clear that it was not IT as such that mattered, but IT's application (CEC and national government officials, Interviews 19,26,28,39,40,41;1993). As one industry observer concluded:

> IT has matured. It does not any longer have any high priority placing. Policy makers see it for what it is. Policy makers do not any longer judge information technology by its intrinsic value, but by its applicability: how effective is it

from a user's point of view (Interview 30;1993).

An effective application of IT, however, does not make a domestically-owned and controlled source of supply per definition imperative. From a purely economic point of view, using an indigenous source of IT would actually be inadvisable if the latter is relatively uncompetitive and technologically lagging behind; the potential advantages of lower transportation costs and zero tariffs are unlikely to outweigh the disadvantages of higher costs and lower quality faced by the consumer. Policy-wise, this would imply that EC and M/S policies aimed at stimulating IT supply may not be necessary; rather, government efforts should concentrate on the application of IT - as, for example, is the case in the Community's BRITE programme.

This thesis argues that an indigenous source of supply is only advisable in the following three cases: (1) IT for military applications; (2) customized IT for commercial applications; and (3) mass-produced IT for commercial applications if world supply conditions raise substantial security of supply concerns.

IT for Military Applications

If IT is applied in military equipment, an indigenous European source of IT continues to be advisable, even though the phasing out of security-inspired restrictions on IT exports is likely to have facilitated European access to foreign-produced IT (see Chapter 6). From a European user's point of view, incorporating indigenous components increases the chances of securing military contracts. From the point of view of the EC and its Member States, incorporating indigenous components in military equipment prevents that the military's dependency on foreign IT can be used as a bargaining chip in international trade negotiations - as allegedly the Japanese government was considering (Fallows, 1994:41-42).

IT for Commercial Applications

In contrast, if IT is applied in commercial equipment, an indigenous European source of IT may not be necessary. As one industry representative argued with respect to the sourcing of semiconductors:

> Special chips used for military purposes, such as those fabricated by Plessey, are most of the time produced within the Member States. Chips used in commercial products, however, should be bought from the cheapest supplier, whether European or not (Interview 32;1993).

Within IT for commercial applications, however, one should distinguish between customized IT products and commodities (see Chapter 5).

Customized IT. With respect to ASICs, the optimal situation would be that the European IT users produce their own ICs, as, for instance, Mercedes does. Through maintaining an in-house production capability at the cutting edge of technology, synergies may be exploited optimally; security of supply concerns may be eliminated; and concerns about any leakage of technology may be reduced (see Chapter 3). As Klaus Knapp, Director of Siemens' Semiconductor Division, argued:

> If you want to have a competitive edge in consumer electronics, you have to develop the required chips yourself. Because the state-of-the-art components, you will get from no one (in Wammes, 14 January 1994:14).

Maintaining an in-house capability of customized ICs, however, may be expensive, certainly if the scale of production is limited. During the 1980s, many IT companies sought to finance their in-house capability of customized ICs through the production of "cash-cows", i.e. low cost/high margin operations. To produce memory chips for that reason, however, has proven to be a costly mistake; it has been more difficult to succeed in DRAMs than in ASICs (see Chapter 5). Alternatively, IT users have sourced their customized components from external suppliers. This, however, requires that the users develop a close working relationship with their suppliers with sufficient safeguards against any unwanted transfer of technology. This working relationship may be facilitated (albeit not necessarily) by the geographical and cultural proximity of the IT suppliers (EECA sources, Interview 31;1993) - the cooperation between Siemens and IBM (an American company *located* in Europe) on DRAM technology being a case in point (see Chapter 5).

IT Commodities. In contrast to the difficulties related to sourcing customized IT products, companies have been able to source mass-produced IT products from external suppliers without too many problems - provided that access to a stable, internationally competitive source of IT at the cutting edge of technology had been secured. As an IT user argued, "firms do not care where components come from as long as it is the right quality at the lowest price" (Interview 13;1993).

An indigenous supply capability is only required if the prevailing world supply conditions of these commodities would raise security of supply concerns, i.e. concerns that monopoly prices might be charged, poor quality products might be delivered, supply lines cut off, deliveries delayed, and information transferred unwantedly (see Chapter 3). Over the 1980s, however, concerns regarding the supply of mass-produced IT products have eased; fears that the EC industries' access to IT might be hampered have been reduced (IT company and EEA sources, Interviews 8,11,15,32;1993).

8.1.2 EASED SECURITY OF SUPPLY CONCERNS

A structural analysis of the supply conditions in the IT industry over the 1980s and early 1990s, based on the framework outlined in Chapter 2, appears to justify the reduction in security of supply concerns.

Supply of Memory Chips

In the early and mid-1980s, the security of DRAM supply was perceived as precarious. At first sight, these threat perceptions seem rather surprising. Not only had the commoditization of memory chips led to an ample supply of DRAMs at relatively low and falling prices, but also the supply risk continued to be spread over a large number of suppliers; as DRAMs have been near-perfect substitutes, the cost of switching from one supplier to another has been relatively low (see Chapter 5). The security of supply concerns that prevailed in the early and mid-1980s, however, were born out of the fact that over the late 1970s and early 1980s, the development and the production of DRAMs concentrated into the hands of Japanese producers. By 1986, Japanese producers held nearly 80 per cent of the world DRAM market (Dataquest in Tyson, 1992:106). In that year, the world's Top 4 DRAM producers, all Japanese, accounted for 62 per cent of the market - a T4 index considerably higher than in the overall semiconductor industry (Dodsworth, Kehoe and Wagstyl, 25 July 1988; Chapter 5).

This concentration of supply affected both suppliers as well as consumers. First, associated with the rise of the Japanese DRAM producers had been a shake-out amongst the non-Japanese suppliers. As DRAM development and production were considered to be vital for making technological progress and improving competitiveness in the higher value-added ASIC segments, it was believed that the exit from DRAM development and production meant that the companies would have to forego the alleged benefits of DRAMs as technology drivers. Moreover, if they would subsequently want to enter the industry, the companies would not only have to face the rapidly increased R&D costs, but also have to overcome the cost advantages enjoyed by the Japanese companies due to the sheer size of their market share (see Chapter 5).

Second, although a DRAM consumer could still choose amongst various Japanese suppliers, the fear prevailed that Japanese producers would give preferential treatment in terms of pricing, quality and delivery times to Japanese consumers over western clients - whether intentionally or not (SERICS, EZ and EECA sources, Interviews 18,19,31;1993; GAO/NSIAD-91-278; OTA/PB92-115757, 1991:12-13). These claims, however, have remained largely anecdotal and may have been used merely as an argument by supporters of government intervention (IT company sources, Interview 8;1993). Nevertheless, as one IT company executive argued:

> Even if the risk of discriminatory treatment is only latent, this constitutes sufficient motive to look for alternatives and second sourcing (Interview 8;1993).

This perception of a supply risk was further fuelled by the fact that the 1986 US-Japan Semiconductor Trade Agreement (STA), which provided for the monitoring of production costs and prices of certain Japanese semiconductor exports to the US and third countries[4], resulted in an increase in DRAM prices (Tyson, 1992:113-124; Kostecki, 1989:27; OTA/PB92-115757, 1991:11).

Over the late 1980s and early 1990s, however, this situation improved for three reasons. First, the technological progress in the more complex, higher value-added ASICs had become less dependent on the mass production of DRAMs - reducing the necessity to develop an in-house DRAM production capability (see Chapter 5). For example, while the technology driving capabilities of DRAMs were "the main reason why Siemens concluded an alliance with IBM", "currently, this has become less important." (DG 3 sources, Interview 3;1993; also: Siemens sources, Interview;1993).

Second, the dominance of Japanese producers in the DRAM industry had decreased. The Japanese share of the DRAM market fell from nearly 80 per cent in 1986 to approximately 60 per cent in 1991, due to the stabilization of the American share and the rapidly rising share of South East Asian producers (Dataquest in Tyson, 1992:106). Moreover, the high degree of concentration declined; in 1991, the world's Top 4 companies (three Japanese and one South Korean) only accounted for 46.5 per cent of the DRAM market (Dataquest in NRC, 15 July 1992:15). This change in the

DRAM supply structure not only increased the number of alternative DRAM suppliers, but also intensified the competition in the DRAM markets substantially, leading to dramatic price cuts. The changing supply structure reduced corporate security of supply concerns. As illustrated by a Siemens executive when explaining their decision in the early 1990s to reduce their concentration on DRAM production (see Chapter 5):

> The main motive for our [1980s] decision to produce DRAMs in-house was that Japanese companies owned the process and had a monopoly. The rest of the world felt threatened and feared that Japanese companies would give preferences in price and time to home companies. Now, this threat is not perceived as such any more (Interview;1993).

Third, technological changes had led to the rise of a new type of EPROM, the Flash memory chip, which is expected to execute functions currently performed by DRAMs (Economist, 18 April 1992). In contrast to other memory production, Flash memory production has been dominated by American producers, with Intel accounting for an 85 per cent share of the market.

Over the late 1980s and early 1990s, in other words, supply conditions improved. As an EEA representative argued:

> There are enough semiconductor producers to produce what we need. The shortage in DRAMs, for example, was more a cock-up than a conspiracy on the side of the Japanese. Anyhow, that example also showed that the shortage of DRAMs was quickly picked up by Motorola and Siemens through increases in their production. It is very unlikely that Europe will run out of supply. It is not a very big danger that Europe will be isolated (Interview 32;1993).

Supply of Microprocessors

In contrast to memory chips, microprocessors have hardly been subject of security of supply concerns within the EC, despite supply conditions that would warrant concern. First, the market for microprocessors has been dominated by American producers, with Intel accounting for 53.2 per cent of the market (Dataquest in Tyson, 1992:127). Second, the market has been relatively concentrated; in 1990, the world's Top 4 microprocessor companies (three of which were American) accounted for over 75 per cent of the market. Third, despite the availability of alternative sources of microprocessors, the costs of switching have been relatively high, since microprocessors have been either proprietary products, binding their consumers to one supplier, or technologically trailing Intel clones, unsuitable for state-of-the-art applications. This situation, however, may be changing (see below). Fourth, the entry barriers into the industry, which would have to be overcome in order to develop an in-house production capability, have been relatively high due to the proprietary nature of microprocessors (see Chapter 5).

The main reason why the American dominance in microprocessor production in general, and Intel's near-monopoly in particular, did not arouse any substantial security of supply fears - in contrast with the Japanese dominance in memory chips - appears to have been the "nationality" of the dominant producers. In the EC, selected government officials and industry representatives[5] have been perceiving "the chance that Japan will abuse its position greater than the chance that the US will do so" (EZ sources, Interview 19;1993).

First, in contrast to the vertically-integrated Japanese semiconductor producers, Intel and its American competitors AMD and National Semiconductor have been merchant producers, i.e. companies producing mainly for the open market (Langlois et al., 1988:27,36; Malerba, 1985:46). This reduces the chance that, in times of shortage, priority will be given to the in-house demand and that contracts with client companies will be delayed or cancelled (EECA sources, Interview 31;1993).

Second, in contrast to the Japanese semiconductor producers, Intel and its American counterparts have not traditionally been linked into a Keiretsu-like structure of companies. Although the American IT producers have become increasingly intertwined, as evidenced by the linkages between IBM and Intel, Apple and Motorola, and the Sematech consortium, the perception has remained that American producers are more reliable suppliers. The chance that preferential treatment will be given to financially or otherwise related companies, at the cost of the unrelated clients, or that information given by the semiconductor user about the system in which the chips have to fit will leak to competing users, has been considered smaller in the American industrial structure (SERICS, EZ and EP sources, Interviews 18,21,39;1993).

Third, although the American government has denied access to IT products and technology to non-American companies for national security reasons, microprocessor users have made few public complaints about the market power of the American producers in general, and Intel in particular. Due to the lack of user complaints, Intel's supply performance reputation has remained relatively unstained despite allegations voiced by competing producers that Intel delayed the introduction of its latest Pentium processor. Moreover, Intel's behaviour towards its competitors, albeit aggressive, has so far not given the FTC sufficient grounds to initiate anti-trust proceedings. Although Intel has adopted a strict licensing policy, it has not exclusively sold its microprocessors to any one buyer, easing security of supply concerns (Cane, 15 November 1993:40; Kehoe, 8 March 1993:15; Ligtenberg, 23 March 1993:15).

Finally, the RISC processor, newly introduced to the markets (see Chapter 5), seems to be destined to challenge Intel's dominance and, thus, to improve the supply conditions in microprocessor markets (Banks, 26 April 1994; Kehoe, 31 May 1994). For example, IBM's development of its "Intel-compatible" microcode, i.e. the software instructions that control the functions of a microprocessor, has opened up a market for its PowerPC, a RISC processor jointly developed by IBM, Apple and Motorola (Kehoe, 26 August 1993:17). The PowerPC has been faster and cheaper than the latest generation Intel microprocessor, and thus may constitute substantial competition to Intel - particularly since the industry standard has not yet been set in this segment of the market (Ligtenberg, 14 December 1993:16; Chapter 5).

Supply of Computers

European concerns about the security of computer supply date back to the mid-1960s when the American government blocked the exports of US-made computers to France, while few non-American sources of state-of-the-art computers existed. Over the 1970s and the early and mid-1980s, IBM's preponderant position, in particular, was a thorn in the eye of the European champions and their home governments. Not only was IBM's market share many times larger than the shares of even its closest contenders, but also its use of proprietary systems effectively guaranteed IBM a secure customer base; the cost of switching to alternative suppliers would be nearly inhibitive (see Chapter 5).

Despite the declining degree of concentration in the computer industry as a whole, it has varied substantially per product segment. In 1985, for example, the Top 4 producers only accounted for a relatively moderate 42 per cent of the midrange and 57.4 per cent of the microcomputer markets. In the same year, however, the four largest mainframe producers accounted for 74 per cent of the world mainframe market, the then largest segment of the world computer market. IBM alone accounted for 55 per cent of this market segment (Datamation, 15 June 1986:44-45; Chapter 5).

The rapid rise of Japanese competitors over the early and mid-1980s (see Chapter 5) added fuel to the fire, raising fears of yet another Japanese challenge. Judging by the degree of protection granted to the computer industry in comparison to the semiconductor industry (see Chapter 3), the Community and its Member States appeared to regard computers as less strategic than semiconductors during the 1980s. Yet, computers were perceived as sufficiently strategic to incorporate projects on advanced dataprocessing into the ESPRIT programme (see Chapter 3).

Over the late 1980s and early 1990s, however, these supply conditions improved when the seeds of change, already present in the early and mid-1980s, came to fruition. First, over the late 1980s, the decline of the United States and the rise of Japan stabilized, reducing both the threat of a major "Japanese Challenge" as well as the more latent risk of an American abuse of its dominant position.

Second, the preponderance of IBM, albeit still present, declined over the late 1980s and early 1990s; its market share fell from 32.2 per cent of the world computer market in 1985 to 20.3 per cent in 1992 (see Chapter 5). While in 1985, IBM accounted for 55 per cent of the world mainframe market, by 1992, its share had fallen to 29.1 per cent. Although IBM's share of the midrange market increased from 21 per cent in 1985 to 26.7 per cent in 1992, its share in the microcomputer markets declined from 36 per cent in 1985 to 30.9 per cent in 1992. In the workstation market, IBM actually ranked second after Sun (Datamation, 15 June 1993:22; 15 June 1986:44-45). Additionally, over the 1980s, IBM and its American counterparts had become more acceptable "European corporate citizens", certainly in the eyes of the EC and its M/S governments. Notably IBM's "indigenisation" in Europe, through manufacturing in the Community, employing local personnel, performing R&TD, and taking management decisions in Europe (see below), won it a place in the Community's R&TD programmes (see Chapters 3,4).

Third, the overall degree of concentration in the world computer markets had stabilized at a moderate level (see Chapter 5). As in the early and mid-1980s, the degree of concentration in the mainframe market remained relatively high in the late 1980s and early 1990s; in 1992, the T4 index for the mainframe computer market totalled 70.5 per cent (Datamation, 15 June 1993:22). In the early 1990s, however, mainframe computers no longer constituted the largest segment of the world computer market. Rather, the largest and fastest growing segments were formed by the PC and workstations markets which showed the lowest degree of concentration, as illustrated by their T4 indices of 42.9 and 53.2 per cent respectively (Datamation, 15 June 1993:22).

Fourth, as outlined in Chapter 5, differential technological change in the three computer segments had led to an erosion of the existing markets for the larger systems, and the increasing importance of PCs and workstations. The reduction in their production costs, combined with a move away from proprietary to open systems, had lowered the entry barriers to microcomputer production and substantially increased competition. Changes in demand further added to the commoditization of microcomputers; they became widely available at relatively low prices, further reducing security of supply concerns.

8.1.3 NECESSITY OF AN INDIGENOUS IT PRODUCTION CAPABILITY

One can conclude from the above that IT has continued to be perceived as a strategic technology. However, some national representatives, notably those of the UK, have argued that an indigenous IT production capability may not be necessary to capture the benefits of IT - an argument justified in the case of mass-produced IT products for commercial applications. Not only has the shift in policy emphasis from production to application of IT over the late 1980s and early 1990s made the access of consumers to IT more important than the actual supply, but also concerns that the access of IT consumers to their basic inputs might be hampered have been eased following the improvement of supply conditions in the mass-produced IT segments over the late 1980s and early 1990s.

The fact that not all EC Member State governments were convinced about the indispensability of a European IT production capability has made it more difficult for the advocates of such an indigenous capability to push through preferential measures aimed at sustaining and improving the position of the indigenous IT suppliers - as illustrated by the endorsement debate of the 1991 White Paper, the reduction in the Community's semiconductor tariffs, and the failure to aggressively implement the Council Resolution (see Chapter 4). As EECA concluded with dismay:

> [..] there is a tendency within Europe at the moment to dangerously underestimate the importance of a local European electronic components industry (EECA Report 1992:4).

8.2 PREPONDERANCE OF SHORT-TERM, ECONOMIC OBJECTIVES

In the early 1990s, however, even the advocates of an indigenous capability merely paid lip-service to the need to maintain an indigenous capability (IT company sources, Interview 16;1993). As one industry representative argued with respect to national government subsidies for FDI (see Chapter 4):

> France is in favour of code of conduct. But what they say and do may be different. For example, they gave money to Sony for the production of ICs [in France]. The Member States, including France, all send delegations to the East and invite them over to invest (Interview 31;1993).

Under pressure of the economic recession of the early 1990s and prompted by the widening and deepening taking place of the EC over the 1980s and early 1990s (see Chapters 5,6), all M/S governments appear to have given preference to the realization of short-term economic objectives; they have been seeking to (1) reduce spending and obtain "value for money" in the wake of soaring budget deficits and public debts; (2) sustain and create employment; and (3) address the issue of cohesion which has arisen from the Community's widening and deepening.

While the European-owned IT companies controlled the corporate assets that the Community demanded for the realization of its long-term, strategic objectives, one could question whether the companies controlled the assets needed for the realization of the Community's short-term, economic objectives. The crisis developing in the IT industry in the early 1990s (see Chapters 4,5) certainly raises doubts about this. Considering the importance attached to "value for money", employment and cohesion, one could question whether the decline in the IT Roundtable's political influence has been caused by a reduction in the importance attached to the European-owned IT companies as sources of these corporate assets (see Chapter 2).

The following three sections will discuss the contributions of the IT Roundtable companies to the realization of the three objectives outlined above.

8.2.1 VALUE FOR MONEY

The recession of the early 1990s, combined with the Member States' EMU-imposed obligation to bring about convergence, brought about severe constraints on public spending within the Community (see Chapter 6). In order to reduce or, at least, contain public debts and deficits, the EC and its national governments became less prepared to spent money on public policies - affecting the funding for JESSI, the Fourth Framework Programme, the TENs and the Semiconductor Initiative (see Chapters 3,4,7,9).

Faced with financial constraints on public spending, the EC and its Members had to set priorities in their allocation of financial resources in the early 1990s. According to various interviewees[6], it became more important to allocate funding to those projects and programmes where they would obtain "value for money" (Interview 30;1993). On the basis of this allocation principle, however, one could question whether the European-owned IT industry constituted a worthy investment.

Perceived Return on Public Investments into the IT Industry

As Chapter 4 outlined, it became clear in the early 1990s, that, despite government efforts, the performance of the European-owned IT companies had not improved; the expected larger market shares and improved corporate results had failed to materialize. Worse, the European-owned companies continued or had begun to incur losses on their IT operations, faced escalating debts, laid off an increasing number of employees, and halted high-profile R&TD projects (see Figure 8.1). Moreover, ICL, the only profitable computer producer, was taken over by a Japanese company (see Chapter 4). Only in 1993, two years after the Commission presented its new IT policy approach, some improvement occurred.

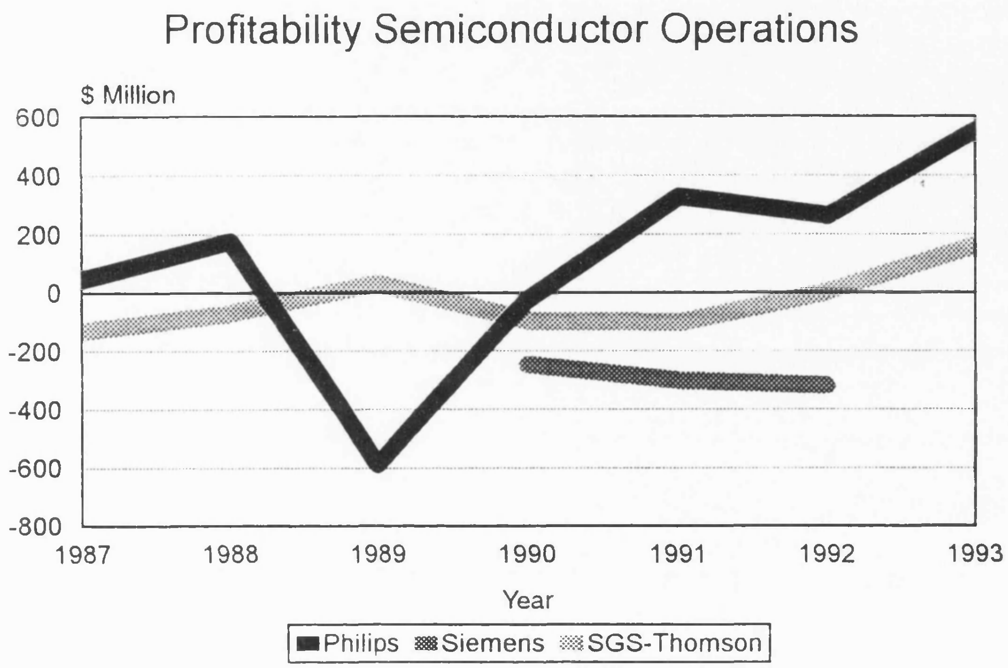
The continued absence of significant improvements in the competitive position of the European-owned IT companies, however, did not only raise questions about the choice, form and shape of EC policies (see Chapter 4), but also about the object of the EC's public funding: the European-owned IT industry. Fuelled by the crisis in the European-owned IT industry, the perception prevailed, both amongst politicians across the EC as well as amongst the general public[7], that the large sums of public funding spent on the European-owned IT industry had been wasted. In particular, money spent on the semiconductor industry was seen as ineffective:

> It is like a "black hole". The more money you throw in, the wider the hole gets (DTI sources, Interview 12;1993).

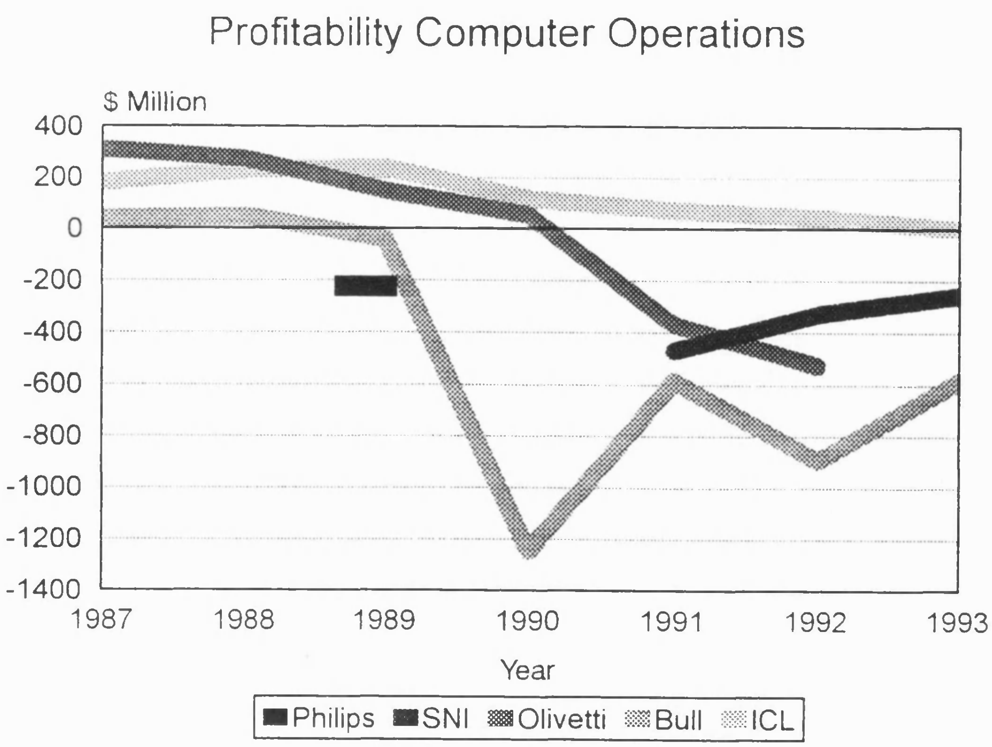
Reduced Value for Money: Reality or Perception?

However, was this perception justified? - for, by virtue of their sheer size and type of operations, the European-owned IT companies continued to be large sources of corporate assets, i.e.: value-added, capital expenditures and employment, technology, exports and FDI (see Chapter 2). The structural and short-term changes in the IT

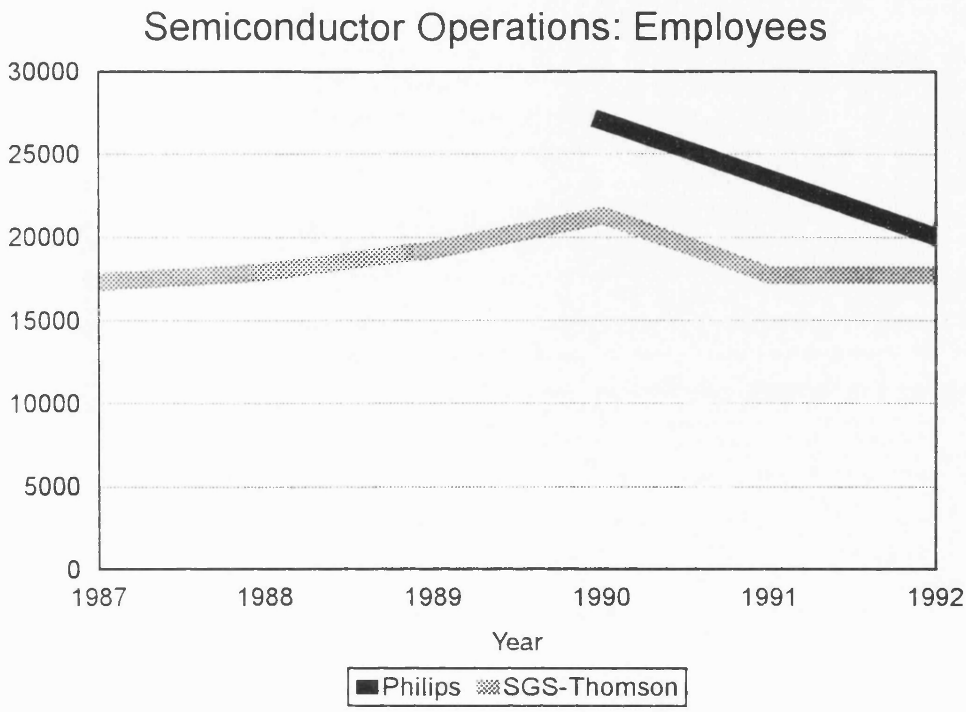
Figure 8.1 Crisis in the European-Grown IT Industry, 1987-1993



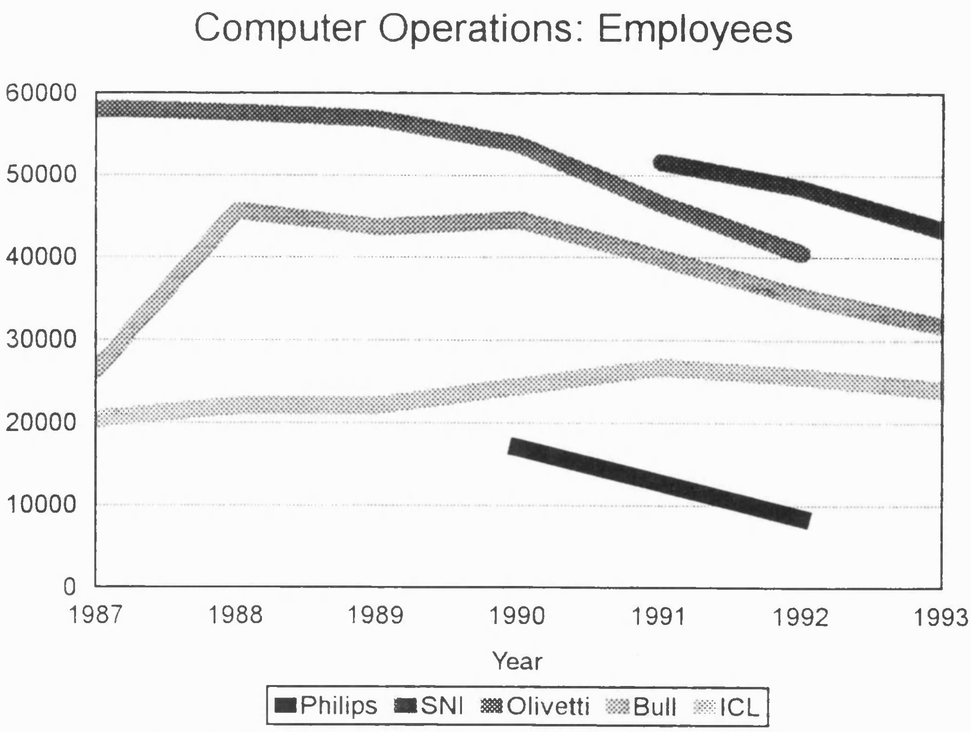
Sources and Notes: see Figure 5.6 Siemens: Data 1987-1989,1993: N/A



Sources and Notes: see Figure 5.15 Philips: only 1989 available; SNI: Data 1987-1989: N/A; Olivetti Data 1993: N/A

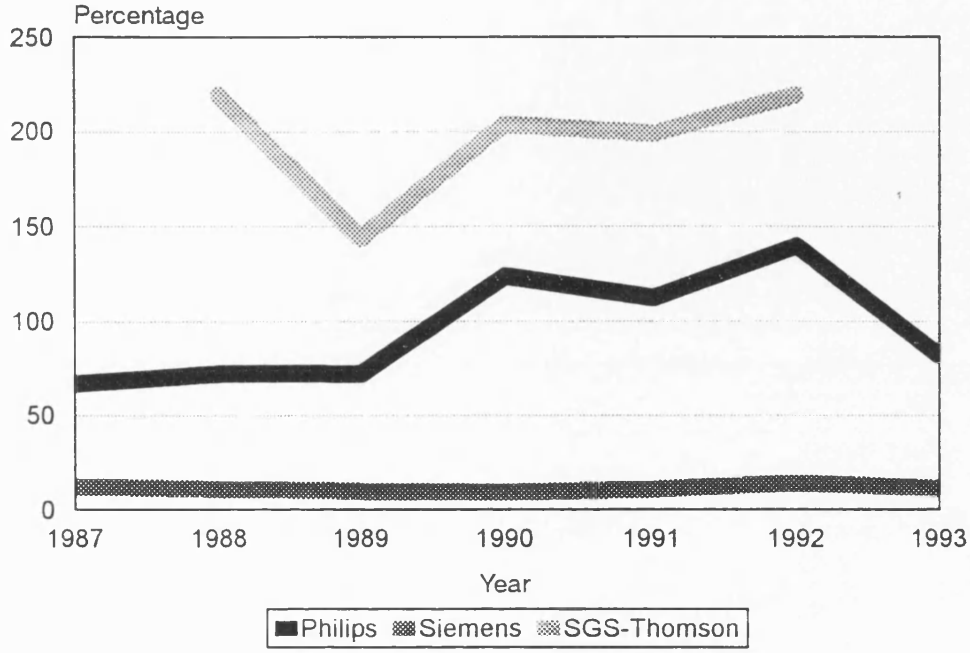


Sources: Appendix 1.1, Chapter 5 Philips Data: Estimates; Siemens: Employment data for semiconductor operations not available



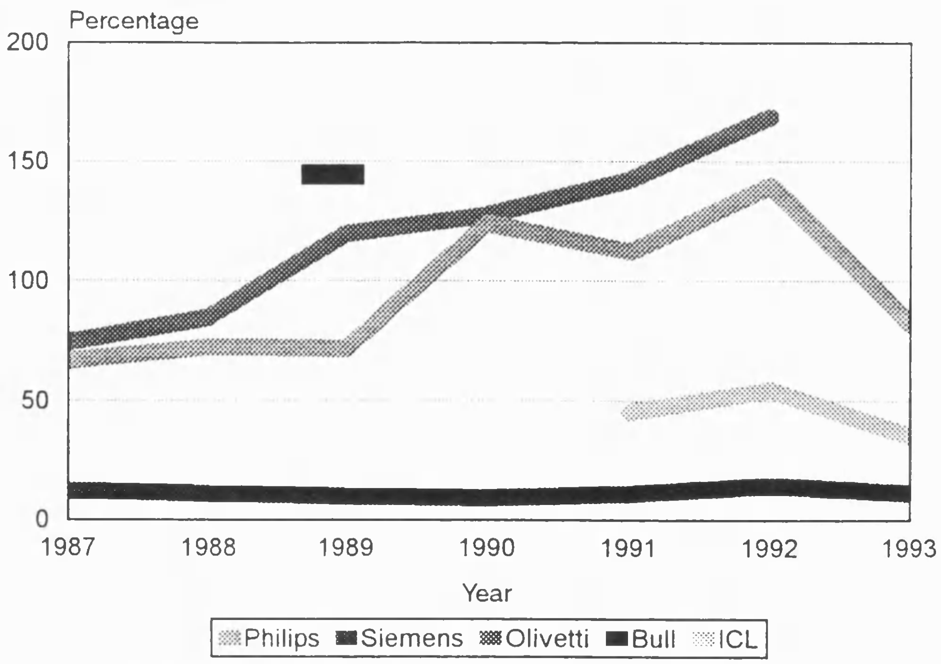
Sources: Appendix 1.1, Chapter 5, Appendix 8.1 Philips Data: Estimates; SNI: Data 1987-1990: N/A; Olivetti Data 1993: N/A

Semiconductor Producers: Debt as Percentage of Equity



Source: Appendix 1.1 SGS Data 1987,1993: N/A Note: Data Philips and Siemens applies to all operations, including semiconductors

Computer Producers: Debt as Percentage of Equity



Source: Appendix 1.1 Bull: Only 1989 available; Olivetti 1993: N/A; ICL Data 1987-1990: N/A Note: Data Philips and Siemens applies to all operations, including computers industry (see Chapter 5), however, have also affected the value of the companies' assets in absolute terms. On the basis of Figures 8.2 to 8.6, which give an indication of the real value of the assets that the IT Roundtable members' have been controlling, one can draw the following conclusions.

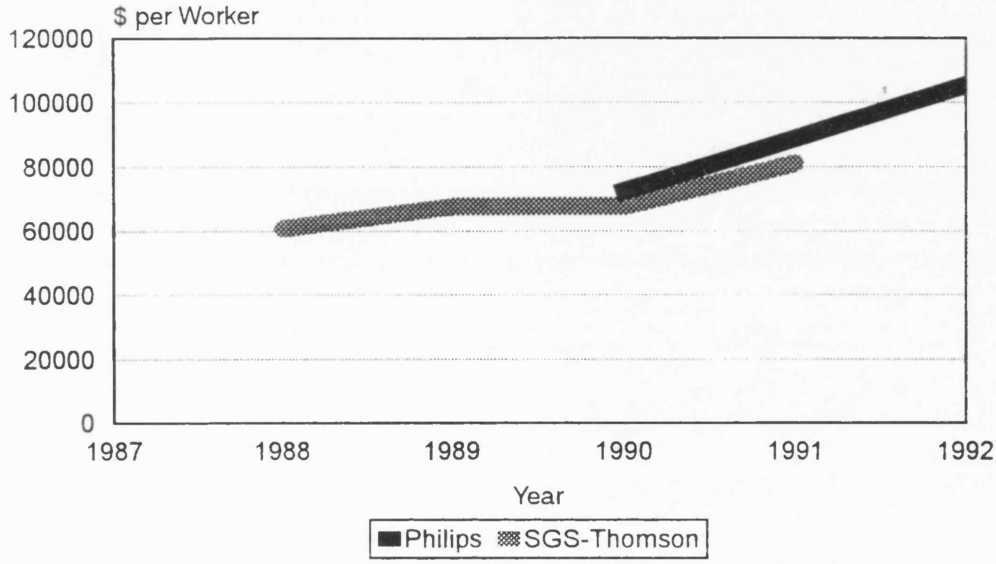
First, the European-grown IT companies' individual contributions to value-added have not declined over the late 1980s and early 1990s; rather, productivity has increased. In the semiconductor industry, the rising turnover (see Appendices 5.4 and 9), combined with reductions in the labour force in the early 1990s (see Figure 8.1), has led to increases in the value of the output produced per employee (see Figure 8.2). In the computer industry, the job cuts have been so extensive, that despite a fall in revenues experienced by some computer producers in the early 1990s, productivity has still improved. Judging by Figure 8.2, one may conclude that the rise in productivity, which leads to improvements in value-added and, thus, in wealth, has provided no justification for the then prevailing perception that public funding of the indigenous IT industry did not yield sufficient "value for money".

Second, the 1991 drop in the European-grown IT companies' investments does, however, provide support for the perception that public investment in the European-owned IT industry in the late 1980s and early 1990s would yield little return (see Figure 8.3). Although the "headquarters-effect" may have limited the negative impacts of the capital expenditure cuts on the companies' home countries, it is unlikely that these countries have remained unaffected, considering their share in the companies' total capital expenditures. Germany, for example, accounts, with a few annual exceptions, for 50 to 70 per cent of Siemens' capital spending (Siemens Annual Reports). Even a small country, like the Netherlands, still accounts for approximately one third of Philips' capital expenditure (gross investments) (NRC, 25 May 1990:11).

Third, the perception that investing in the European-owned IT industry did not

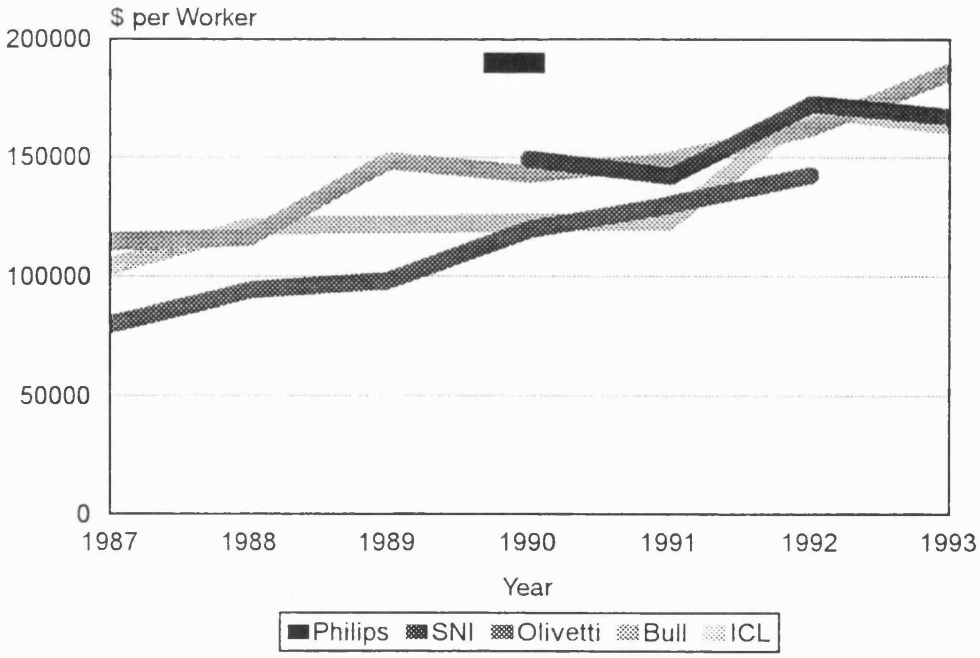
Figure 8.2 Corporate Assets 1: Labour Productivity, 1987-1993

Semiconductor Operations



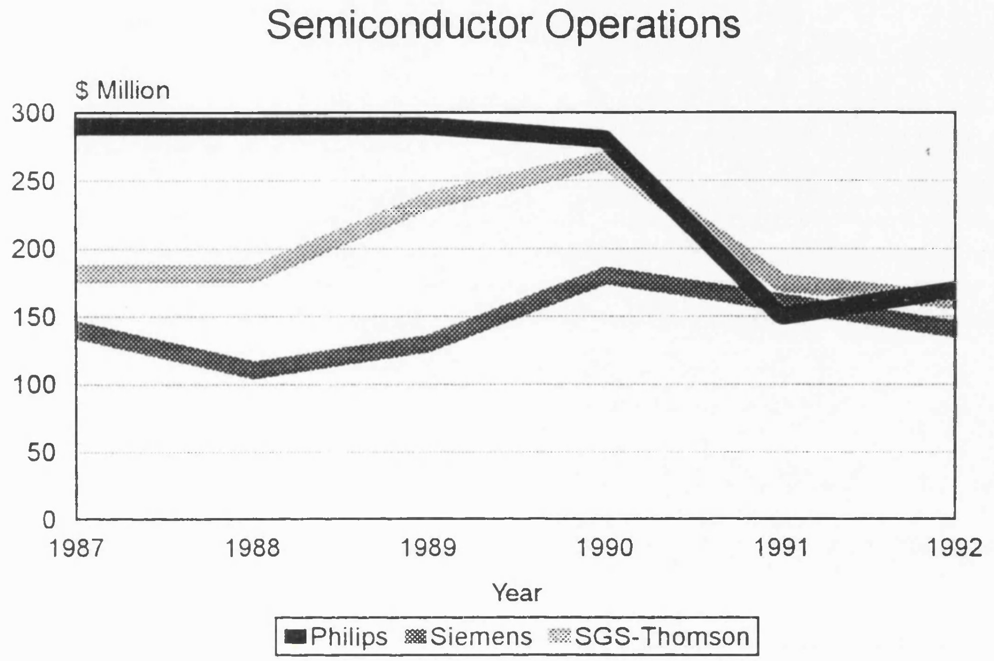
Source: Appendix 8.1 Philips Data 1987-1989: N/A; SGS Data 1987,1993: N/A; Siemens: No data available (see App.8.1)

Computer Operations

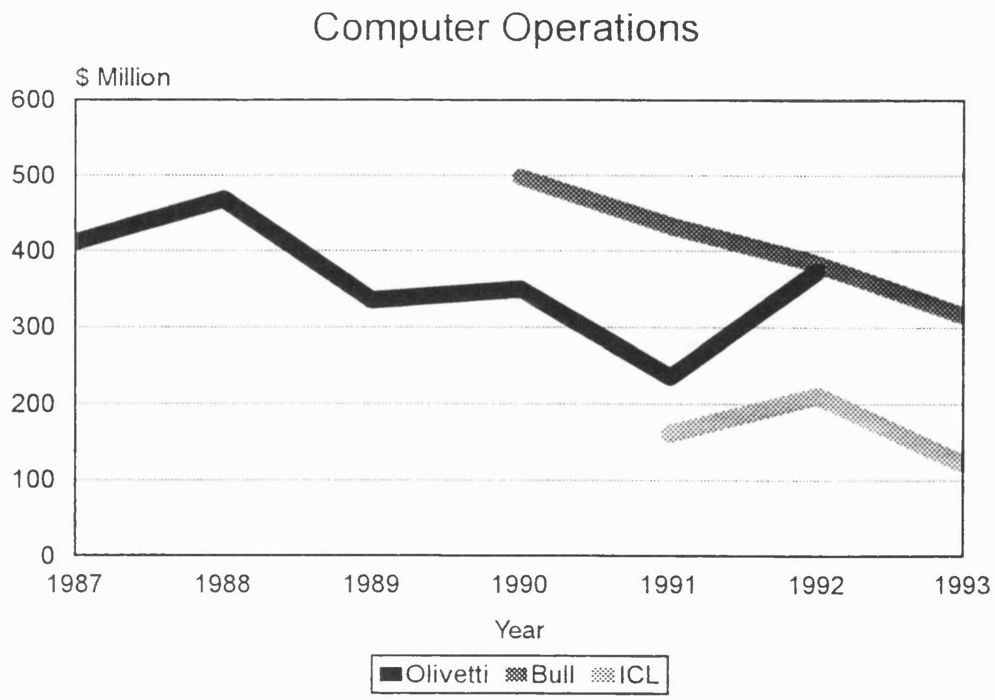


Source: Appendix 8.1 ICL Data 1989-90: N/A; Olivetti Data 1993: N/A; SNI Data 1987-89: N/A; Philips: Only 1990 available

Figure 8.3 Corporate Assets 2: Capital Expenditures, 1987-1993



Source: Appendix 1.1

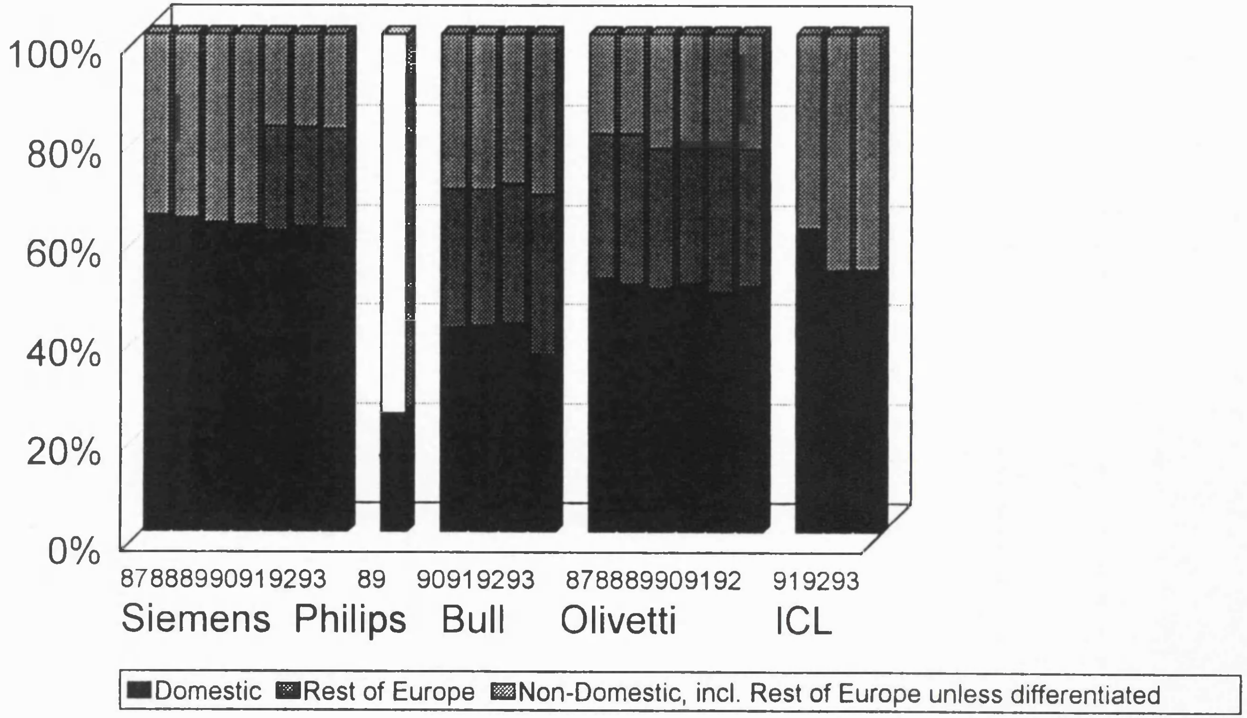


Source: Appendix 1.1 Siemens, Philips: No data available on computer operations-related capital expenditure; Bull Data 1987-1989: N/A; Olivetti Data 1993: N/A; ICL Data 1987-1990: N/A provide sufficient "value for money" has also been supported by the reduced contribution of the European-grown IT companies to employment; over the early 1990s, the absolute number of jobs offered by the companies has fallen (see Figure 8.1). The share of domestic and European employment within the companies' total employment has remained relatively stable over the early 1990s, with the exception of ICL, implying that the job cuts have been spread across the companies' geographical scope (see Figure 8.4). As, however, the majority of the jobs have been located within the European economies, the absolute employment level within the EC has been negatively affected by the companies' job losses.

These job losses, however, have been merely referring to losses in direct employment. The relatively poor performance of the indigenous European IT companies also has affected indirect employment, notably jobs at supplying and distributing companies. Philips, for example, accounted for an estimated 24,000 jobs in the supplying sector before the start of Operation Centurion; nearly one fifth of all Dutch companies with 5 or more employees supplied the company, accounting in total for 20 per cent of Philips' supplies. Additionally, approximately 25,000 jobs in the distribution sector were dependent on Philips (NRC, 25 May 1990:11). Although this example may be misleading to the extent that Philips has been disproportionally large in comparison to the small Dutch economy, it does show how many jobs may have been affected by Philips' poor corporate performance.

Fourth, the perception that financially supporting the indigenous IT industry constitutes a waste of money has been neither fully supported nor fully undermined by data on the Roundtable members' contribution to product and process technology and management skills (see Figure 8.5). Over the period 1987-1992, the IT companies either increased their R&D expenditures in absolute terms or roughly maintained their spending levels - providing no real justification for the perception outlined above. The

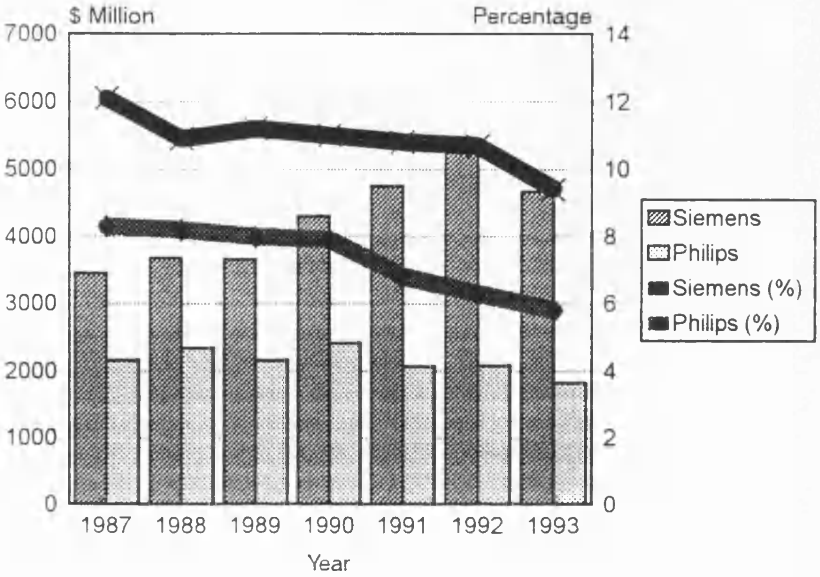
Figure 8.4 Corporate Assets 3: Employment, 1987-1993
Breakdown by Area



Source: Appendix 8.2 Data SGS: N/A; ICL Data 1987-1990: N/A; Olivetti Data 1993: N/A; Bull Data 1987-1989: N/A; Philips: Only 1989 domestic data available

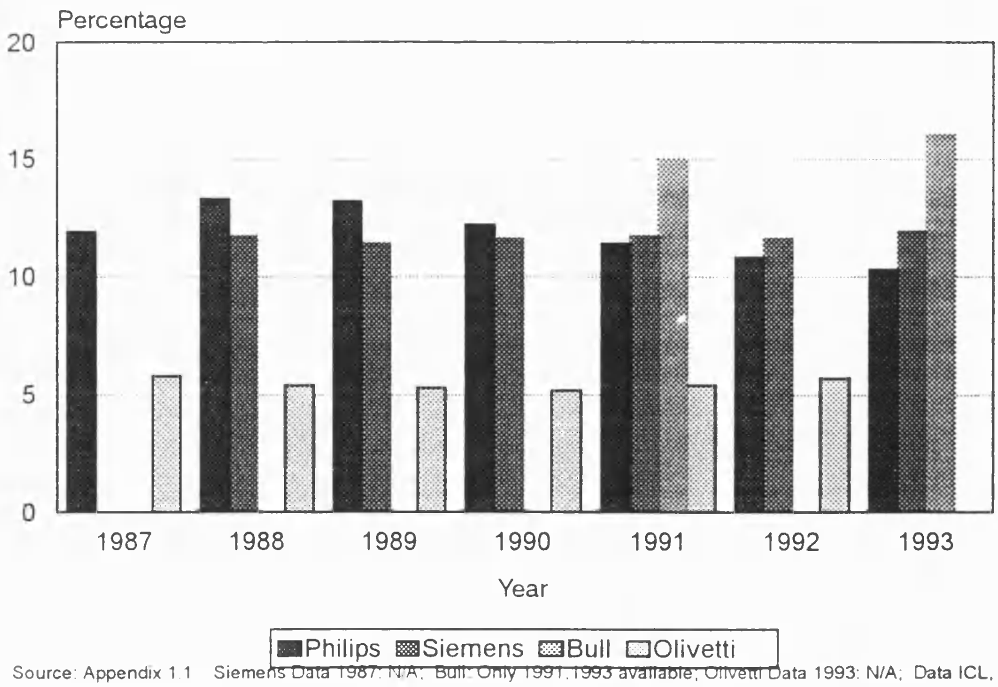
Figure 8.5 Corporate Assets 4: R&D Expenditures and Employees, 1987-1993

R&D Expenditures: in $ Million and as % of Sales



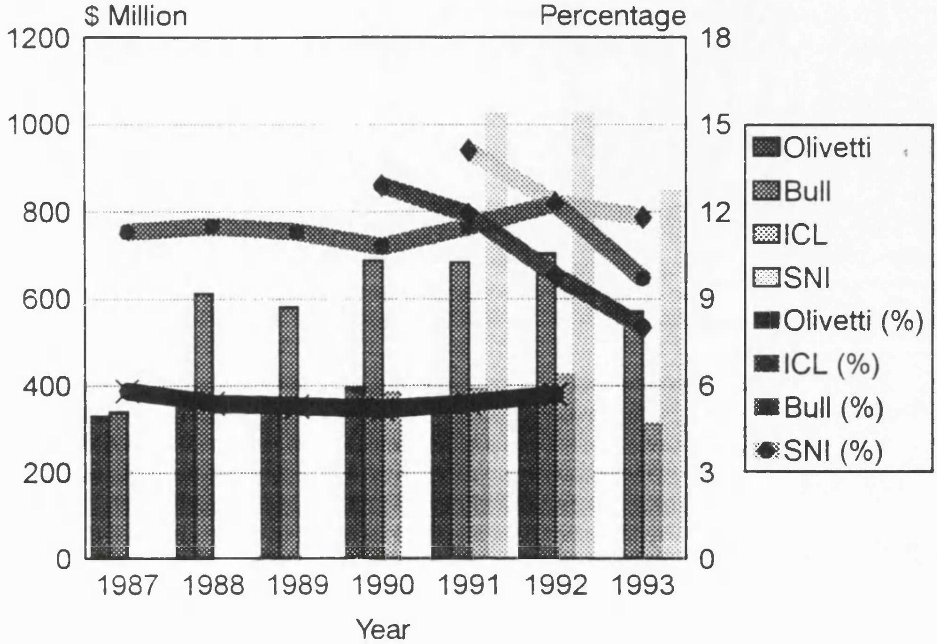
Source: Appendix 1.1

R&D Employees as % of Total Labour



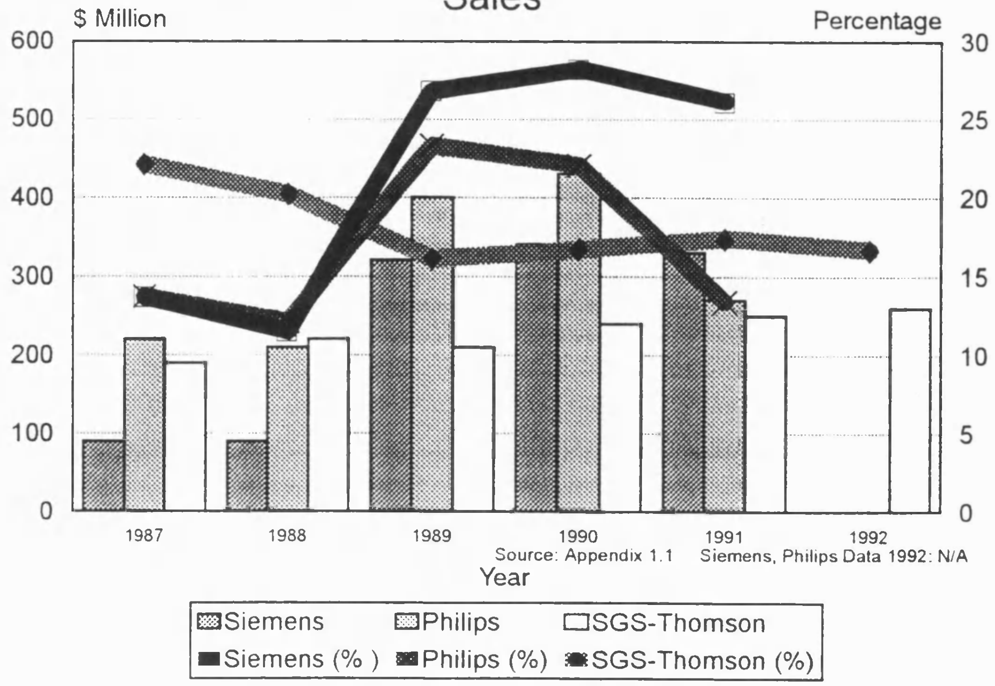
Source: Appendix 1.1 Siemens Data 1987: N/A; Bull: Only 1991, 1993 available; Olivetti Data 1993: N/A; Data ICL, SGS-Thomson not available

Computer R&D Expenditure: in $ Million and as % of Sales



Source: Appendix 1.1 and SNI A/R; Philips: Data for R&D Expenditures on Computers not available; ICL Data 1987-1989: N/A; SNI: Data 1987-1993: N/A; Olivetti 1993: N/A

Semiconductor R&D Expenditures: in $ Million and as % of Sales



Source: Appendix 1.1 Siemens, Philips Data 1992: N/A majority of these R&D expenditures are likely to have benefitted the home country; the Netherlands, for example, accounts for approximately 60% of Philips' R&D operations (NRC, 25 May 1990:11). Only in 1993, well after the plans of the Commission were outlined, corporate R&D expenditures dropped significantly.

In relative terms, however, the general trend appears to have been one of stabilization or decline - with the notable exception of Philips and Siemens' semiconductor R&D expenditures. While Philips' and Siemens' share of R&D in overall sales fell over the late 1980s and early 1990s, over the period 1989-1990/91, Philips and Siemens increased substantially the share of their semiconductor R&D expenditures - most likely to prepare their respective RAM technologies for production. In contrast, SGS-Thomson's share of R&D in total corporate sales fell over the late 1980s and early 1990s. Similarly, the computer R&D expenditures of SNI and ICL fell as a percentage of their overall sales, while Olivetti and Bull maintained their R&D commitment at stable, albeit widely diverging levels. Facing the realities of its upcoming privatization, Bull's commitment to R&D dropped significantly in 1993.

Data on the absolute number of R&D employees and their share in the companies' total labour force have been inconclusive; the individual corporate trends appear to be related to the financial conditions of the company in question and/or the extent to which they have been cutting their R&D force relative to other employees. For example, the rate at which the financially-squeezed Philips has reduced its R&D personnel has been higher than the rate at which the company has been reducing its overall labour force, resulting in both an absolute as well as a relative decline in R&D personnel. As an estimated 50 per cent of Philips' R&D personnel has been located in the Netherlands[8], this has had negative consequences for the overall employment level in the Netherlands. In contrast, the cash-rich Siemens, which employs over 70 per cent of its R&D personnel in Germany, has been increasing its R&D employees in absolute terms, although the share of R&D personnel in Siemens' total labour force has remained relatively stable (see Figure 8.5).

Five, the reduction in non-European sales in the early 1990s, used as a proxy for exports and FDI, gives some support to the perception that funding the European-owned IT industry does not yield "value for money". Figure 8.6 does not only illustrate the IT Roundtable members' heavy concentration on the European market and, thus, its limited contribution to extra-EC exports and FDI, it also shows that the companies' presence in international markets became even smaller in the early 1990s. In 1991, the falling share of non-European dataprocessing sales in total dataprocessing sales coincided with an absolute fall in non-European sales.

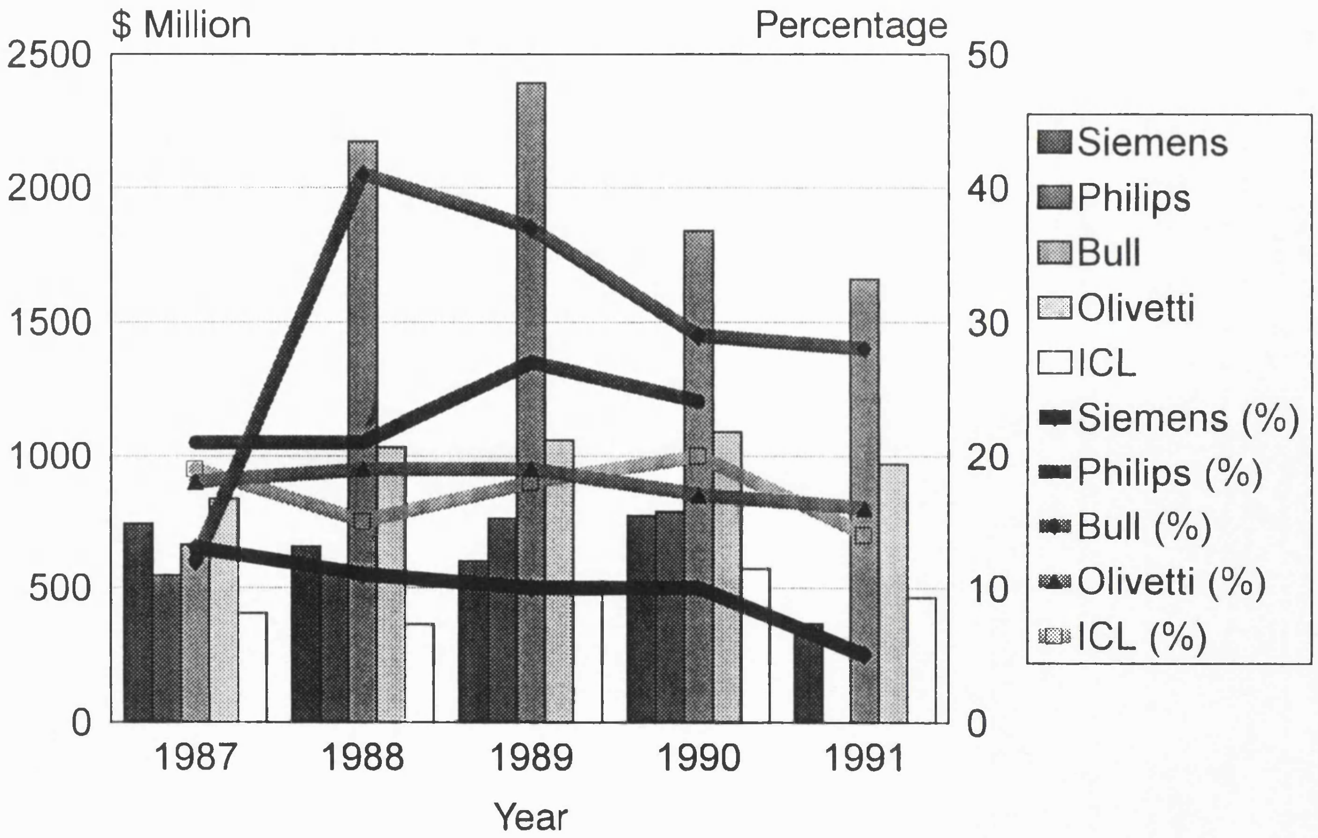
In sum, the perception that financially supporting the European-owned IT industry would not yield "value for money", has been supported by the reduction in the IT Roundtable companies' investments, IT-related employment, R&D expenditures in relative terms and exports/FDI. However, this perception was not supported by any fall in the companies' productivity nor by reductions in the absolute amount spent on R&D. Although various government officials have continued to perceive the European-owned IT producers as important sources of value-added and R&D (Interviews 19,33,39;1993), in the early 1990s, these corporate assets were not the ones that mattered most. Instead, the main public emphasis appeared to be on creating and sustaining employment - a corporate asset of which the value depreciated markedly over the early 1990s.

8.2.2 CREATING AND SUSTAINING EMPLOYMENT

The recession of the early 1990s and the rising unemployment in the Community, made it increasingly imperative that jobs be sustained and created in the EC (National government sources, Interviews 19,18,33,40;1993). As an IT company

Figure 8.6 Corporate Assets 5: Contribution to Exports/FDI, 1987-1991

Non-European Dataprocessing Sales in $ Million & as % of Total Dataprocessing Sales



Source: Appendix 8.3 Philips Data 1991: N/A executive argued: "The level of employment that a firm guarantees is very important. That is the first priority of the government" (Interview 5;1993).

The decision of the European-owned IT companies, as well as their foreign competitors, to cut employment in response to the structural changes taking place in the IT industry in the early 1990s, however, implied that, from an employment point of view, the electronics industry in general, and the IT industry in particular, left much to be desired (see Figures 8.1 and 8.4). Moreover, it was felt that the contribution to employment by the electronics industry in general, and the IT industry in particular, had not been as high as in other industries. Especially the car industry, which is a user of IT, was perceived as scoring better in this respect (SERICS sources, Interview 18;1993) - a perception verified by Figure 8.7.

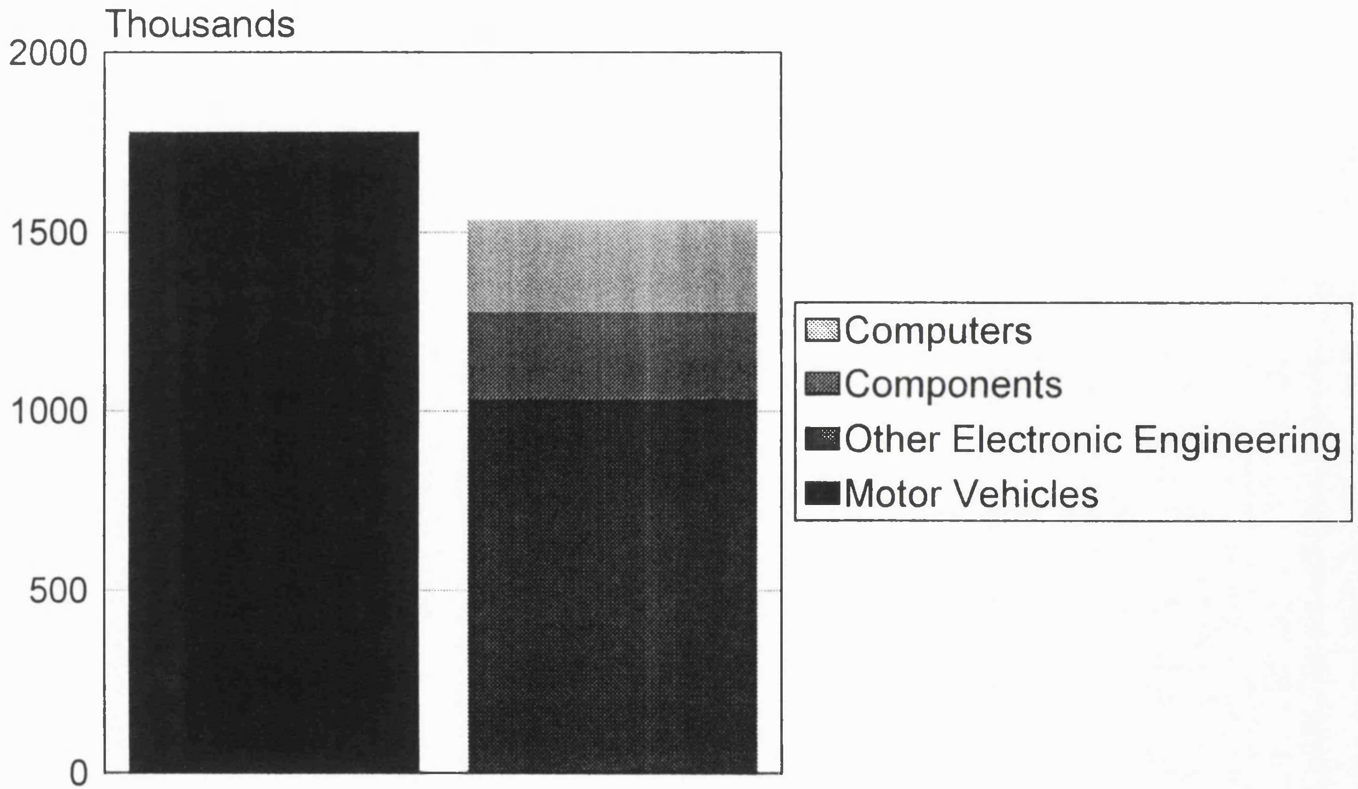
Additionally, it was felt that EC programmes seeking to support an IT manufacturing capability in Europe had contributed very little to employment in IT manufacturing. As a DG 13 official argued: "the initiatives produced very few jobs. Their effect [on employment] was minimal" (Interview 6;1993). This perception may have added to the doubts concerning the effectiveness of programmes like ESPRIT (see Chapter 4).

8.2.3 WORKING TOWARDS COHESION

The political clout of the IT industry was further undermined by the fact that it was felt that the benefits that the companies *did* generate, were spread unevenly over the Community (EC, national government and IT industry sources, Interviews 16,24,29,31,36,39;1993). The concentration of the operations of the European-owned IT companies in France, Italy, Germany and the Netherlands (see Figures 1.2, 5.20, 8.4 and 8.5) has indeed implied that the employment sustained, the R&D activities

Figure 8.7 Employment: European Industry Comparison

1992



Source: Eurostat in EC Panorama (1993)

undertaken, and the value-added generated by these companies predominantly benefit the developed regions within the EC.

In the early 1980s, the uneven distribution of the companies' assets did not appear to be a problem. This changed, however, over the 1980s, following both the deepening and widening of the Community (see Chapter 6). The impact of EC policies on regional disparities became increasingly an issue in EC policy-making - as the concerns expressed by, for example, Ireland in the 1991 White Paper endorsement discussion have illustrated (see Chapter 4). Similarly, the allocation of EC R&TD funding to IT, which would mainly benefit France, the UK, Germany, Italy and the Netherlands, has become a subject of debate (see Chapters 4 and 9).

Moreover, judging by the EC's response to the request of the European-owned IT companies to control national subsidies to foreign companies investing in peripheral regions (see Chapter 4), the EC and its Member States have begun to attach a greater importance to the companies that would invest in the Community's lesser developed regions. As one BMFT official argued in response to the IT Roundtable members' complaints about national incentives to foreign inward investors (see Chapter 4):

> If the industry comes to us and raises concerns about Texas Instruments in Italy and says: "you must intervene in Brussels", our reaction is: "why do *you* not invest in those areas?" The answer is: "yes, but we are not interested".
>
> Nevertheless, the subsidies do constitute competition to the Europeans. But we have not intervened in this situation. We recognize that it is not a good situation, but we cannot prevent it, as we have no similar plans coming from our European industries (Interview 33;1993).

8.2.5 ECONOMIC OBJECTIVES DOMINANT

Under pressure of tighter economic conditions and the deepening and widening of the Community, the policy emphasis of the EC and its M/S governments shifted over the late 1980s and early 1990s from long-term to short-term objectives. With the shift in objectives, the Community's demand for corporate assets shifted as well - away from the European-owned IT companies' ability to develop and produce strategically important products and technology, to the companies' ability to contribute to the EC's short-term, economic objectives: "value for money", employment, and cohesion. However, while the European-owned IT companies had been able to meet the Community's demand for an indigenous source of IT, the companies were less able to contribute to the realization of the Community's economic objectives.

The perception that public funding of the European-owned IT industry did not yield sufficient "value for money", particularly in terms of jobs and cohesion, made it politically and financially more difficult to justify any further investments of public funds in programmes specifically supporting the European-owned IT suppliers - as illustrated by the difficulties of the JESSI firms to secure the promised Commission funding, the discussions about the share of funding assigned to IT in the Fourth Framework Programme, the problems encountered in securing funding for the TENs, and the failure of the Semiconductor Initiative (see Chapters 3,4,7,9).

8.3 THE RISE OF ALTERNATIVES TO THE EUROPEAN-OWNED IT HARDWARE INDUSTRY

The perception that public investments in IT may not be yielding a high-return has prompted a debate, amongst EC officials, national officials and industry representatives about the allocation of EC funding. In line with Chapter 7, which found that other companies have begun to compete with the IT Roundtable and its members in providing policy input into the Commission, the findings in this Chapter appear to indicate that these alternative companies have also started to compete with the IT

Roundtable members as sources of corporate assets.

IT Hardware Segments: Priority on Semiconductors

It has been argued that, in any trade-off between the semiconductor and the computer industry, public funds should be targeted at the semiconductor industry, even though the latter has been perceived as merely absorbing funding (SERICS sources, Interview 18;1993). The argument goes beyond the strategic importance of semiconductors as components in downstream applications (see Chapter 3). It states that public investments in the semiconductor industry have a greater chance of success than public investments into the computer industry, due to the better competitive position of the European-owned semiconductor producers (see Chapter 5) and/or the better options to intervene in this sector (see Chapter 9). Public investments in the semiconductor industry would thus be more likely to yield value in the near future than government support for the computer industry. As a French government official illustrated:

> Our financial resources are limited: we need to set priorities. We do not hesitate to support computer producers, but when you want to succeed, you have to support those [sectors] in which you are most likely to succeed.
>
> The European actors in the computer industry are doing poorly. In the computer industry, the competition is harder. We do not have the same level of world wide ranking [as the European semiconductor and telecommunications companies]. The European computer firms do not have the same strength. The computer industry is a synonym for crisis. It is a question of priority. One has to focus on the main things; which sector could be saved more easily (SERICS, Interview 18;1993).

IT Industry Segments: Priority on Software and Services

Following the structural changes in the IT industry, it has been argued that public funds should not be invested in components and computer hardware, but rather in the rapidly growing, higher value-added computer software and services segments (see Chapter 5). Due to the falling margins in the semiconductor and computer industries, subsidizing hardware has been perceived as an intrinsically bad investment, while the computer software and services industry, notably at the higher end, has been perceived as offering more potential. As summarized by an industry observer:

> As a government, you have to ask yourself: where do you put your money? You have to be selective and determine what are the EC's strengths. Its strengths are in software and in telecommunications, not in hardware (Interview 30;1993).

In 1990, EC producers accounted for over 25 per cent of the world software and services market - a considerably larger presence than in the world computer and semiconductor markets. Moreover, as Table 8.1 illustrates, members of the Group of Six as well as other European-owned software and services companies have been well-positioned within the European market, especially at the higher end of the market[9]. In 1990, the estimated employment offered by software and services companies within the EC totalled well over 400,000, which, if correct, would be substantially more than the jobs sustained by the electronic components and the computer and office equipment industries (EC Panorama, 1993:25-3 to 5; Chapter 5; Figures 8.1 and 8.7).

As Chapter 7 outlined, the shift in production from hardware to software and services has prompted the EC to seek the input of the European-owned customized software and professional services producers, notably the Group of Six. Their relatively strong economic position appears to have conferred a greater political weight on their policy preferences. As one industry observer argued:

> Judging by the effect, the interface of the software and application software industry with the EC has been quite successful. They have had a significant impact (Interview 30;1993).

Priority on Other EC Industries

It has also been argued that the EC should change its focus from supporting the

Table 8.1

MAIN SUPPLIERS TO THE EUROPEAN COMPUTER SOFTWARE AND SERVICES MARKET, 1987 AND 1990

	1987 MS %			1990 MS %	
IBM		8.3	IBM		7.4
Nixdorf (EUR)		3.0	CGS (EUR)		2.3
Unisys		2.0	Reuters (EUR)		1.9
CGS (EUR)		1.5	Siemens (EUR)		1.6
Siemens (EUR)		1.5	Finsiel (EUR)		1.4
Digital Equipment		1.3	Fujitsu, incl.ICL		1.3
Finsiel (EUR)		1.2	Digital Equipment		1.3
Reuters (EUR)		1.1	Andersen Consulting		1.3
Transpac		1.0	SEMA Group (EUR)		0.9
Olivetti (EUR)		0.9	Sligos (EUR)		0.9
Bull (EUR)		0.7	Bull (EUR)		0.8
Datev (EUR)		0.7	SD-Sicon (EUR)		0.8
Sligos (EUR)		0.6	Computer Associates		0.7
GSI (EUR)		0.6	Unisys		0.7
McDonnel Douglas		0.6	ESD		0.7
Scicon (EUR)		0.6	Microsoft		0.7
Volmac (EUR)		0.6	SAP (EUR)		0.7
SEMA Metra (EUR)		0.5	Olivetti (EUR)		0.7
CISI (EUR)		0.5	Debis (EUR)		0.6
Andersen Consulting		0.5	Oracle		0.6
Computervision		0.5	MacKinsey		0.5
Computer Associates		0.5	Datev (EUR)		0.5
ICL (EUR)		0.5	Concept (EUR)		0.5
Telesystemes (EUR)		0.4	Axime (EUR)		0.5
Thorn SW (EUR)		0.4			
Top 25	$10675mn	29.9	Top 24	$18573mn	29.1
Others	$25025mn	70.1	Others	$45157mn	70.9
Total	$35700mn	100.0	Total	$63730mn	100.0

Sources: 1987 Data: Input in EC Panorama 1990:30-15; 1990 Data: Datamation and SEMA Group/Consultronique in EC Panorama 1993:25-6 and 25-3.

Notes

EUR Europe
MS Market Share
• Exchange Rates: see Appendix 5.1

IT industry to supporting other, newly emerging and/or seemingly more valuable sectors. As one UNICE representative expressed it,

> UNICE has been stressing that the ITC industry is not the only industry. [..] Stopping costly programmes allows the government to save money for sectors with better assets (Interview 4;1993).

These better "options" could comprise: (1) other high-tech industries, and (2) related industries, notably IT users.

First, the search of some M/S governments to increase their *national* returns on payments made to the EC (see Chapter 6) has made high-tech industries other than the IT industry, more important as political actors. Prioritized by Member States without a significant IT capability (DG 3 sources, Interview 26;1993), biotechnology and other HT industries have become increasingly effective competitors to the IT industry in the allocation of EC R&TD funding; the share of funding allocated to, for example, biotechnology has shown a marked increase in the Fourth Framework Programme (see Chapters 4,9).

Second, the recognition that it is the application of IT that matters rather than its supply, has made IT users more important as political actors (EC and national government sources, Interviews 21,26,33,39;1993). Not only has this recognition prompted the EC to seek and incorporate the input of users of IT in its development of EC IT policies, as Chapters 4 and 7 outlined, also it appears to have induced the EC to attach more political weight to the policy preferences of these users. As an industry observer summarized with respect to the Community R&TD programmes:

> For some time now, there has been a concern among policy makers about the direction of R&D; there has been the feeling that the thrust of the R&D programs has been too much on the supply side and too little on the market side. It was felt that there should be a much greater focus on the application, the use of information technology. Subsequently, users of IT have been getting more influence (Interview 30;1993).

The telecommunications equipment industry and the automotive (motor vehicle) industry, in particular, have been identified as IT users with an already large, and increasing political clout (Interview 30;1993) - a judgement justified by the size of their corporate assets (see Figure 8.8).

The telecommunications equipment industry, which has been represented in the IT Roundtable (see Chapter 1) has been drawing its political weight mainly from its commercial success, as its overall profitability, its positive extra-EC trade balance, and its revealed technological advantage (RTA) index illustrate (see Figure 8.8; De Jonquières, 25 July 1990; Cane, 2 March 1994:11). Moreover, the industry has been the largest contributor to value-added within the Community's electronic engineering sector. The industry, however, has sustained far less employment than the consumer electronics industry and even less than the computer and office equipment industry.

The political weight of the automotive industry has been based on its enormous size in terms of both value-added as well as employment. Its contribution to value-added has far outweighed those of the computer, component, and even telecommunications industries. Its labour force has been larger than the number of people employed in the whole electronic engineering industry. Internationally, Europe has been relatively strong in motor vehicle technology. Not surprisingly, the industry's contribution to extra-EC exports has been positive (see Figure 8.8).

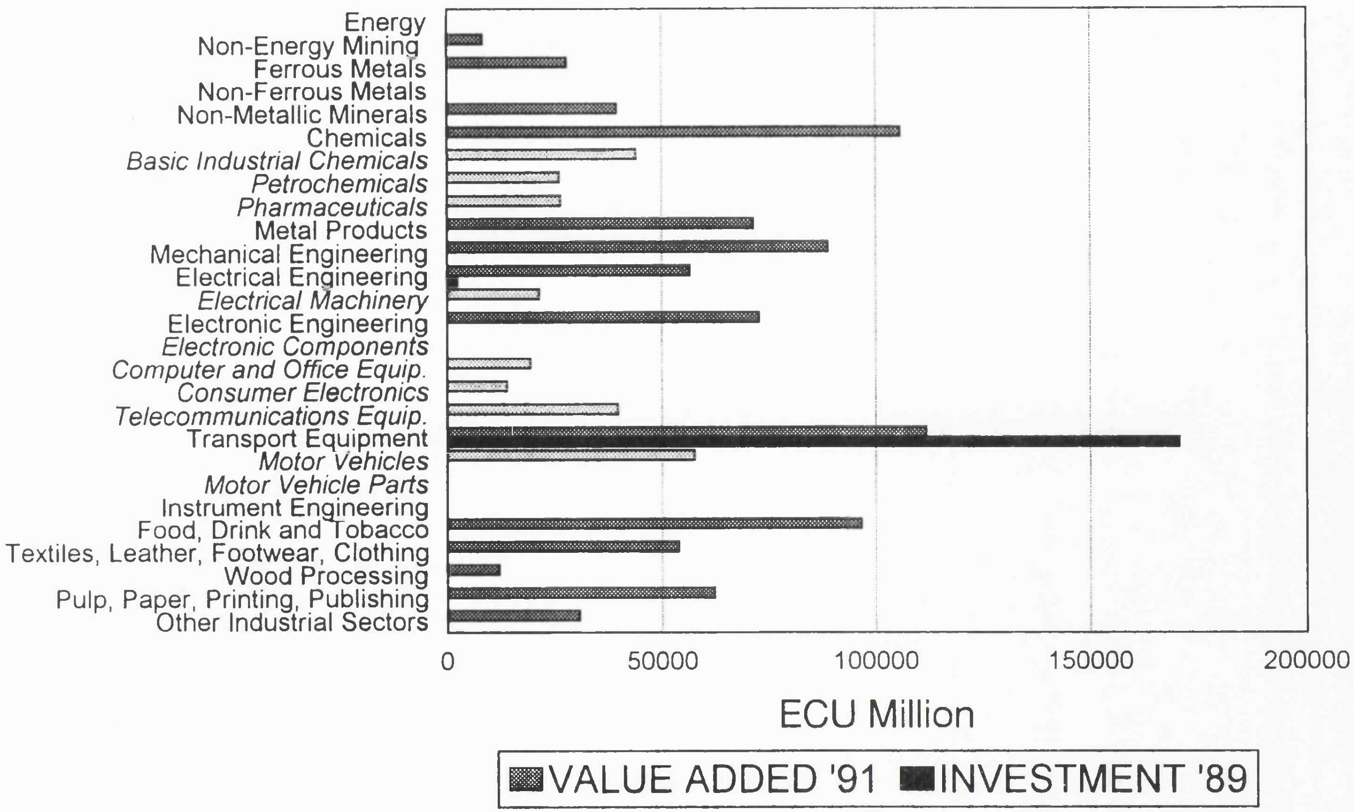
Priority on European-Owned IT SMEs

As Chapters 4 and 7 have illustrated, the EC has been intensifying its efforts to improve the participation of SMEs in the EC IT policy-formulation and implementation - convinced about the benefits that SMEs may yield.

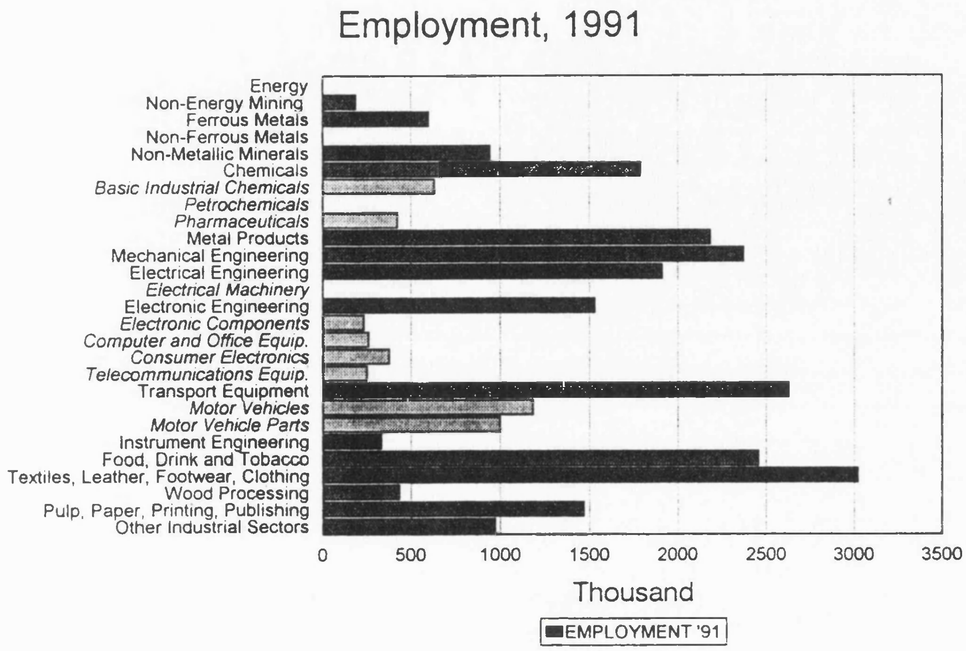
Despite their reputed innovative capability, the EC has not been considering the SMEs' potential to innovate as their main corporate asset. Particularly in the IT industry, where only the large multinational enterprises have both the funds to finance

Figure 8.8 Alternative Sources of Corporate Assets, 1984-1991

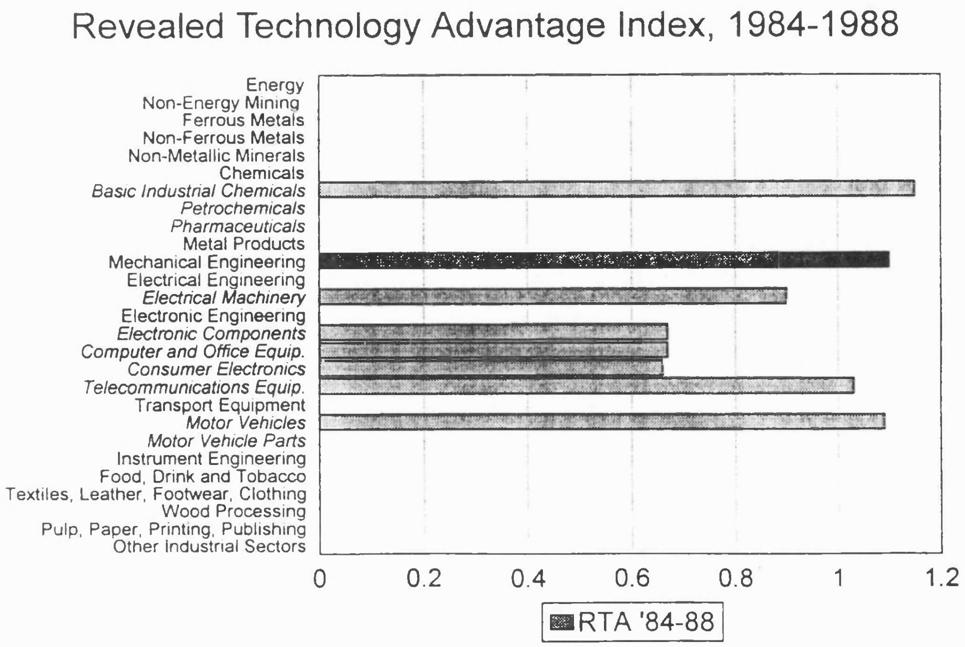
Value Added (1991) and Investment (1989)



Appendix 8.4 In Italics: sub-categories, Value Added

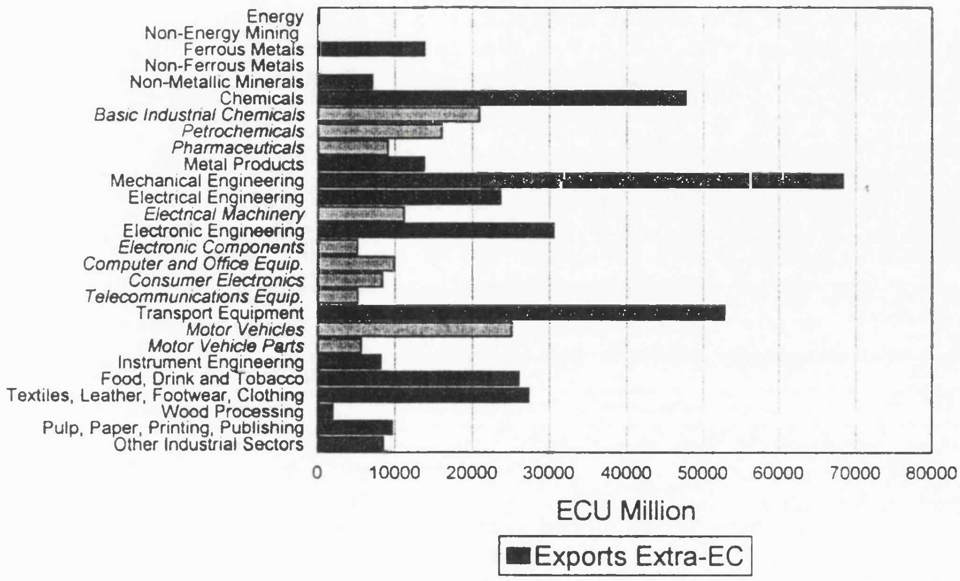


Source: Appendix 8.4   In Italics: sub-categories



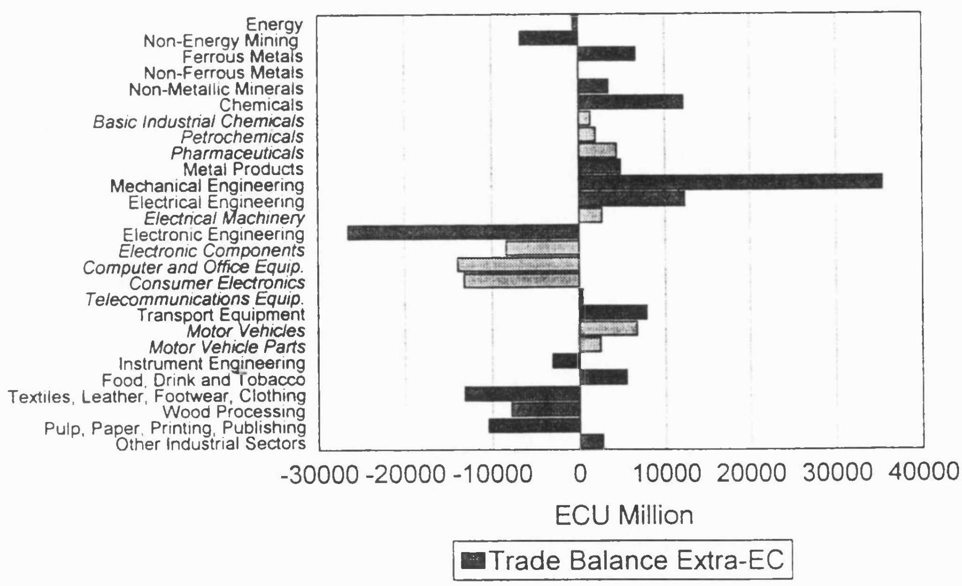
Source: Appendix 8.4   In Italics: sub-categories

Extra-EC Exports, 1991



Source: Appendix 8.4 In Italics: sub-categories

Extra-EC Trade Balance, 1991



Source: Appendix 8.4 In Italics: sub-categories

R&D and the financial staying power to wait for the results of basic research, the SMEs' contribution to new technologies has been comparatively small. Rather, the EC's recent enchantment with SMEs derives from the SMEs' employment generating capability (EP sources, Interview 21;1993). In the early 1990s, small to medium-sized enterprises constituted, as a group, the largest contributors to employment - a welcome resource in times of recession (EC Panorama, 1991:116).

This perceived advantage, however, may not have been justified in the case of SMEs operating in the European-located IT industry. A very crude estimate of the employment generated by these enterprises in the European-located IT industry appears to suggest the contrary, namely that the large IT multinationals have been constituting the largest employers within the European-located IT industry[10]. Nevertheless, concerns that support measures for the IT industry might discriminate against IT SMEs, as expressed by Ireland and Spain in the Council meeting endorsing the 1991 White Paper (Europe, 29/30 April 1991:7-8), form indications of the weight attached by some M/S governments to SMEs.

Priority on Inward Investors

After the stir caused by Fujitsu's take-over of ICL in 1991 (see Chapter 4), the Community and its national governments appear to have become more open towards foreign equity participation in the European industry and/or alliances between European-owned and foreign companies. Although changes in government may have contributed to this change in attitude, more likely is that this attitude change was imposed on the EC and its national governments by the harsh economic realities (see Chapter 6).

While the European-owned IT companies came to realize that they could not afford to "go it alone" and that they needed to cooperate with non-European companies in order to stay competitive (see Chapter 5), the EC and its national governments came to realize that they could not afford to continue financing uncompetitive home companies and that a solution had to be found in order to improve the competitiveness of the former national champions. This applies even to France, if one accepts the explanation that the French government's 1993 capital injection in Bull has been aimed at preparing the company for privatization (see Chapter 6). As one French government official argued, provided certain safeguards are met (see below), foreign participation and cooperation could "enhance and improve the technological level of the European companies" (SERICS sources, Interview 19;1993).

Moreover, as illustrated above, despite the fact that, for example, the French government has nurtured its IT industry over the past, at the same time, it has actively encouraged foreign-owned companies to invest in France in general, and in its regionally deprived areas in particular. Foreign inward investors have been perceived by both the EC as well as the national governments as substantial additional sources of corporate assets, especially in terms of employment and investment (EC and national government sources, Interviews 6,11,18,19,40;1993). In 1989, for example, IBM employed 100,000 employees in its 12 European manufacturing plants and its 9 European R&D operations - more than twice the number that Olivetti employed in the Community in that year. Similarly, Texas Instruments' ECU 1.09 bn investment into a wafer fabrication plant in Italy in 1990 constituted a welcome addition to the European-owned IT companies' capital investments (Peters, 1992:93; EC Panorama 1991:12-14; Appendix 8.2).

Not all EC governments, however, have been welcoming inward investors in a manner as undiscriminating as the UK, which has argued that "any company operating in the UK is valuable" (DTI sources, Interview 40;1993). French, German and Dutch government officials, for example, have argued that in order to derive benefits for their national economies, the attitude towards the foreign inward investors should depend on the type of operations involved (merely assembly or also R&D and management activities), and the investors' integration into the European industrial fabric (linkages) (BMFT, SERICS, EZ sources, Interviews 18,19,33;1993).

Although several of the foreign IT companies located in the Community have gone through similar restructuring exercises as the European-owned IT companies (see Chapter 5), concerns that the implementation of the 1991 White Paper might discriminate against foreign-owned IT companies, as expressed by Ireland and the UK in the Council meeting endorsing the White Paper (Europe, 29/30 April 1991:7-8; Chapter 4), form indications of the increased political weight of the foreign-owned IT companies. As one industry observer argued, the inward investors' contribution to employment, R&D and cohesion has yielded them "a substantial influence" in the EC (Interview 30;1993).

8.4 CONCLUSION

This chapter has sought to explain the loss in political influence experienced by the IT Roundtable in the early 1990s, in comparison to the 1980s, by analyzing changes in the political weight of the IT Roundtable's policy preferences.

In the early 1980s, the political weight attached by the European Community and its national governments to the IT Roundtable members' policy preferences was based to a large extent on the perception that the European-owned companies, as indigenous sources of IT, were necessary for capturing the benefits of IT. Although the EC and its Member States continued to perceive information technology as an economically and militarily strategic technology in the late 1980s and early 1990s, notably the UK government questioned whether maintaining an indigenous IT production capability was an absolute prerequisite - a perception supported by the shift in emphasis from the supply to the application of IT and by the alleviation of security of supply concerns in the commodity IT market segments.

Over the late 1980s and early 1990s, the EC shifted its policy strategy from the supply of IT to the use of IT in recognition that it is the application of IT, and not its production, that generates value. An effective application of IT, however, does not necessarily require an indigenous supply source of IT. Although this thesis argued that an indigenous capability would be advisable in the case of IT products used in military applications and an in-house capability preferable in the case of ASICs and other commercially-applied customized IT products, reliance on foreign sources of IT could be justified in the case of mass-produced IT products used in commercial applications, provided that the European IT users would have access to an internationally competitive, state-of-the-art source of information technology. The main reason underlying this argument was that over the late 1980s and early 1990s, the supply conditions of both semiconductors as well as computers improved, securing access of the IT users to IT sources and easing security of supply concerns.

Whether justified or not, the reduced importance attached by some EC governments to the strategic necessity of a European-owned and controlled industry has made it more difficult to adopt EC-wide measures in support of the European-owned IT industry - explaining in part the IT Roundtable's loss in political influence in the late 1980s and early 1990s. Doubts about the necessity of an indigenous IT capability have depreciated the perceived value of the IT Roundtable's main asset, that wielded it so much political weight in the early and mid-1980s: its capability to supply economically and militarily strategic technologies and products.

Instead, in the early 1990s, short-term economic objectives became increasingly important - even amongst the Dutch, French and German governments that had been paying lip-service to the necessity of an indigenous IT and, particularly, a European-owned and controlled semiconductor capability. Under pressure of the economic recession of the early 1990s and the widening and deepening taking place of the EC over the 1980s and early 1990s, "value for money", employment and cohesion became increasingly important issues on the EC policy agenda.

Due to the crisis in the IT industry, however, public support of the European-owned IT companies was perceived as yielding insufficient "value for money". Although this perception was not fully justified, the companies did score poorly on the one corporate asset that mattered most; over the late 1980s and early 1990s, the IT Roundtable members' contribution to employment was not only relatively small in comparison to other industries, but also rapidly declining. Moreover, the companies' employment and other contributions to the European economy mostly benefitted the Northern, developed regions, and contributed little to cohesion.

Whether justified or not, the perception that public support of the European-owned IT industry did not yield sufficient "value for money", made it politically and financially more difficult to justify any further investments of public funds in programmes specifically supporting the European-owned IT suppliers. As such, the crisis in the IT industry contributes to an explanation of the IT Roundtable's loss in political influence in the late 1980s and early 1990s.

Moreover, with the increasing preponderance of short-term, economic objectives, alternative sources of corporate assets appear to have become more important - implying that the IT Roundtable did not only face competition in providing policy inputs into the Commission in the early 1990s, but also in convincing the Commission about the importance of meeting its policy preferences and not those of others. The policy preferences of the software and services companies, IT user firms and other high-tech companies may have carried more political weight, judging by their contributions to the realization of the Community's economic objectives. IT SMEs and foreign-owned IT companies have been perceived as welcome additional sources of corporate assets, boosting their political weight within Community politics.

8.5 NOTES

1. DG 13, EP, SERICS, EZ, BMFT and DTI sources, Interviews 6,18,19,21,33,40,41;1993; Italian government sources, Communication 42;1994.

2. DG13, EP, SERICS, EZ and BMFT sources, Interviews 6,18,19,21,33;1993.

3. IRDAC and DTI sources, Interviews 13,40,41;1993; Walker (1993:185-186).

4. This provision was contested by the EC under GATT Article XXII and won by the EC in 1988 (Europe, 22 June 1989:8).

5. EP, SERICS, EZ, EECA and ORGALIME sources, Interviews 18,19,21,23,31;1993.

6. DTI, EP, IT consultancy sources, Interviews 1,10,12,30,41;1993.

7. EP, EZ, SERICS, DTI, UNICE and IT company sources, Interviews 1,4,8,10,12,18,30,39;1993.

8. In the late 1980s, approximately 16000 Philips NL employees were involved in R&D. In 1990, Philips employed in total 35127 employees in R&D related activities (NRC, 25 May 1990:11; Philips Annual Report).

9. The market for packaged software has been dominated by American producers (Oracle, Computer Associates, Microsoft) (EC Panorama, 1993:25-5).

10. In 1988, the EC computer and office equipment industry employed 265900 people. It has been estimated that, in total, 5701 micro (0-9 employees) and small enterprises (10-99 employees) accounted for 13.6 per cent of the jobs (36162), while 213 medium (100-499) and large companies (500 and more employees) accounted for 86.4 per cent (229738). On average, each medium and large company would thus employ 1079 people. Most likely, however, there have been a large number of medium-sized companies employing less than 500 employees and a small number of large companies employing more than 500 employees. In 1988, for example, Olivetti alone already accounted for an estimated 46080 European jobs. Not all these jobs may have been in the computer and office equipment segment or within the European Community, but the sheer size of the number employed supports the expectation outlined in the text (Appendix 1.1; Figure 8.4; EC Panorama, 1993:10-18; 1991:114).

Chapter 9

POLITICAL REALIZATION

Chapters 7 and 8 have argued that the loss of the IT Roundtable's political influence can be explained by the declining effectiveness of the IT Roundtable as a channel of political activity and by the reduced political weight attached to its policy preferences. However, even if the IT Roundtable would have voiced its policy preferences in an optimal fashion and these preferences would have carried sufficient political weight, one could question whether these policy preferences could be realized (see Chapter 2). Would the EC be able to supply the policies requested?

This chapter seeks to explain the loss in political influence experienced by the IT Roundtable in the early 1990s, in comparison to the 1980s, by analyzing changes in the ability of the European Community to provide the policies, as requested by the IT Roundtable. The first section focuses on the internal impediments hampering the EC's ability to realize the IT companies' policy preferences. The second section discusses the limitations set by the nature of the industry in which the EC has been intervening.

9.1 THE EC AS A POLICY-SUPPLIER: INTERNAL SHORTCOMINGS

As Chapter 2 outlined, the effectiveness of the EC as a policy supplier may have been affected by four factors. First, the EC may not have had the competencies to provide the policies preferred by the IT Roundtable, i.e. (1) a better funded, near-market, second generation IT R&TD programme; (2) transitional protective arrangements to secure a balanced opening of third country markets and controls on national incentives to inward investments; and (3) a relaxation of the EC's anti-trust policy and preferential treatment of the European-owned IT companies in the implementation of the Trans European Networks (see Table 4.1). Second, the EC may not have been endowed with an adequate array of policy instruments to execute its competencies. In particular, is it possible that the EC's policy instruments have been inept to deal with the far more interventionist-inclined policy demands of the IT Roundtable in the early 1990s? Third, the realization of the IT Roundtable's policy preferences may have floundered due to the lack of resources available for Community activities and, especially, the Community's IT R&TD programmes and TENs. Finally, the EC, as a fragmented policy supplier, may not have been able to respond sufficiently fast to keep up with the pace of change in the IT industry.

9.1.1 SCOPE OF COMPETENCIES

By the time the Commission's 1991 White Paper was drafted, the competencies to build an IT industrial policy at the Community level were not yet in place. The White Paper, however, was written with the clear understanding that the EC would be endowed with a competency in this area and, indeed, after substantial delays in its ratification, the Maastricht Treaty did so (see Chapter 6).

The institutional changes brought about by the Maastricht Treaty, however, have only partially strengthened the EC's competencies in the area of industrial policy (DG 3 sources, Interview 11;1993). The provisions outlined in the Treaty limit the actions that the EC, as such, can take. First, the Community should seek to realize the objectives outlined in the provisions through the "policies and activities it pursues under other provisions of the Treaty" (EC Treaty (93):Art.130). Second, as Church and Phinnemore (1994:214) argue: "The only decisions the Community may take on the basis of Article 130 are specific measures designed to support action taken in Member States". Third, the implementation of such common actions has been made subject to unanimity voting in the Council of Ministers - a forum characterized by ideologically diverging policy-stances regarding government intervention in support of industry (see Chapters 2,4,6). Finally, the Treaty has set clear limits to the interventionist nature of any measure to be taken on the basis of Art. 130; they should not lead to a distortion of competition. This has implied that the EC's responsibility to ensure "that the conditions necessary for the competitiveness of the Community's industry exist" is still far away from a comprehensive and coherent EC Industrial Policy in the area of IT.

The competencies for the individual policy areas identified in the 1991 White Paper, however, either were in place or were being put into place under other provisions in the Treaty. As Chapter 2 expected, the EC should thus be able to implement the White Paper and satisfy even the IT Roundtable's more far-reaching policy demands - particularly after it was endowed with new competencies by the Maastricht Treaty.

R&TD: Second Generation

When the IT Roundtable lobbied in favour of a Community R&TD programme in the early 1980s (see Chapter 3), the EC competencies thereto were not in place. The lack of formal competencies on R&TD, however, did not hamper the realization of the IT Roundtable's policy preferences; the first Community R&TD Framework Programme (OJ C208, 1983) and the ESPRIT programme (OJ L67, 1984) were introduced on the basis of Article 235 of the EEC Treaty (58) (see Chapter 3). When the IT Roundtable lobbied for a second generation IT R&TD programme in the early 1990s (see Table 4.1), no such problems existed; in 1987, the Single European Act had formally endowed the EC with powers in the area of Community research and technological development and had made EC R&TD decisions subject to more lenient voting rules (see Chapters 3,6).

Fair Competition and Market Access

As the institution responsible for the Community's commercial policy, the EC was, in theory, in a position to satisfy the IT Roundtable's demand for transitory protective arrangements (see Table 4.1). First of all, the EC could exercise its rights under the GATT; in international negotiations, it could make the reduction of existing tariff or non-tariff barriers pending on concessions offered by third countries or, in more urgent cases, resort to safeguard measures. Alternatively, the necessary measures could be taken on the basis of Article 113 of the EC/EEC Treaty (93;87;58), which allows the Commission to submit proposals to the Council for the implementation of its common commercial policy. With some exceptions (EC Treaty (93):Art.228), the Council would decide on these proposals by qualified majority.

Similarly, the EC could satisfy, in theory, the IT Roundtable's preferences for controls on national incentives to inward investments (see Table 4.1) through a far stricter interpretation of the EC rules on those forms of state aid that are compatible with the common market, notably those on aid to promote the economic development of regionally underdeveloped areas (EC/EEC Treaty (93;87):Art.92.2 and 3).

Trans European Networks

In the context of the Maastricht Treaty, the EC also acquired a legal responsibility in the area of TENs (see Chapter 6). Satisfying the IT Roundtable's wish for preferential treatment for European-owned IT companies, however, would be more difficult to realize within the context of the GATT. Nevertheless, to the extent that the development of these TENs would involve bidding for government tenders involving the formerly excluded sectors and, particularly, telecommunications, the EC's preferential treatment clauses could apply; a three per cent price preference could be given to European bidders in the allocation of the contracts (Art.29). Any waiver of these preferential clauses could be made conditional upon reciprocal access to the third countries' markets - as illustrated by the waiver towards American companies bidding for contracts in all formerly excluded sectors but telecommunications (see Chapter 4).

Moreover, the EC Commission, as the authority responsible for the Community's competition policy, could, in theory, reinterpret its guidelines on the application of its rules on undertakings - allowing the EC to meet the IT Roundtable's demand for a more pragmatic anti-trust policy in the implementation of TENs (see Table 4.1). A precedence thereto was set in 1971, albeit in a different area, when the Commission was empowered to apply exemptions to R&D agreements up to the stage of industrial application (OJ L285, 1971). In 1984, the Commission made use of this power by adopting a regulation exempting joint R&D and exploitation agreements from EC competition rules (OJ L53, 1985). This block exemption was further amended and extended in 1992 to cover the joint distribution of products resulting from joint R&D - provided the market share of the participating companies would not exceed a certain limit (OJ L21, 1993).

Theory versus Practice

In theory, the competencies were thus in place to implement the White Paper and satisfy the IT Roundtable's policy demands. As Chapter 2 expected, however, in practice, it has been more difficult to implement the areas identified in the White Paper, let alone to realize the IT Roundtable's more far-reaching policy preferences (DG 3 and EP sources, Interviews 3,11,21,26;1993). First, as outlined in the case of a common industrial policy, ideological divergencies amongst the Member States have hampered the realization of the White Paper and more aggressive interpretations thereof - the difficulties to implement the Council Resolution being a case in point (see Chapter 4).

Second, the new terms of co-existence between the EC, as a supplier of IT and other industrial policies, and the national governments (see Chapter 6), have constrained the actions the EC can actually undertake, as is particularly clear in the case of the Community's R&TD policies and the TENs. In the area of R&TD, the application of the principle of subsidiarity, for example, has strengthened the position of EUREKA, the inter-governmental R&TD programmes, vis-à-vis Community programmes. In the area of TENs, clear limits have been set as to the EC's ability to raise funds; the development of a new financial instrument at the EC level, namely the Union bonds, was not welcomed by the M/S governments (see Chapter 4; see below).

9.1.2 PORTFOLIO OF POLICY INSTRUMENTS

By the time the Commission's 1991 White Paper was drafted, the EC did have at its disposal various policy instruments to execute its competencies in the area of R&TD, trade and competition, and TENs. However, were these instruments adequate to satisfy the IT Roundtable's more far-reaching policy demands, as Chapter 2 has questioned?

R&TD: Second Generation

The SEA's formalization of the EC's competencies in the area of research and development bestowed the EC with a new policy instrument, namely R&TD subsidies for precompetitive collaborative R&TD projects. By keeping the collaborative projects precompetitive, the EC stayed within the confines of the derogations allowed under Art. 85 and 86 of the EEC Treaty. In the early 1990s, however, the IT Roundtable members began calling for subsidized collaborative R&TD projects which would go beyond the precompetitive stage (see Table 4.1). Subsidizing near-market R&TD

projects, however, would raise the question of the impact of these projects on competition. As one IT Roundtable source argued:

> We are reaching the ceiling of what can be interpreted as precompetitive. We need actions in the competitive field, but how to do so? The Commission is not allowed to do so on the basis of its competition policy. It cannot agree to sponsor the development of a product (Interview 36;1993).

The constraints imposed by the EC's competition policy on the application of R&TD subsidies, however, do not appear to have hampered the development of a more market-oriented second generation of IT R&TD programmes within the context of the EC's Fourth Framework Programme. As Chapter 4 outlined, the EC has resorted, first of all, to focused clusters, under which the EC's financial support will be confined to the up-stream precompetitive elements, and secondly, to closer linkages with the more market-oriented EUREKA projects. As one IT Roundtable member commented with respect to the new IT programme: "The precompetitive wording has disappeared in the Commission document. [..] Now the goal is commercial products" (Interview 5;1993).

Market Access

In the late 1980s and early 1990s, the EC had access to a wide array of trade policy instruments to protect and promote the interests of its IT industry, including the Common Customs Tariff[1], its safeguard provisions[2], its anti-dumping and countervailing duty clauses[3], its rules of origin[4] and its *de facto* local content requirements (Vermulst and Waer, 1990; Kelly, 1988;1992). In 1984, the Community expanded its portfolio of trade policy instruments by forming the New Trade Policy Instrument (NTPI). This instrument would allow the Community to take measures to counter unfair trading practices or to ensure the full exercise of its international trade rights (OJ L252, 1984). None of the EC's trade policy instruments, however, has been able to work as effectively as the American "Section 301" in opening third country markets.

Section 301 of the US 1974 Trade Act, as extended by the 1988 Omnibus Trade and Competitiveness Act, gives the US President the power to take trade measures to enforce America's rights under any trade agreement; it gives the US the powers to force open foreign markets which are deemed to be closed to US exports. Moreover, it gives the President the powers to take retaliatory measures to counter trade practices which the US considers to be unjustifiable, unreasonable, or discriminatory, and which injure or restrict US trade. The main power of Section 301 lies in the fact that it has allowed the US to act unilaterally in defining its trading rights, determining their infringements, and meting out the punitive measures (Bhagwati, 1989:440; CEC, 1990:2). Moreover, as Bhagwati (1989:441) notes, the Super 301 provisions of the 1988 Act, outlined in Section 301, allow the US to reprimand entire countries (not just individual industries) as unfair traders, at the end of a mandatory course of actions. As such, the current Section 301 is incompatible with the multilateral obligations of the United States.

In contrast to the American Section 301, the Community's trade policy instruments adhere to the multilateral trading principles, although in particular in the case of the EC's anti-dumping legislation, the definition of what is legitimate under GATT has been stretched to a breaking point[5] (<u>Economist</u>, 10 September 1988:77-78; DG 3, Interview 11;1993; Kelly 1988:92; Norall, 1989:83). However, even the Community's NTPI, which comes closest to the American Section 301 provisions, requires that the EC retaliatory measures have to be compatible with the EC's existing *international obligations and procedures* (OJ L252, 1984). This implies that, in the case of frictions between the EC and its GATT partners, the EC would have to participate in an international consultation or dispute settlement procedure, prior to imposing the retaliatory measures, and that the final policy actions would have to take into account the results of these consultation and settlement procedures. Lack of consensus about the formation of a GATT panel or the adoption of panel reports, would not allow the EC to act unilaterally under this instrument (GATT, 1993:225). The NTPI can only be used unilaterally against non-GATT member countries - hampering the EC's ability to pry open third country markets (Buchan, 22 July 1993:6).

In line with the hypothesis outlined in Chapter 2, the main reason for the Community's adherence to multilateral trading principles in the application of its trade policy instruments appears to have been the EC's inherent ideological balance between liberal and interventionist Member States (see Chapter 6; Buchan, 18 May 1993:4; Barber, 9 February 1994:6). Although the French government has called for more effective commercial policy instruments, the overall ideological balance within the EC over the 1980s and early 1990s has been such that political consensus in favour of any departure from the multilateral trading principles has been difficult to reach - the problems in reaching a compromise on the 1991 Council Resolution and the subsequent inaction being the case in point (see Chapter 4).

The EC has even been reluctant to use the NTPI in its present form, which is still GATT-compatible - making the prospects of any removal of the references to GATT procedures in the NTPI, as suggested by the French (Buchan, 22 July 1993:6), highly unlikely. Over the first ten years of its existence, only four investigations have been conducted under the provisions of the NTPI, while none of the three concluded cases has led to retaliatory action. The EC, however, has met the French demand for efficiency improvements in the Community's anti-dumping regime despite initial opposition of the UK, Germany, Denmark and the Netherlands - allegedly as part of the price demanded by France for supporting the Uruguay Round agreement (Barber, 9 February 1994:6; Presse 4426/94:11).

The lack of policy instruments similar to the American Section 301, which have been perceived by Commissioner Pandolfi as "totally outside the multilateral trading framework" has meant that the EC would "have to rely on a mixture of patience and determination" to realize the 1991 White Paper's objective of equitable access to third country markets (Pandolfi in Business Europe, 5 April 1991:7).

Fair Competition: National Incentives on Inward Investment

Despite the Commission's competencies in the area of competition policy, no mechanism has been in place to control national incentives to inward investment, as advocated by the IT Roundtable. Instead, the status quo is that state aids to promote the economic development of regionally underdeveloped areas are compatible with the common market provided that such aid does not adversely affect trading conditions to an extent contrary to the common interest (EC/EEC Treaty (93;87):Art.92.3c). Considering the Member States' interest in attracting inward investors into their peripheral regions, they are unlikely to perceive the "common interest" as being adversely affected by these national incentives.

Trans European Networks

As the TENs are only in their preliminary stages (see Chapter 4), it is hard to assess whether or not the instruments in place have been adequate to realize the IT Roundtable's specific policy preferences - although Article 29 and Commissioner van Miert's more pragmatic interpretation of EC competition rules would seem to confirm this (see Chapter 4 and above). However, at this stage in the implementation, the realization of the TENs, as such, is still at stake. Two aspects are crucial for the realization of a Trans European Telecommunications or Information Network: (1) the liberalization of the nationally protected telecommunications markets and the consolidation of demand at the Community level, and (2) the funding of these networks (IT company sources, Interview 5;1993 and Communication 15;1994).

First, although the liberalization of telecommunications infrastructure and services has been on the EC's policy agenda since its decision to complete the Single European Market (Catinat, 12 November 1993:13-14), progress has been slow - reflecting the vested interests of the national telecommunications operators, notably France Telecom, Deutsche Telekom and STET, in maintaining their monopolies. Without the cooperation of the M/S governments in liberalizing these markets, however, the EC does not have at its disposal the instruments to overcome the fragmentation of the European market and to consolidate demand at a level where companies would be interested to invest in the so-called telecommunications or information networks. In that sense, the Corfu Summit's endorsement of the Bangemann Group's conclusions may signal a greater political commitment to the realization of the TENs (see Chapter 4).

Second, although the EC does possess financial instruments that could be used to finance the networks, such as the European Investment Bank, the introduction of a new, additional instrument at the Community level - favoured by the EC to raise the necessary funds - has run into opposition of the M/S governments. In particular, some Member States expressed their concern that the creation of Union bonds would thwart the national governments' budgetary discipline and that loans to Member States with poorer credit ratings would undermine the Commission's own credit rating (Dixon, 21 February 1994:17; Hill, 14 December 1993:5). As will be outlined below, the Corfu Summit may also have brought the TENs' financing problem one step closer to solution (Gardner, 27 June 1994:3).

No Alternative Actions at the National Level

In sum, one could conclude that the evidence on the adequacy of the

Community's policy instruments is ambiguous. While the EC's R&TD policy instruments have been adequate, the EC's trade policy instruments have certainly not been sufficient to realize the IT Roundtable's more interventionist policy preferences.

One might expect that the shortcomings in the EC's array of policy instruments have prompted the IT Roundtable companies to resort to their respective national governments (see Chapter 2). Although the M/S governments have been reasserting their sovereignty in those areas where the division of tasks between the EC and the national governments is not clearly defined, the EC has been curtailing the powers of the national governments in those areas which fall explicitly under the EC's authority - notably trade and competition. Since the EC has started to regulate national industrial policy instruments in order to create a level playing field within Europe, the Member States' ability to use their portfolio of policy instruments has been reduced.

Over the late 1980s and the early 1990s, the EC abolished national quotas on non-EC imports or replaced them by EC-wide quotas (see Chapter 3). Although most national quotas on electronic goods concern consumer electronics rather than IT products, the implication of this Commission policy has been that, at any future point in time, the European-owned IT companies cannot ask their national governments to impose such barriers, as has been done in the past for VCRs, colour TVs, et cetera (GATT, 1989:169-170; Barber, 9 February 1994:6).

Moreover, at the same time, the Commission started to enforce a stricter competition policy (see Chapter 3). National capital transactions to companies, in particular, have been put under increasing scrutiny - the Commission's investigations into French aid to Groupe Bull being a case in point.

Over the period 1991-1993, the capital transactions of the French government and the state-owned France Telecom to Groupe Bull totalled nearly FF 18 bn (see Appendix 1.1). If it could be proven that the French state had acted like any private investor, these capital transactions would not constitute aid and, therefore, fall beyond the scope of the Commission's competition authorities (OJ C273, 1991; Dawkins and Leadbeater, 5 April 1991:2; Economist, 8 June 1991:18-20; 2 March 1991:14-15). Even if the capital transactions would constitute aid, these still could be legal, providing that they would be compatible with the common market, as outlined in EC/EEC Treaty (93;87:Art.92.2 and 3). In two cases, however, the Commission doubted the commercial behaviour of the French government and the justification of its transactions sufficiently to open an investigation.

The first investigation was initiated in July 1991, spurred by complaints of ICL that the capital injections of FF 4 bn and the R&D funding of FF 2.6 bn by the French government and France Telecom, would distort competition in the European computer industry (Drozdiak, 28 April 1991:E5; Daily Telegraph, 16 April 1991). In line with remarks made by Roger Fauroux, French Minister of Industry, that

> No private shareholder would make the effort that the state will make [for Bull]. It is a political investment" (quoted in "Liberation", Browning, 4 April 1991),

the Commission concluded that the French government indeed had not acted as a private investor. The funds transacted therefore constituted state aids (OJ C244, 1992). After an extensive period of investigation, the Commission eventually approved the French state aids in 1992, on the basis of the derogation outlined in Art.92.3c of the EEC Treaty (87). As required for the applicability of Art.92.3c, the aid was perceived as "facilitating the development" of the Community's computer industry without "adversely affecting trading conditions to an extent contrary to the common interest" (Art.92.3c; OJ C244, 1992). One should note, however, that the direct investments of IBM and NEC in Bull over the course of 1991 and 1992, combined with the company's restructuring efforts, played a crucial role in convincing the Commission of the legality of the French state aids.

The second investigation was initiated in October 1993, following a capital injection of FF 2.5 bn into Bull. This enquiry was extended in January 1994 to include another FF 8.6 bn in capital pledges, directly from the French government and via France Telecom. In anticipation of the results of the Commission's investigation, the French government was asked by the Commission to freeze FF 2.5 bn of the latest capital transactions, as the justifications given by the French government for the funding merely constituted of a statement of intent rather than a serious restructuring plan.

By the end of July 1994, the Commission had not yet ruled on the case. However, van Miert's positive response to the restructuring and privatization plans outlined by the company in Spring 1994 did increase the chances of approval[6]. Although, formally, the Commission cannot tie aid to privatization as it is not allowed to discriminate between private and public ownership, the EC could apply a "premium to privatization"; privatization would make the restructuring plans more credible and increase the chances that the aid would indeed be a "one time, last time" event (Dixon, 11 March 1994:17; Ridding, 18 February 1994:24, 2 March 1994:30).

The Bull state aid examples illustrate that the Community's scrutiny of state aids has constrained the French government's freedom of action. Although the first batch of state aid was approved and the second batch looks bound to be accepted as well, the French government still had to go through extensive lengths to justify its actions - making political investments without a sound commercial base or without restructuring or privatization provisions increasingly unlikely.

The constraints imposed by the EC on national trade measures and state aids, has implied that the M/S governments have been less able to use their own policy instruments in support of their indigenous IT companies. Despite the political influence exercised by these companies over their home governments (see Chapter 7), the companies may thus not even see their policy preferences translated into *national* actions.

9.1.3 ACCESS TO RESOURCES

The Community's overall budget has been relatively small - despite the resentment voiced by national governments about its size (Nugent, 1991:314). Although the Community's deepening has been accompanied by an increase in its budget, the tight financial conditions faced by the EC Member States and their preference for subsidiarity and national solutions (see Chapter 6) have set a clear ceiling to the expansion of the Community's budget. This has implied that the EC's resources have been limited - providing a reason to belief that the hypothesis outlined in Chapter 2 has been correct; the EC's resources may not have been sufficient to realize the IT Roundtable's policy preferences on IT R&TD and TENs (see Table 4.1).

R&TD: Second Generation

As Chapter 4 has illustrated, the adoption of the Fourth Framework was delayed by the reluctance of Germany, France and the United Kingdom to approve the R&TD budget suggested by the Commission. Moreover, the IT Roundtable's demands for a significant increase in funding allocated to IT R&TD were not met - leading us to question why the EC and its Member States did not allocate more funding to IT despite its "strategic" technology status. Four explanations can be discerned.

First, within its overall budget, Community funding for R&TD programmes accounts for only a small share. Despite the European Council's statement in the mid-1980s that at least 6 per cent of the EC's budget should be devoted to Community R&TD (DG 12 sources, Interview 24;1993), the budgeted expenditures on R&TD have stayed well below that goal; in 1990, R&TD totalled only 3.3 per cent of the Community's budget (see Figure 9.1). In absolute terms, the EC's R&TD funds were smaller than the individual R&D budgets of Germany, France, Italy, Great Britain and Spain in that year. Even the Netherlands, a small state, spent more on R&D than the Community (Eurostat in P-13, 1993). The main reason for the R&TD's small share in the EC budget is that the Member States have been attaching a far greater priority to alternative Community objectives in their allocation of resources. In line with the expectation outlined in Chapter 2, the emphasis on cohesion following the 1986 enlargement of the Community (see Chapter 6) has been diverting resources to other Community initiatives, away from R&TD programmes. As one national government official commented regarding the budget compromise concluded at the 1992 Edinburgh Summit:

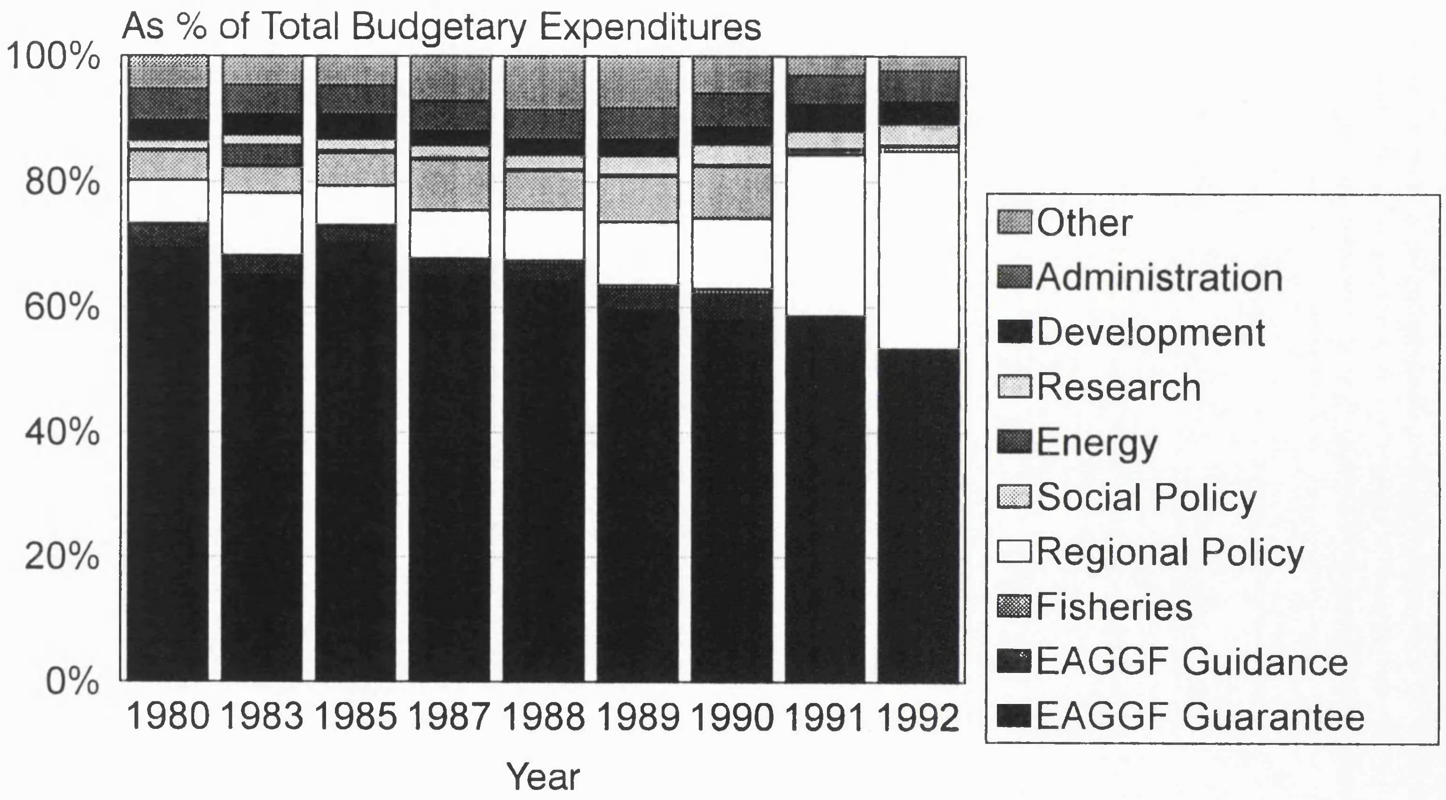
> Cohesion, structural funds and external policies ranked above the internal policies of which R&D is a part. It got the least priority (SERICS sources, Interview 18;1993).

As R&TD constitutes a budget items in which the vested interests of the Member States are not as high as in other areas, by default, these items are subject to expenditure cuts (IT company sources, Interview 14;1993).

Second, the relatively limited funds available for R&TD activities have been spread over a large number of sectors, creating the risk that the funds have been spread too thinly. Politically, however, concentration of funding on a few sectors has proven to be unfeasible since each Member State would like to reap its "fair" share of the Community's R&TD funding (see Chapter 6). As one national government official observed:

> When the Commission contacted the Member States to ask their opinions about the Fourth Framework Programme, all national government officials said: "This is a good paper, but could you add this or that?" Nobody indicated which topic could be cancelled (BMFT sources, Interview 33;1993).

Figure 9.1 Structure of EC Budget Expenditure, 1980-1992



Note: 1991 and 1992: new groupings of budget items, not fully comparable to groupings used between 1980-1990. See Appendix 9.1

Source: Appendix 9.1

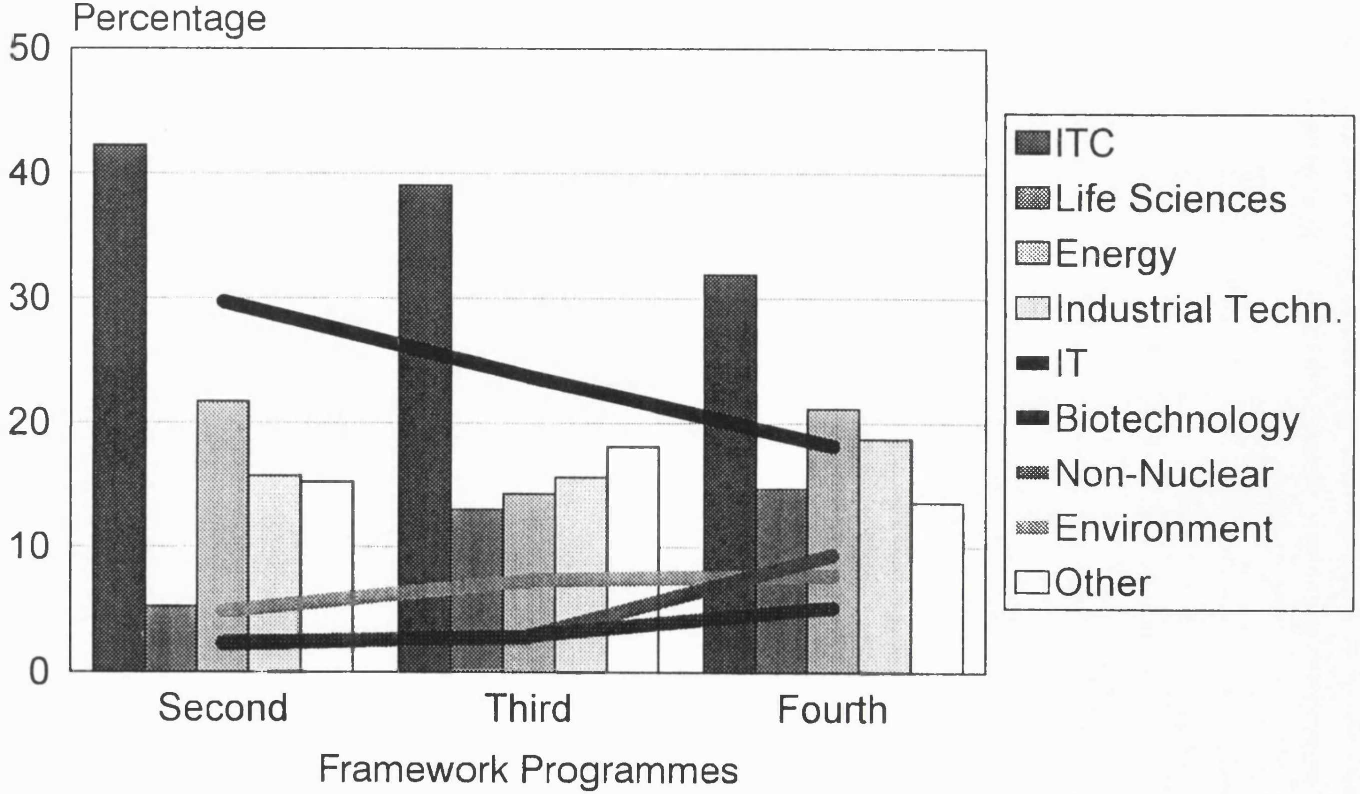
Although ITC research has been accounting for the largest share in the Framework budgets over the 1980s and early 1990s (see Tables 4.3 and 4.4), as Chapter 4 outlined, maintaining this preponderant share has not simply been a matter of course. Notably those Member States without a strong presence in ITC production, such as, Denmark, have strongly pressed for the allocation of funds to other high-tech sectors, such as biotechnology (DG 3 sources, Interview 26;1993). As Figure 9.2 shows, in contrast to the share of IT funding, the share of funding allocated to, for example, biotechnology, non-nuclear energies and environment research has risen substantially over time.

Third, despite the preponderance of ITC research in the Community's R&TD budget, the actual funds allocated to IT R&TD projects have been small. In 1990, for example, the EC's commitment to IT R&TD activities was comparable to Groupe Bull's $ 687.5 mn annual R&D expenditures, larger than ICL's and Olivetti's annual expenditures on R&D, but far smaller than Philips' and Siemens' annual R&D spending (see Appendix 1.1). This amount of funding, moreover, has been allocated to a large number of projects - reflecting the unwritten rule that EC programmes should benefit all parties involved. The result has been that when the Community's R&TD funds have been spread out over all the information technology research projects and all its participants, the actual Commission funding allocated to the large, European-owned IT companies has been very modest indeed; Community funding constitutes approximately 1 per cent of Siemens' and Thomson's annual R&D expenditures (Siemens and Thomson sources;1993). As one IT company executive argued:

> There has been an incredible amount of small projects. None of these have a critical mass: you just scratch the surface (Interview 5;1993).

Fourth, the unwritten rule that EC programmes should benefit all parties involved has led the Commission to make a conscious effort to involve SMEs (see Chapters 4,7). Moreover, there have been pressures to apply the principle of juste

Figure 9.2 EC R&TD Framework Programmes: Breakdown of Resources



Sources: OJ C208 (1983), L302 (1987), L117 (1990), L126 (1994); Table 4.3

retour to the allocation of project contracts and, thus, funding (Dekker Report, 1992:12,60). As one national government official argued:

> The Commission proposes more or less a compromise. The Commission will never propose a set of projects where the money only goes to France, the Netherlands and Germany. The Commission looks for a mixture (Interview 33;1993).

The danger of applying the concept of juste retour at the level of allocating project contracts, however, has been that geography, rather than technological excellence, determines the allocation of EC funds - as most of the IT industry's capability has been concentrated in France, Germany, Italy, the UK and the Netherlands (see Chapter 1). Although this hypothesis has been hard to prove, insistence on the application of juste retour might, in that case, lead to an inefficient allocation of resources which compromises the very objective of the Community's R&TD programmes: the improvement of the IT industry's competitiveness (Dekker Report, 1992:12,60; DG 3 and 13 sources, Interviews 6,24,26;1993).

Although, for the reasons outlined above, the resources available for Community R&TD have been clearly constrained, hampering an optimal implementation of the R&TD programmes, this statement should be qualified. EC R&TD funding has been neither the only nor the main benefit of participating in the Community's IT programmes. Although the IT Roundtable companies lobbied unsuccessfully for more funding (see Table 4.1), "money has not been the main issue" (IT company sources, Interview 15;1993). As one IT Roundtable member commented: "For the financial aspects, we would never participate in Commission projects" (Interview 8;1993). Instead, the main benefits of participating in ESPRIT have been the value-added that cooperation in well-aimed priorities can bring, and the continuation of these cooperative arrangements beyond the scope of the projects (IT company sources, Interviews 8,15,16;1993). As one executive noted:

> Collaborative R&D projects allow a company the leverage out of five to six other organizations. You might end up with 10 man years of R&D for the costs of one man (Interview 15;1993).

Trans European Networks

As in the case of IT R&TD, the hesitance of the Member States to contribute funds to the TENs has been hampering their speedy realization (see Chapter 4). Although the ITC-related projects would be largely funded by the private sector and the financing could be eased by loans from the European Investment Bank and the Cohesion Fund, the Member States' fear has been that the TENs would still involve a considerable amount of government spending (Norman, 14 December 1992; Financial Times, 8 December 1993:2). As one IT company executive commented:

> Since the troubles with ratifying the Maastricht Treaty, the Member States have not been willing to create Trans European Networks. This is a public budget issue: the TENs need a few billion ECU for funding. The Member States are not unwilling to proceed, but they are careful not to make any commitments (Interview 5;1993).

In this respect, the Corfu Summit's statement that "measures will be taken - if proved necessary - in order that priority projects do not run into financial obstacles that would jeopardise their implementation" (Gardner, 27 June 1994:3), may prove to be a turning point (see Chapter 4). Considering the American political drive behind the realization of its "information super-highways", this move to overcome the financial obstacles to implementation has been long overdue (Cookson and Fisher, 2 March 1994:11).

9.1.4 SPEED OF POLICY-MAKING AND IMPLEMENTATION

The delays incurred in the implementation of the TENs and the Fourth Framework were not only caused by delays in the ratification of the Maastricht Treaty or by squabbles between the national governments and the EC about the means and level of funding. The realization of these EC initiatives was also affected by the fragmentation of the Community's policy-making structure, as Chapter 2 expected.

Commission: Fragmentation

While the EC's IT policy during the 1980s fell mainly under the responsibilities of DG 12 and 13, the broader policy approach adopted by the Commission in the early 1990s, implied that the policy proposals went beyond the responsibilities of DG 12 and 13; due to the incorporation of trade, training and demand-stimulating elements in the 1991 White Paper, the latter had a direct bearing on other DGs as well (see Chapters 4,7). The involvement of multiple DGs with different mandates and ideologies in the development of the 1991 White Paper, and their lengthy inter-DG consultations, have been seen as one of the main reasons for the 12-months development time of the White Paper - too long for an industry, where a speedy policy response is essential (DG 3 and IT Roundtable sources, Interviews 11,16,36;1993).

As outlined in Chapter 4, this was one of the reasons why the Member States opted for a fast-track procedure in the adoption of the 1991 Council Resolution, thus infringing on the Commission's prerogative to develop proposals (DG 3 sources, Interviews 3,11;1993). As one Commission source indicated:

> If you want to get a rapid solution, the only solution is to let the Council presidency present it. If not, you have to do it via the Commission, which is more time consuming (Interview 3;1993).

Similarly, the perception exists that the slow implementation of the Community's Trans European Networks has been caused, in part, by the involvement of at least five DGs in the realization of these networks, namely those on transport (DG 7), energy (DG 17), IT and telecommunications (DG 13), internal market (DG 3) and R&D (DG 12,13), as this has hindered the formulation of a coordinated approach, complicated the building of consensus and delayed the decision-making and implementation processes (Hill and Barber, 10 December 1993:2, IT Roundtable sources, Interview 36;1993).

EC Institutions: Fragmentation

In order to formulate a coherent and speedy policy response, it is not only important that the various Commission DGs coordinate their activities, but that the various EC institutions do so as well. Not only might this avoid delays in decision-making, also it secures that every institution is able to contribute to the debate about a policy *when it is being formulated.* In this respect, it is interesting to note that the January 1994 Metten Report and EP Resolution on the IT industry, which called for urgent action in support of the IT industry, followed from a decision taken in May 1991. As one DG 3 source commented:

> The report arrived very late in comparison to the events. It took [the EP] a long time to reply. We [the Commission] have progressed. We have the Fourth Framework Programme, we have the 1993 White Paper, we have the Bangemann Group's report and their recommendations. We are mainly working on these recommendations. (DG 3 sources, Communication 3;1994).

In terms of decision-making, it is expected that the new decision-making procedures introduced by the SEA and the Maastricht Treaty will further delay the policy-making processes; the introduction of new elements, such as the EP's increased role and the Conciliation Committee's mediating activities, are expected to extend the length of EC decision-making (see Chapter 6). As a DG 12 official commented:

> The total adoption of the research plan, i.e. the Framework Programme and the specific programmes, took on average one year. Now, it will take much more due to Maastricht. From this point of view, Maastricht is bad for research (Interview 24;1993).

9.1.5 INTERNAL CONSTRAINTS TO POLITICAL REALIZATION

In conclusion, the realization of the IT Roundtable's policy preferences has been hampered by four shortcomings in the EC's policy-supplying capabilities, namely: (1) its inability to actually use the competencies assigned to it, due to ideological divergencies between the M/S governments and their insistence on subsidiarity; (2) the absence of interventionist trade policy instruments in its portfolio which could realize the IT Roundtable's more far-reaching trade policy preferences; (3) its dependency on the M/S governments to financially contribute to Community initiatives, resulting in delays in the implementation of the initiatives and in limited financial resources for IT R&TD; and (4) its fragmented structure, slowing down policy-making and implementation.

9.2 THE EC AS A POLICY-SUPPLIER: EXTERNAL CONSTRAINTS

As Chapter 2 outlined, the EC's ability to supply the policies requested by IT Roundtable members may also have been constrained by factors external to the EC, i.e. the structural changes in the IT industry. On the basis of interviews with corporate executives and IT industry representatives, EC and national government officials[7], this thesis found that the internationalization of the IT industry (see Chapter 5) has limited the Community's practical possibilities of intervention, as it has made the more interventionist EC policies, i.e. those involving forms of protectionism, preferential treatment and subsidies, increasingly ineffective. As one DG 13 official commented:

> I think the point is that the IT industry is the type of industry where there are very little opportunities for intervention. It is not like other sectors that depend on regulations. It is an industry where the trade issue is very complex (April 1993).

The declining effectiveness of the EC's policy instruments can be attributed to three factors: (1) the difficulties in determining corporate nationality and product origin; (2) the costs imposed on indigenous European companies; and (3) the threat of retaliation posed by third countries in response to EC policies.

9.2.1 DETERMINING NATIONALITY AND ORIGIN IN A GLOBAL INDUSTRY

Central to an effective implementation of a more "pro-European" interpretation of the Community's trade policy instruments, government procurement and R&TD programmes is the definition of the "Community industry" and the determination of the national identity of companies and the origin of their products; the EC would have to distinguish between the "European" industries, companies and products that would be eligible for preferential treatment, protection and other benefits, and the "foreign" industries, companies and products that would not. Determining Community industry, corporate nationality and product origin, however, has become increasingly difficult in a globalized, interlinked industry, while the outcome has become increasingly subject to the discretion of the regulatory regimes.

Defining Community Industry

The "Community Industry" has been defined as comprising all those companies producing within the EC. Due to inward investments of foreign IT companies into the Community, however, this criterion cannot be used any longer to separate the European-grown IT companies from those that originate from non-EC countries. This has made discrimination between the group of companies that should benefit from EC policies and those that should not far more difficult - as illustrated by the 1987 DRAM anti-dumping case (see Chapter 3).

In that case, none of the complainants commercially manufactured DRAMs during the period of investigation. In contrast, the EC-located subsidiaries of the Japanese firms that were charged with dumping did produce DRAMs (see Chapter 3). To resolve this situation, the Community eliminated the Japanese-owned production facilities in the Community from the scope of the domestic industry through invoking the "related-party" provision, i.e. the exclusion of the Japanese subsidiaries on the basis of the fact that they were related to the exporters or importers of DRAMs, or were themselves importers of the allegedly dumped or subsidized products (OJ L209, 1988:Art.4; Vermulst and Waer, 1990:83). Because of the significant investment costs incurred in unsuccessfully setting up DRAM production facilities, the Commission defined the "Community industry" subsequently as consisting of the four complainants, i.e. Siemens, SGS, Thomson and the American-owned European subsidiary of Motorola - illustrating the impact of the Commission on which companies constitute "Community industry" and which do not.

Defining European Corporate Nationality

Similarly, traditional criteria for determining the identity of companies, such as percentage "Community" ownership, the overall citizenship of management and employees, or the location of the majority of value-added, have been invalidated by the trend towards cross-ownership, cross-border alliances, and the spread of R&D and other high value-added activities across borders (Kline 1989:26; Business Europe, 21 September 1990:5). As a Siemens executive commented, with respect to the "nationality" of the American-owned IBM, which derives more than 50 per cent of its value-added from its operations in Europe:

> How do you handle IBM? Who is us? IBM is like a European company. Do you handle it differently? We, Siemens, have 40.000 people working in US, we do R&D -we would like to be treated as an American company. Surely we

want equal access, and we want to be equally well treated (Interview;1993).

The influence that the regulatory regime can have on the outcome, i.e. whether or not a company is considered "European", has been illustrated by the divergent attitudes of the EC and EUREKA towards ICL's participation in collaborative R&TD projects. When ICL was taken over by Fujitsu, ICL's continued participation in both ESPRIT and JESSI was questioned, since it was felt that EC and EUREKA R&TD projects should benefit only European-owned companies, and not their main competitors. The JESSI-board, consisting of executives of European electronics companies, decided to oust ICL from all its projects, and reinvite the company to participate in those cases where its absence would be too disruptive (see Chapter 4; DTI sources, Interview 12). In contrast, the Council of Research Ministers did not reconsider ICL's participation, despite France's insistence; faced with divergent opinions amongst its own ranks, the EC argued that ICL was meeting its conditions for foreign firms to participate, namely that it had been established in the Community for several years and had been carrying out R&D in IT within the borders of the EC. Under ESPRIT's rules of participation, ICL was regarded a "European" company for all practical purposes.

Defining European Product Origin

Moreover, due to the involvement of IT companies in internationalization, alliances and M&As, it has become increasingly difficult for the EC to determine the origin of products, as multiple countries have become involved in their production. For example, one of the questions brought up in the 1987 DRAM anti-dumping case (see Chapter 3) was whether or not DRAMs assembled in third countries from processed wafers and dice produced in Japan, should be considered as originating in Japan - a question circumvented by the Commission by excluding such products from the investigation (Vermulst and Waer, 1990:78-79).

The influence that the regulatory regime can have on the outcome, i.e. whether or not a product is considered of "Community" origin, has been illustrated by the Community's rules of origin on integrated circuits. The Community has been determining the origin of a product on the basis of four criteria, of which, in practice, the location of the "last substantial process" has been by far the most important factor[8] (Vermulst and Waer, 1990). The last substantial process refers to those operations that bring about a substantial transformation in the properties and composition of the product and give the product its essential character[9] (OJ L148, 1968).

In the case of integrated circuits, the Community used to interpret the assembly stage as the "last substantial process", thus determining the origin of semiconductors by the location of the assembly operations. Under this interpretation, however, the ICs produced by Japanese companies, assembled and tested within the Community, would have "Community" origin. The products of the European-owned semiconductor producers, in contrast, would be considered "non-European", as they had moved their assembly and testing operations to South East Asian countries (see Chapter 5) (Vermulst and Waer, 1990:66). Formally, the European-owned IC producers would thus not be able to benefit from EC policies that discriminate between European and foreign companies, such as EC protection against dumping and illicit trade practices, et cetera.

In 1989, the Community changed its interpretation of the "last substantial process", following concerted lobbying by the European-owned semiconductor producers. The new rules determine the origin of chips by the location of diffusion (OJ L33, 1989). As the European-owned producers have been locating their diffusion processes within the Community, while the Japanese producers have been executing these stages of the production process elsewhere, the new rules rectified the regulatory mismatch caused by the internationalization of the European-owned semiconductor producers' operations. Moreover, it secured the upgrading of Japanese investments within the Community, as diffusion involves more capital and R&D and yields more value-added than assembly.

9.2.2 THE COSTS IMPOSED ON INDIGENOUS EUROPEAN COMPANIES

The number of alliances and cross-ownership existing between the European-owned IT companies and non-European firms has increased dramatically over the late 1980s and early 1990s (see Chapter 5). This has implied that when the EC imposes policies that benefit its own indigenous producers at the cost of non-European producers, these support measures might at the same time impose a cost on the foreign partners of European-owned companies and, thus, indirectly hurt the latter. Consequently, many European firms have been reluctant to cooperate with policies that would discriminate against their foreign partners - hampering the effectiveness of the EC's policy instruments. As one national government official illustrated in the case of the centralized information point provided for in the 1991 Council Resolution (see Chapter 4):

> You will not get a lot of information on what is going on in other countries, not even from your own firms. The problem is that the firms are involved in cooperative agreements with foreign companies. Their cooperation could be hampered by antagonisms. You will not get a lot of information from industry for the use in political battles (Interview 33;1993).

9.2.3 THE THREAT OF RETALIATION

Finally, the Community's practical possibilities of intervention have been limited by the threat of retaliation, which has become increasingly credible over the

1980s and early 1990s (see Chapter 5). The risk of retaliation has implied that the EC, when intervening, has to weigh the benefits of intervention against the costs of potential retaliatory actions.

In comparison to Japan, the United States has more opportunities to retaliate (Sally, 1992). Although the European-owned IT companies' shares in third country markets has been small (see Chapter 5), the European-owned IT firms' stake in the American market, partly secured through exports and partly through ownership of American companies like Zenith, is larger than their minute presence in the Japanese market - giving the American government more chances to "hurt" European-owned producers than the Japanese government. Moreover, beyond the domain of the IT industry, the Community's stake in the American market is far larger than its stake in Japan. Combined with the assertive attitude that the US has adopted in its trading relations, as illustrated by its use of the highly effective Section 301, this has implied that the US could set a credible threat - a view confirmed by DG 3 sources (Interview 11;1993).

9.2.4 THE NEED FOR A WORLD-WIDE LEVEL PLAYING FIELD

However, even if the EC would succeed in overcoming these three practical limitations to intervention in an increasingly globalized industry, its policy instruments would not be sufficient to improve the competitiveness of the European-owned IT producers. The increasingly globalized nature of competition has implied that the European-owned IT companies need a level playing field, not only within Europe, but also internationally (see Chapters 4,5). At the world-wide level, however, such a level playing field has not been present - as illustrated by, for example, the structural impediments to entering the Japanese market and the "Buy American" clauses in

American state government procurement.

The Community's traditional policy instruments, however, have not been geared towards securing an international level playing field, while global instruments, such as the internationally agreed minimum competition rules envisaged by the EC's new Competition Commissioner van Miert, have not been realized as yet (DG 3 sources, Interview 3;1993; Hill, 9/10 October 1993:2;25 October 1993:36). The structural changes taking place in the IT industry have thus put pressure on the Community to bring about this world-wide level playing field through alternative policy approaches, i.e. multi- or bilateral negotiations.

Inducing the "cooperation" of the US or Japan to grant market access or national treatment through multi- or bilateral negotiations, however, depends to a large extent on the economic and political leverage of the Community over its partners in the international system, namely the US and Japan. This, in turn, depends on the asymmetry in economic inter-dependency; how dependent is the Community on certain economic assets from Japan and the US, in comparison to the dependency of Japan and the US on the economic assets of the home country? (see Chapter 2).

As Chapter 5 has illustrated, the Community has been a small supplier to the American and Japanese semiconductor and computer markets, accounting for 5 per cent of the American semiconductor market, less than 1 per cent of the Japanese semiconductor market, 4 per cent of the American computer market, and less than 3 per cent of the Japanese computer market. Meanwhile, American and Japanese producers have accounted for over 60 per cent of the European semiconductor market, and approximately 70 per cent of the European computer market (see Chapter 5). The EC's dependency on American and Japanese sources of computers and semiconductors, while American and Japanese IT users remained relatively independent from EC sources of supply, has strongly undermined the Community's leverage over Japan and the US in bilateral or multilateral negotiations - as illustrated by the 1986 Japan-US Semiconductor Trade Agreement.

The STA, exemplifying the increasing US reliance on managed trade, included a clause which *de facto* set the semiconductor prices that European semiconductor producers and users would have to face, without the latter having had any input in the decision-making process (see Chapter 8). The EC condemned the agreement, arguing that it was unacceptable that Japan, its main source of semiconductors, would unilaterally determine its export prices in a strategic sector and thus threaten legitimate Community interests (Europe, 22 June 1989:8; EC Memo 79/87; EC Memo 32/89). Although the Community won the subsequent GATT dispute settlement case, and Japan lifted its restraints on exports to third countries, the incident showed that the EC, as a small player, was not only a taker of market prices, but also of politically determined prices (van Walsum, 1990). As Flamm (1990:248) argued:

> The 1986 Agreement contained the implicit message that Europe had ceased to be an important player in the international semiconductor industry and could safely be ignored by the two top semiconductor producers in "managing" their trade relations.

Ironically, to the extent that the EC has some form of bargaining power in multi- or bilateral negotiations on IT-related issues, it is in the area of semiconductors. As follows from the above, however, the EC's bargaining power is not production but consumption based; the EC derives its leverage from (1) the relatively large size of its semiconductor market and (2) the fact that this market, in contrast to its computer market, has been shielded by a relatively high tariff. The relatively high degree of EC protection on semiconductors, for example, has given the Community a bargaining chip in multi- or bilateral negotiations; it can offer the opening of its market in return for trade concessions, i.e. the lowering of existing non-tariff barriers, by the American and, notably, the Japanese government. In contrast, the Community's computer market yields little leverage; although the market is relatively large, its relatively low tariff of 4.9 per cent implies that the EC has already given away its most important bargaining chip: market access.

Inducing reciprocity through *erecting* tariff or non-tariff barriers which close off the European market, is far more difficult to achieve than inducing reciprocity through *resisting* any lowering of the existing entry barriers to the European market - as the EC is a signatory to GATT. As one IT Roundtable member argued, establishing a "balance" in trade liberalization is essential; unless the EC negotiates the opening of third country markets simultaneously with the opening of its Common Market, it will be in difficult situation diplomatically; it is hard to be successful in negotiations if all the bargaining chips have already been given away (Interview 14;1993; see also EP Rapporteur Metten in NRC, 12 January 1994:16).

9.3 CONCLUSION

This chapter has sought to explain the loss in political influence experienced by the IT Roundtable in the early 1990s, in comparison to the 1980s, by analyzing changes in the ability of the European Community to supply the policies, as requested by the IT Roundtable.

First of all, this chapter found that shortcomings in the EC's competencies, its portfolio of policy instruments, its resources, and its speed of policy-making and implementation have hampered the Community's policy supplying capabilities and, thus, its ability to realize the actions identified in the 1991 White Paper and the IT Roundtable's policy preferences.

Although the Community's competencies to supply a comprehensive IT *industrial* policy have remained limited despite the institutional changes outlined in the

Maastricht Treaty, the competencies to implement the individual areas outlined in the 1991 White Paper and to satisfy the IT Roundtable's policy demands were either in place or being put into place. Nevertheless, two sets of short-term factors appear to have undermined the *de facto* capabilities of the EC to realize the actions identified in the White Paper and the IT Roundtable's more far-reaching policy preferences: (1) the ideological divergencies amongst the Member States, hampering consensus about the measures to be taken; and (2) the national governments' insistence on subsidiarity, limiting the actions the EC can actually undertake.

Despite the EC's access to a wide portfolio of policy instruments, the Community's trade instruments were inadequate to satisfy the IT Roundtable's more far-reaching policy demands; the Community's ideological composition has made the introduction of a unilateral, aggressive trade policy instrument unlikely. Resorting back to the policy instrument portfolios of the M/S governments, however, would not bring any solution either; the EC has been curtailing the independent powers of the national governments in those areas which fall explicitly under the EC's authority, namely: competition and trade. In contrast to the expectations outlined in Chapter 2, however, the EC appears to have found a way around the shortcomings of its policy instruments in the area of R&TD.

The resilience of the M/S governments to transfer funds to the EC level, prompted by the recession and fuelled by the emphasis on subsidiarity and national solutions, has further hampered a speedy implementation of both the new IT R&TD programme as well as the TENs. Moreover, the priority attached to cohesion and the Southern countries' emphasis on juste retour has diverted resources away from R&TD in general, and from R&TD in the area of information technology in particular - as the latter would mostly benefit the Northern countries. Furthermore, a speedy implementation of the areas identified in the White Paper and the Council Resolution has been hampered by the EC's fragmented decision-making structure - arguably making the EC, as a policy supplier, less suitable to respond to the rapidly changing conditions in the IT industry.

Second, the EC's policy-supplying capabilities have been hampered by the increasingly global nature of the IT industry. The internationalization of corporate operations has made it increasingly difficult to define "Community" industry and to determine corporate nationality and product origin - concepts that are crucial to implementing an effective "pro-European" policy. This has implied that regulators, like the Commission or the JESSI board, increasingly determine whether or not industries, companies or products are considered to be European. Moreover, the cross-border linkages existing between companies have implied that a policy which appears to benefit the indigenous company, may, at the same time, impose a cost on the company's foreign partner, and thus indirectly hurt the indigenous company. Also, such policies may prompt the US and Japan to retaliate - a threat enhanced by the EC's relatively large stake in the US market.

These developments have prompted the EC to reconsider its policy approach and instruments; there has been a clear realization that pursuing policies to protect or subsidize the IT Roundtable companies is not sufficient any more to improve the competitiveness of the European-owned producers. The increasingly globalized nature of the IT industry has implied that the IT Roundtable members need access to an international level playing field - an objective that, with the current instruments, can only be reached through multi- and bilateral negotiations. However, as the Community has been only a small IT supplier to the Japanese and American markets and hugely dependent on Japanese and American semiconductors and computers, its economic leverage over Japan and the US in bilateral or multilateral negotiations on IT has been relatively weak. This applies to its negotiations on both semiconductors as well as computers - although with respect to semiconductors, the EC at least holds the bargaining chip of a relatively closed market.

9.4 NOTES

1. EC/EEC Treaty (93;87;58): Art.18-29.

2. Council Regulation (EEC) No 288/82 (OJ L35, 1982) as amended by various regulations, the last one being Council Regulation (EEC) No 2875/92 (OJ L287, 1992).

3. 1979-1984: OJ L339 (1979); 1984-1988: OJ L201 (1984); 1988 onwards: OJ L209 (1988).

4. OJ L148, 1968; OJ L363, 1987; OJ L33, 1989.

5. The only point where a GATT Panel has marked the EC's anti-dumping legislation as incompatible with the GATT's provisions, has been the EC's inclusion of an anti-dumping duty circumvention clause in its legislation (OJ L209, 1988; L167, 1987). Concluding that the Panel's report did not provide any GATT-compatible solution to the problem of circumvention through relocation of production, the EC argued that a solution should be found within the Uruguay Round negotiations. The Uruguay Round agreement did indeed provide for rules on the circumvention of anti-dumping duties (Financial Times, 16 December 1993:4).

6. Sources: Hill, 21 January 1994:2; Hill and Ridding, 7 October 1993; 27 January 1994:2; NRC, 27 January 1994:21; Buchan, 30 July 1994.

7. Interviews 3,6,8,11,14,18,19,29,32,36;1993.

8. The basis of the Community's non-preferential rules of origin are laid down in EC Regulation 802/68, which states that products wholly obtained in one country shall be considered as originating in that country. If two or more countries have been involved in the production of goods, these products shall be considered as originating in the country in which (1) the last substantial process or operation (2) that is economically justified was performed, (3) having been carried out in an undertaking equipped for the purpose and (4) resulting in the manufacturing of a new product or representing an important stage of manufacture (OJ L148, 28 June 1968).

9. For the three definitions of "substantial transformation" used by the EC, see Annex D.1 of the International Convention on the Simplification and Harmonization of Customs Procedures which was accepted by the EC by Council Decision of 18 March 1975 and 3 June 1977.

PART 4

Chapter 10

CONCLUSION

10.1 THE ARGUMENT

The weak competitive position of the Community's IT industry has been for long a concern to the European Community and its Member States. In the mid-1960s, the M/S governments sought to overcome the competitiveness problems of their national IT industries through a three-way policy approach, comprising industrial restructuring, preferential government procurement, and R&D programmes. When the shortcomings of these national solutions became apparent in the late 1970s and early 1980s, ESPRIT was adopted - a subsidized R&TD programme at the Community level, aimed specifically at the European IT industry. The crisis developing in the IT industry over the course of 1990 combined with doubts about the efficacy of a precompetitive R&TD programme in improving corporate competitiveness, however, prompted the European Community to present a new IT policy approach in the early 1990s: the 1991 White Paper.

While the European-owned IT multinationals, as represented in the IT Roundtable, exerted a preponderant influence over the shape, approval and implementation of ESPRIT, particularly in its early phases, they appeared to have less influence on the development, endorsement and subsequent implementation of the 1991 White Paper. The 1991 White Paper fell far short of the expressed preferences of the Roundtable, notably in terms of its support for the European-owned IT producers and its implications for foreign-owned competitors. Subsequent efforts to secure a more far-reaching implementation of the areas of action identified in the White Paper and to adopt specific support measures beyond the scope of the White Paper, were largely unsuccessful. Even the implementation of the areas identified *in* the White Paper proved to be a time-consuming process, particularly in the areas of R&TD, market access, and TENs. Although the IT Roundtable did see various of its policy preferences that were *within* the scope of the White Paper, translated into the new IT R&TD programme and into the TENs, the European-owned IT companies were unsuccessful in securing their preferred levels of funding.

Despite the fact that, in the early 1990s, the factors which could yield political influence appeared to be in place - the companies continued to account for the majority of Europe's indigenous IT production capability, internationalization continued to shift control over national wealth into the hands of corporate management, and rapid technological change continued to move high-tech policy-making beyond the proficiency of the Commission officials into the realm of corporate executives -, this thesis found, on the basis of interviews with Community and national government officials, corporate executives and representatives, and industry/government observers, that the IT Roundtable companies' diplomacy was less effective in the early 1990s than it was in the early and mid-1980s.

This thesis argues that the loss in political influence could be explained by: (1) changes in the political activity undertaken by the IT Roundtable members, both individually and as a group; (2) changes in the political weight attached by the EC and its national governments to the policy preferences articulated by the IT Roundtable companies; and (3) changes in the ability of the EC to realize corporate policy preferences.

The loss of the IT Roundtable's political influence cannot be explained by the absence of any political activity or the wrong timing thereof, nor by a drastic reduction in effort put into lobbying or a decline in the openness of the Community and its Member States. The loss in political influence, however, can be explained by the fact that, in the early 1990s, the effectiveness of the IT Roundtable as a channel of political activity had been undermined by the following three factors: first, its declining representativeness following the structural changes taking place in the IT industry; second, its lack of internal coherence caused by the diverging interests of its members; and, third, the perception that the Roundtable has been suitable for articulating preferences in the area of R&TD but inappropriate for voicing broader preferences on industrial policy. While the lack of internal coherence made it more difficult for the IT Roundtable companies to present one substantial policy stance, the Roundtable's declining representativeness and doubts about its expertise in industrial policy formulation made it imperative for the EC to widen the scope of its consultation to include software and services companies, IT users, IT SMEs and even foreign-owned IT companies - thus ending the IT Roundtable's near-monopoly on policy input (see Chapter 7).

The policy preferences articulated by the IT Roundtable, moreover, did not carry as much political weight as they used to do. The doubts expressed by some national governments about the necessity of an indigenous IT capability depreciated the perceived value of the IT Roundtable's main bargaining chip: its capability to supply economically and militarily strategic technologies and products. Rather, the M/S governments - even those paying lip-service to the need for an indigenous IT capability - attached a greater importance to the realization of short-term economic objectives and, thus, to those corporate assets meeting these objectives. In this respect, however, the crisis-ridden European-owned IT companies had little on offer, particularly not in terms of contribution to cohesion and employment. Consequently, public investments into this industry were perceived as yielding little "value for money".

This made it politically and financially more difficult to justify any further investments of public funds in programmes specifically supporting the European-owned IT suppliers. Rather, alternative sources of corporate assets, such as software and services companies, IT user firms and other high-tech companies appeared to have become relatively more important - implying that the IT Roundtable did not only face competition in providing policy inputs into the Commission in the early 1990s, but also in convincing the Commission about the importance of meeting their rather than other companies' policy preferences (see Chapter 8).

Finally, even in those cases in which the IT Roundtable's policy preferences carried sufficient political weight, the translation of the IT Roundtable's policy preferences into policy outcomes was hampered by shortcomings in the EC's ability to supply the requested policies - caused by the national governments' lack of consensus based on diverging ideologies, their insistence on subsidiarity, national solutions and juste retour, their resilience to spending money in times of recession and soaring public debts and deficits, and the fragmented EC decision-making structure. These shortcomings have hampered the EC's *de facto* use of its competencies, the realization of the IT Roundtable's more interventionist policy preferences, the allocation of the preferred levels of resources, and a rapid implementation of the areas identified in the 1991 White Paper. Additionally, the EC's ability to supply the policies requested has been hampered by the increasingly internationalized nature of the IT industry, making it more difficult to implement an effective "pro-European" policy without imposing high costs on other industrial segments or triggering retaliation. The EC's limited leverage over Japan and the US in international negotiations on IT, moreover, has undermined the EC's ability to impose a level playing field in the world IT markets (see Chapter 9).

10.2 EVALUATING THE METHODOLOGY

Central to this argument have been two methodological issues, namely: (1) how to measure the influence of companies on public policy outcomes, and (2) how to explain corporate political influence and changes therein. This section seeks to evaluate the methodology used in this thesis.

10.2.1 MEASURING CORPORATE POLITICAL INFLUENCE

As establishing a correlation between the IT Roundtable's professed policy preferences and the EC IT policy outcomes does not provide sufficient proof of any causal links (see Chapter 1), this thesis has sought to measure the political influence of the IT Roundtable companies over the 1980s and early 1990s in terms of "perceived" influence, i.e. the political influence of companies on public policy outcomes as perceived by selected government officials, corporate executives and representatives, and industry/government observers. With the benefit of hindsight, what can be said about the strengths and weaknesses of this approach?

As Chapter 1 outlined, the main strength of this approach is that it allows for the measurement of corporate political influence, both relative to other explaining variables as well as over time. The main weakness of this approach, however, is that its value depends to a large extent on the selection of the so-called "well-placed observers". In particular, one could ask the following questions. Were the relevant officials and executives from the main institutions, organizations and companies included in this selection? Did these observers occupy key positions in both time periods? Were these observers able to assess the importance of corporate political influence relative to the pressures exerted by other variables?

Selection of Key Actors. As outlined in Chapter 1, this thesis used three complementary methods to select the interviewees. The author feels confident that the selection made did represent the key actors involved in the EC IT policy network; the fact that, towards the end of the interview cycle, the "observers" referred to persons that had already been interviewed can be interpreted as an indication thereof.

Nevertheless, the selection of interviewees could be improved by incorporating: (1) representatives of DG 1, DG 4 and other directorates; (2) representatives of the seven remaining Member State governments; (3) representatives of IT users, foreign IT producers, and small to medium-sized European IT suppliers; and (4) representatives of national industry associations and standardization bodies (see Chapter 1).

This, however, would substantially expand the scope of research. In order to separate the wheat from the chaff, it may be useful to conduct a policy network analysis *prior* to any in-depth research on measuring corporate political influence. By plotting the extent and the nature of the interaction between actors, such an analysis would help to define the boundaries of the Community's policy network, to determine which actors occupy a central position within this network and, thus, to decide whom to interview.

Comparisons over Time. In order to measure the influence of the IT Roundtable over time, the observers were asked to give their perception of the influence of the IT Roundtable in both time periods. As outlined in Chapter 1, it did not prove difficult to trace the persons that were actually occupying key positions during the formulation of the 1991 White Paper and its implementation. Few of the interviewees, however, had been directly involved in the ESPRIT policy-making and implementation processes in the early and mid-1980s - raising doubts about the validity of their judgements.

In order to overcome this weakness and to verify the assumption that the IT Roundtable exerted a preponderant influence in the early and mid-1980s, the information given by the interviewees was cross-checked and supplemented by: (1) the research results of various authors, including Peterson (1992), Sandholtz and Zysman (1989) and van Tulder and Junne (1988); (2) EC documents about the formulation and establishment of ESPRIT; and (3) evidence provided by the affected parties to the House of Lords Select Committee on the European Communities (see Chapter 3). The similarities between the information provided by these sources and the responses of the interviewees have given the author no grounds to doubt the validity of this assumption. Nevertheless, further empirical research to strengthen our knowledge of the formulation, approval and implementation of ESPRIT may yield valuable insights.

The Relative Importance of Corporate Political Influence. The author found that the interviewees were able to give an assessment of the importance of corporate political influence relative to the pressures exerted by other variables and, in particular, other companies, but that they were only able to do so in very general terms. The semi-structured interview technique used in this thesis does not lend itself for a more detailed specification of the relative importance of companies in influencing policy outcomes. However, even if a more structured technique would have been used, one could question whether the interviewees would have been able to "isolate" the influence of companies from other pressures on policy outcomes, as the various explaining variables have been perceived as interlinked.

10.2.2 EXPLAINING CORPORATE POLITICAL INFLUENCE

In order to explain the changes in the IT Roundtable's political influence, this thesis has adopted an interdisciplinary approach. The merits of this approach are three-fold. First, this framework provides a comprehensive approach to analyzing corporate political influence; in contrast to many of the IPE, interest group and international business studies discussed in Chapter 1, this approach addresses the full process of converting corporate policy preferences into policy outcomes.

Second, although this approach focuses on the impact of companies on economic policy outcomes, other impacts, such as the influence of ideology, state structures and actors, societal interests, and international economic and political conditions, have been integrated into this framework, in recognition that both domestic-level as well as system-level variables are intertwined.

Third, by linking structural and short-term changes in the production and policy-supply arrangements to the determinants of corporate political influence, this approach provides a coherent basis for analyzing the dynamics of corporate political influence. The structural and short-term changes may include but are certainly not limited to rapid technological change and internationalization (see Chapter 1).

Ironically, one of the strengths of this approach could also be perceived as a weakness. This approach may place too little emphasis on the distinct influence that other explaining variables, such ideology, state actors and structures, societal actors, and the international economic and political conditions, may have on economic policy outcomes. This is due to the fact that this approach accords a central role to the company; it discusses the other variables only to the extent that they are related to the company's political activity, the weight of its policy preferences, and the extent to which these preferences can be realized.

In the EC IT policy case, for example, state actors and structures have been discussed merely in relation to the EC's "openness" for the IT Roundtable's political activity and in relation to the EC's ability to realize the Roundtable's policy preferences (see Chapters 7 and 9). Little attention, however, has been paid to the "leadership" role played by the EC Commissioners in establishing and maintaining relations with the IT Roundtable companies and in building EC-level industrial policies. This point will be addressed in a greater detail in section 10.4.

10.3 CORPORATE POLICY PREFERENCES

This thesis has recorded the policy preferences as *professed* by the IT Roundtable and its members in their public statements (see Chapter 1). However, one could question whether these preferences reflect the companies' real interests. As one EP official argued:

> The companies say one thing, but do something else. They say that their main priority is to cooperate together, but in fact they want alliances with foreign firms (Interview 1; 1993).

ESPRIT. It has been argued, for example, that the IT Roundtable companies' preference for cooperative R&TD in the early 1980s was merely born out of a desire to exploit the EC as an additional source of funding. When asked about their demands for funding, however, the IT Roundtable companies have stressed that access to financial resources has not constituted the main motive behind their participation in ESPRIT - an argument that seems credible considering the small amount of funding actually available to the IT Roundtable members (see Chapter 9).

Rather, the companies' choice for R&TD cooperation over other forms of industrial policy can be explained by three factors. First, the European IT companies were technologically lagging behind their Japanese and American counterparts. In order to overcome this gap, a technology push was considered necessary (see Chapters 3 and 5). Second, the companies were, however, hesitant to engage in far-reaching forms of cooperation within an EC policy framework, as it would require them to share sensitive information (see Chapter 3). Even in the area of precompetitive R&TD, the companies initially only opted for projects that were of marginal importance to their core business strategies (see Chapter 3). Third, the choice for precompetitive R&TD had the additional advantage that it would be compatible with the EC's competition legislation (see Chapter 3). Although the precompetitive nature of ESPRIT can be seen as a "concession" made by the companies to the anti-interventionist elements within the EC, the IT suppliers' hesitation towards joint production illustrates that the companies, at that time, were not pursuing closer cooperation within an EC policy framework (see Chapter 3).

In contrast to the European consumer electronics producers, which used anti-dumping as a hidden instrument of protectionism, the IT suppliers did resort only three times to the EC's anti-dumping instrument (see Chapter 3). The differences in approach between the IT and the consumer electronics producers can be explained by the fact that the semiconductor anti-dumping duties did not unequivocally benefit all European IT producers; they imposed a cost on the EC's computer producers (see Chapters 3 and 4).

An additional point of interest is that ESPRIT has remained open to foreign participation, despite its objectives of strengthening the European IT companies vis-à-vis their Japanese and American competitors. This "concession" to foreign companies is even more surprising if one takes into account that American and Japanese R&TD programmes generally have remained closed to foreign participation. One explanation may be that the European firms and their home governments have perceived participation of foreign companies, and American firms in particular, as beneficial; their participation would give the European producers access to state-of-the-art technologies not available amongst European producers. At the same time, however, the "concession" granted should not be exaggerated. Only companies with a substantial presence within the EC have been allowed to participate in EC R&TD projects - virtually excluding Europe's most feared competitors: the Japanese electronics companies. Moreover, the foreign companies that do participate in EC R&TD programmes, mainly operate in the second tier of these programmes - reducing the potential threat that their participation poses (see Chapter 3).

IT Industrial Policy. Similarly, it has been argued that the IT Roundtable's policy demands in the early 1990s (see Chapter 4) were merely born out of a desire to protect their market shares and financial results in the face of ever increasing competition. The IT Roundtable's policy preferences, however, can also be seen in a different light. Rather than reflecting demands for protectionism and preferential treatment, the policies may reflect strategic industrial and commercial policy choices. In line with Milner and Yoffie's findings on trade policy preferences (1989), a direct link between the companies' policy preferences and the policies of foreign governments can be discerned; the IT Roundtable companies asked for trade barriers and preferential treatment since they perceived the American and Japanese IT markets as closed and/or foreign policies as discriminatory.

The author is inclined to accept the second interpretation on the basis of economic logic. In an internationalized and competitive industry, like the IT industry, companies need access to third country markets in order to obtain the economies of scale necessary to operate profitably in the IT industry's mainstream markets (see Chapter 5). The fact that the European IT companies' shares of foreign markets are relatively small and that their global production networks are relatively modest (see Chapter 5) does not reduce this need; to the contrary, it makes access to and presence in foreign markets even more imperative.

10.4 TRIANGULAR DIPLOMACY IN IPE

As discussed in Chapter 1, one can discern three forms of diplomacy in IPE: (1) the interaction between states (governments); (2) the interaction between firms (MNEs); and (3) the interaction between states (governments) and firms (MNEs). What conclusions and implications can be drawn from the EC IT policy case concerning these three types of interaction?

10.4.1 INTER-STATE DIPLOMACY

Internationalization of the IT industry has made it increasingly important to apply anti-trust regulations on a global rather than a regional basis. In an international system consisting of wealth and security-pursuing national states, however, a global competition regime is unlikely to be realized in the short term. A first policy implication is thus that the US, the EC and Japan would have to engage in bilateral and multilateral competition policy agreements in order to secure a level playing field for their companies within the Triad - the American and European cooperation on anti-trust issues being a case in point (see Chapter 4).

The EC policy case, however, has shown that the outcome of bilateral and multilateral negotiations on sensitive issues like market access and fair competition, depends on the bargaining power of the parties involved. Despite the EC's potential bargaining power (see Chapter 6), the EC's leverage over Japan and the United States in international negotiations on IT-related policy issues has remained limited; Europe's one-sided dependency on American and Japanese products has made it very difficult to induce the "cooperation" of the US and Japan in opening markets and eliminating discriminatory practices (see Chapter 9).

If the EC would want to improve its leverage in bilateral or multilateral negotiations on IT-related issues, it would have to correct the asymmetry in its IT trade and investment flows with the US and Japan. Only a symmetry in the Triad powers' economic inter-dependencies can create a balance of power within the Triad. In order to redress the balance, the EC would either have to limit its dependency on foreign IT suppliers, or force the American and Japanese markets to increase their dependency on

European IT products. Neither of these options appear very realistic - thus casting doubts upon the EC's ability to improve its bargaining position in international negotiations on IT-related issues.

The first option, which would require greater protection and promotion of the indigenous European IT industry, would be unrealistic, considering: (1) the ideological objections of certain Member States to greater intervention in the IT industry; (2) the failure of national policies and EC initiatives to bring about a drastic improvement in the performance of the European IT industry; (3) the Member States' resistance to increase their public expenditures and their emphasis on value for money; (4) the benefits that inward investment in the IT industry has brought; and (5) the increasingly interlinked nature of the IT industry (see Chapters 8 and 9).

The second option, which would require the EC to pry open the Japanese and American markets, might offer more prospects. The EC's recent attempts to strengthen its anti-dumping and countervailing regime, however, may not be sufficient to improve market conditions abroad. Despite the changes to the EC's portfolio of trade policy instruments, any introduction of unilateral measures similar to Section 301 of the US Trade Act remain unlikely (see Chapter 9). Moreover, strengthening the Community's portfolio will not solve the problems posed by the internationalization of the IT industry: i.e. the difficulties of discriminating between "us" and "them"; the increasingly uncontrollable distribution of costs and benefits; and the threat of retaliation, notably from the American government (see Chapter 9).

10.4.2 INTER-FIRM DIPLOMACY

A first lesson that could be drawn from the EC IT policy case regarding inter-firm diplomacy is that inter-firm cooperation involves a large element of "learning".

This is evidenced by the history of the IT Roundtable. Initially, the cooperation between the companies took place under the patronage of Commissioner Davignon; as staunched competitors, the companies mistrusted each others' intentions. Only later, when the companies had learned to act according to an informal code of conduct, did their cooperation, both economically as well as politically, take a momentum of its own; over the 1980s, the IT Roundtable companies extended their cooperation on R&D and other business operations beyond the framework of ESPRIT and broadened the scope of their political cooperation to include a wide range of industrial policy issues (see Chapters 1, 3 and 5).

Second, as illustrated by the IT Roundtable example, inter-firm cooperation within lobby groups offers companies a venue to exchange their views, attune their policy stances, and build coalitions. Chapter 7 has argued that this will prove increasingly important in those areas of EC decision-making governed by majority voting rules, as the introduction of the latter has made the building of political support for either a winning majority or a blocking minority imperative.

Third, the IT Roundtable's experience has demonstrated that, despite the larger gains that collective action through an association of selected companies might yield (see Chapters 1 and 2), lack of internal coherence may still hamper the elite group's success rate. Moreover, if the association does not include those actors that are widely regarded to hold the key to the industry's future, such as the IT users and software and services companies absent from IT Roundtable, the association's representativeness may be questioned by the home government - even if the combined member companies still account for the majority of the country's or region's production and R&D capabilities in that industry (see Chapter 7).

10.4.3 STATE-FIRM DIPLOMACY

In line with Milner (1987), the EC IT policy case has illustrated that there exists a mutual dependency between home governments and firms; while the EC has been dependent upon its companies for the realization of its wealth, social stability and security objectives, the companies have been dependent upon the EC to open up third country markets and to provide other favourable policies.

On the basis of the evidence provided in this case, what can one conclude concerning the balance of power between home governments and their home-grown multinationals? Van Tulder and Junne (1988:177-197) have argued that the balance of power between home governments and their MNEs may have shifted towards the multinationals, as a result of internationalization and rapid technological change. Eden (1991:215), in contrast, seems to suggest the opposite. "Given the escalating demands for competitiveness by home states", Eden advocates the application of the obsolescing bargaining model to the interaction between *home* countries and their multinationals. Although both dynamics are obviously taking place in parallel, the evidence provided in this thesis has pointed to a shift in the balance of power towards the home government. Two considerations, however, have to be taken into account, as this case-specific outcome may by no means apply to home government-firm relationships in general.

First, in the EC IT policy case, one of the factors contributing to the IT Roundtable's loss in political influence was that the EC and its Member States gave prevalence to short-term, recession-induced economic objectives over strategic goals. In the early 1990s, the EC and its Member States were consequently less attentive to ownership-issues; what mattered most was the contribution of companies to investment, employment and value-added, not the origin of these companies. It may be possible, however, that in times of economic upturn, ownership considerations may once more grow in importance, as governments can "afford" to adopt policies that may impose a short-term economic cost.

The reduced importance attached to ownership, however, may not simply be a recession-induced phenomenon. The increasing emphasis of countries on their national competitiveness and wealth (see Chapter 6), combined with the pragmatic difficulties faced in determining ownership and nationality (see Chapter 9), may signal a more structural change in the attitude of home governments towards ownership. In that case, a home government may indeed be able to exert its bargaining power. With alternative sources of corporate assets widely available within the Triad (due to the inward investment flows), home governments may be able to set the terms of their interaction with their former national champions.

Second, in the EC IT policy case, the IT Roundtable companies appear to have been unable to politically exploit their control over wealth-creating operations. Although the companies have occasionally threatened to move their operations to other regions, one could question the IT Roundtable companies' ability to fully execute this threat in the face of their dependency on the European market and their sunk-in investments in production operations. Other home-grown companies, however, may be far more "foot-lose" and thus in a better position to exploit their bargaining chips.

10.5 DYNAMICS OF EUROPEAN INTEGRATION

What conclusions and implications can be drawn from the EC IT policy case concerning the dynamics of European integration?

10.5.1 CULTIVATED SPILL-OVER

This thesis has found that the Commission has been "cultivating" spill-over; it has been using the IT Roundtable to strengthen its information base and to build political support for its proposals (see Chapter 7). Commissioner Davignon, in particular, has played an important role in this respect (see Chapter 3). By establishing a mutually supportive relationship between the IT Roundtable companies and the Commission, Davignon has strengthened the EC vis-à-vis its Member States; with the help and support of the companies, Davignon has contributed to the creation of a new "technology" policy role for the European Community, complementing its role in restructuring traditional industries.

Davignon's successor, Commissioner Pandolfi, displayed a clear willingness to support the European IT companies. Yet, the Roundtable companies were allegedly not happy to work with Pandolfi. As one of the interviewees commented, he would "turn any opportunity into a disaster" (Interview 10;1993). Pandolfi's autocratic management style and unrealistic vision, in particular, have been criticized for undermining the special relationship between the IT Roundtable companies and the Commission (Commission, IRDAC and M/S government sources, Interviews 10,11,12,13;1993).

Since 1990/91, Commissioner Bangemann has been involved in IT policy-making. As Chapter 4 has illustrated, Bangemann played an important role in defining the principles underlying an industrial policy at the Community level. His efforts also opened the way for an information technology industrial policy. In contrast to Davignon, however, Bangemann resorted to a wider constituency for expanding the EC's industrial policy role; as illustrated by the development of the 1991 White Paper, the Commission also used large IT users and other lobbies as sources of information and legitimation (see Chapter 7).

Over 1993 and 1994, moreover, Bangemann's case-by-case approach to industrial policy appears to have favoured the telecommunications industry over the IT industry. Pragmatic considerations may well have been underlying this choice. The practical possibilities of intervening in the telecommunications industry have been greater than in the IT industry due to the telecommunications industry's regulated nature and the EC's limited dependency on foreign suppliers. Moreover, the prospects of a successful intervention have been relatively good due to the telecommunications industry's current commercial success (see Chapters 7 and 8).

10.5.2 POLITICAL SPILL-OVER

With the institutional strengthening of the EC (see Chapters 5 and 6), the Commission and the European Parliament have become increasingly important as lobbying targets. Chapter 7, however, did not find evidence that the IT companies have *shifted* their political activity *away* from the national governments. Certainly, some form of political spill-over has taken place (see Chapter 1), but the prevailing importance of the Member States in EC policy-making has made a continued lobbying of the national governments imperative.

As Chapter 7 has discussed, the relationship between the IT companies and their home governments has remained very close, with the possible exception of ICL and the UK. Lobbying the home government, however, did not prove to be sufficient in the late 1980s and early 1990s. By then, the introduction of majority voting (see Chapters 6 and 7) and the widening of the Community (see Chapters 6 and 9) had made it increasingly important to lobby the remaining national governments as well. The IT Roundtable companies' (direct or indirect) relationships with these Member States, however, have yet to be cultivated to a greater degree (see Chapter 7).

As Chapter 9 has illustrated, the Southern enlargement has diluted EC-wide support for high-tech policies, including IT. The upcoming "Nordic" enlargement of the Community may shift this balance of interests again - albeit not necessarily in favour of information technology. Although Sweden and Finland did develop their own national champions in electronics and other high-tech industries, their presence in IT has been relatively weak. While Ericsson's data systems division was taken over by Nokia in 1988, Nokia Data was subsequently acquired by ICL.

10.6 IT INDUSTRY: STRATEGIC OR NOT?

As Chapter 3 has illustrated, the development of an Community-level IT policy was justified by the argument that a presence in IT was of strategic importance for the wealth, political autonomy and security of the EC and its Member States. Was this indeed the case, or was the argument merely used to justify government support for the IT industry?

While Chapter 2 has outlined which technologies are generally considered "strategic" and how the necessity of an indigenous production capability is linked with the supply conditions in the industry in question, Chapters 3 and 8 have applied these concepts to European IT policy case.

This thesis has found that it is important to make a distinction between the strategic importance of a technology and the products embodying this technology on the one hand, and the strategic importance of an indigenous production capability on the other. While IT meets the definition of an economically and militarily strategic technology (see Chapter 3), a domestic production capability may not always be necessary - certainly not if it concerns mass-produced IT products for commercial applications. Chapter 8 found that by the early 1990s, the world supply conditions of mass-produced IT products for commercial uses did not give rise to security of supply concerns any more - justifying the UK in its belief that a domestic IT production facility is not indispensable and proving wrong those Member States that did belief otherwise.

The continued lip-service paid by some Member States to the strategic necessity of a European IT production capability, despite changes in the IT supply conditions (see Chapter 8), can be explained by the fact that the threat perceptions of governments may suffer from "inertia"; the perceptions may not reflect the prevailing security of supply conditions at any given point in time. Companies, in particular, may have a vested interest in maintaining certain threat perceptions, notably if such perceptions would strengthen their political influence.

Linking the concept of the necessity of an indigenous production capability with the supply conditions in an industry, however, raises the following questions. Is it worthwhile investing in a strategic production capability if the supply conditions justifying this capability are subject to change over time? Are there other, more efficient and effective ways in which the government might correct the conditions in the world markets that give rise to security of supply concerns? In the end, governments may find the alternative of cooperating in a global competition regime, responsible for regulating the concentration and anti-competitive practices in the world IT industry, less costly than building up a *competitive*, indigenous IT production capability.

APPENDICES

Appendix 1.1

EUROPEAN-GROWN IT MNEs: PROFILES (1987-1993)

Siemens

Siemens has been a large, diversified electronics producer (see Figure 1.1). In 1990, the Munich-based company derived 20 per cent of its S 34 bn sales from dataprocessing. The share of dataprocessing revenues in Siemens' total revenues had been boosted by the merger of its profitable dataprocessing operations with the German minicomputer producer Nixdorf in 1990. The resulting, legally independent entity "Siemens Nixdorf Informationssysteme AG", however, was hampered by the partners' diverging corporate cultures and incompatible business procedures and computing systems; in the early 1990s, SNI was heavily loss-making.

Siemens' semiconductor operations, largely loss-making, accounted for roughly 3 per cent of Siemens' sales in 1990. In 1989, it transpired that Siemens sought to acquire the cash-rich and profitable electronics producer Plessey, in a joint bid with GEC. Plessey's semiconductor operations would be jointly owned by Siemens and GEC and Siemens would exert management responsibility. Although Siemens and GEC eventually succeeded in their take-over bid, Plessey's microelectronics operations were consolidated fully within the GEC structure, following objections of the UK Ministry of Defence to the control Siemens would have over Plessey's defence-related chip manufacturing capabilities.

Despite their lack of profitability, Siemens has stressed that both semiconductors as well as computers remain core businesses within Siemens (Cane, 14 May 1992:26; Parkes, 15 January 1993:15). Siemens' overall profitability and its cash-richness have implied that the company has had the financial means to sustain its loss-making computer and semiconductor operations. However, supporting loss-making operations out of profits has a number of disadvantages. It limits the funds available for both dividend payments and reinvestment in profitable divisions. Moreover, there may be a point where Siemens' net income from its large holdings of liquid assets (1990: S 1.4 bn, in comparison to Philips' S 0.4 bn), cannot any longer compensate for disappointing performances on industrial operations. In 1993, however, Siemens still appeared to be far from this point[1].

Philips

Comparable in size to Siemens is the Dutch electronics company Philips (see Figure 1.1). Over the 1980s, Philips' results on its business operations were consistently disappointing. The company blamed these results mostly on external factors, such as aggressive Japanese competition, high interest rates, unfavourable exchange rate fluctuations and the fragmentation of the European home market. Corporate analysts, however, also point at a number of internal factors, including a complacent corporate culture, a tendency to treat prestigious projects as "sacred cows", and an organizational structure which impeded the formulation and execution of a truly global policy. Over the 1980s, however, Philips managed to prop up its poor results from operations through sales of real estate and non-core operations.

Meanwhile, however, the group's financial position had become more and more precarious with long-term debt rising to over 120 per cent of its stockholders' equity in 1990. Philips ended up in a spiral of debt - borrowing money to finance existing debts (Kerres, 22 February 1992:15,16). In Spring 1990, Philips' financial difficulties

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[1] Sources: Bradshaw, 11 March 1991:VI; Cane, 14 May 1992:26; Dickson, 25 August 1989; Economist, 22 December 1990:94; 13 January 1990:66; Electronics, March 1989:56B; Financial Post, 13 December 1988:12; Fisher, 7 July 1992:27, 22 October 1991:25; Krause, 14 March 1991:7,12; Nakamoto, 17 March 1992:I; NRC, 18 August 1992:13; Siemens A/R; Skapinker, 16 October 1990; Wittenberg, 24 January 1991:15.

came to a climax when it became clear, after unexpectedly disappointing first quarter results, that the company would make a loss over 1990. While in April 1990, President van der Klugt still argued that the group would improve its results in 1990, by May it had become clear that Philips first quarter profits totalled only *f* 336 mn, of which *f* 330 mn guilders came from the sale of its defence companies and only *f* 6 mn guilders from business operations (NRC, 30 June 1990:17).

Philips' extraordinary income for the year 1990 was expected to be insufficient to counterbalance the low income on normal business operations, which was depressed by extremely high losses on various production segments, notably semiconductors and computers. Dataprocessing accounted in that year for approximately 11 per cent of Philips' total revenues from sales, while the semiconductor operations accounted for roughly 18 per cent of the company's revenues[2].

As a result of the credibility crisis caused by the forecast of substantial losses, which resulted in a fall of Philips' shares from about *f* 50 guilders in 1989 to *f* 32 in Spring 1990, the company initiated a large-scale restructuring programme dubbed "Operation Centurion". The most visible elements of the operation included: (1) the trimming of Philips' organization, notably its bureaucracy, (2) the elimination of unprofitable business operations, particularly semiconductors and computers, at (3) a radical cut in employment. Less visible elements of the restructuring process comprised attempts to: (1) speed up decision-making, (2) change management mentality, and (3) increase performance in terms of quality, cost, output and innovation time-span.

In the context of Operation Centurion, Philips substantially reduced its computer and semiconductor operations. Over 1990-1991, the company withdrew from

[2] Philips' semiconductor operations are part of its Components and Semiconductors Division. In 1990, deliveries in the components and semiconductors sector totalled 10,378 mn guilders. This constitutes 17.4 per cent of Philips' total sales of 59,821 mn guilders and 18.6 per cent of Philips' net sales (Philips A/R 1991).

high-cost semiconductor projects such as the SRAM project. In 1991, it sold its minicomputer and automatization operations of its Data Systems division to Digital Equipment. The company initially retained its PC operations, albeit in a scaled-down form, but withdrew completely from the production of PCs in 1993.

After losses of S 2.3 bn in 1990, the company returned to the black in 1991. In 1992, however, business performance deteriorated again, particularly in consumer electronics, leading to an overall loss. In 1993, however, Philips' net result became positive once more. Its debt to equity ratio fell markedly, partly due to the company's sale of its 35 per cent interest in Matsushita. In November 1993, Philips' president Jan Timmer announced that Philips had met all targets set by Operation Centurion. In early 1994, he argued that Philips had gone through the worst. Judging by the price rise of Philips' shares, by mid-1993 the public confidence in Philips' performance appeared to have returned[3].

Bull

In comparison to the electronic giants Siemens and Philips, the state-owned computer producer Bull has been considerably smaller. In 1990, Bull's total revenues totalled S 6.4 bn - approximately 0.2 times the size of Siemens' sales. In that year, Bull's labour force of 44,500 people was about 8 times smaller than Siemens' body of employees (see Figure 1.1).

In 1990, Bull became loss-making - partly caused by the substantive losses made by Zenith Data Systems, its American acquisition of 1989. In contrast to

[3] Sources: Economist, 21 August 1993:55; Electronics, 23 November 1992:14; Fentrop, 3 July 1990:11; Financial Times, 11 August 1992:12; Kerres, 2 August 1991:9, 22 February 1992:15-16, 24 July 1991:16, 5 November 1993:16; Metze, 1991; Nakamoto and van de Krol, 25 February 1992:19; NRC, 30 June 1990:17, 24 March 1993:17; Philips A/R; Philips Quarterly Report, 30 June 1993; Teulings, 31 October 1990:3; van Alphen, 31 March 1993:25; van de Krol, 9 March 1994:21; Wammes, 4 March 1993:4; Wittenberg, 14 May 1990:11.

Siemens and Philips. Bull did not have the option of compensating its loss-making operations through profits on non-IT activities; it has been deriving all its revenues from dataprocessing. Instead, the French government came to the aid of the ailing computer firm. The government has held a majority interest in Compagnie des Machines Bull (CMB), the parent company of the Bull Group, since it nationalized CII-HB (as Bull was called then) in 1982. In 1991 and 1992, the French government supported the group through FF 4 bn in capital injections and FF 2.6 bn in research funding. The capital injections were funded in part by the state-owned France Telecom, which currently has a 17 per cent stake in Bull (Browning, 4 April 1991; Dawkins and Leadbeater, 5 April 1991:2).

In response to its substantive losses, Bull initiated a transformation programme, geared at improving the company's performance. Over the course of 1991 and 1992, Bull also sold part of its shares to NEC and IBM. By then, foreign equity participation in a state-owned national champion operating in a strategic industry, had become possible: the French government had relaxed its regulations to allow for a partial privatisation of the state companies on the condition that the French or foreign private investors would provide new capital for the state firm and close an industrial, commercial or financial cooperation accord. In November 1991, NEC (J), which had been supplying mainframes to Bull, acquired 4.7 per cent of the shares of CMB in exchange for its 15 per cent share in Bull HN Information Systems. In February 1992, Bull balanced the share of NEC by selling 5.68 per cent of its CMB-shares to IBM, in exchange for a capital injection of S 102.3 mn, a transfer of RISC technology and cooperation in the areas of marketing and R&D.

Despite Bull's transformation programme, the company made substantive losses. In February 1993, the French government granted the ailing computer group a capital injection of 2.5 bn FF, to prop up its financial condition. In May 1993, the new conservative government announced its intention to privatize Bull. Bull had been on the list of companies proposed for privatization of the 1986-88 conservative government. The group's precarious financial condition, however, thwarted at that point in time a speedy realization of the government's intent.

Following the need to stem the losses, return to profitability, and prepare the company for privatization, Bull announced a new restructuring programme in November 1993. This programme would have far reaching consequences for the strategy, internal organization, and employees of the company. The programme would cost 8.6 bn FF, financed by the French state (7 bn FF) and France Telecom (1.6 bn FF). NEC and IBM, the other principal shareholders, were asked to contribute through new capital injections - a request rejected by IBM, but accepted by NEC[4].

Olivetti

Like Bull, Olivetti is considerably smaller than Siemens and Philips (see Figure 1.1). In 1991, the group, which derives the majority of its sales from dataprocessing, turned loss-making despite ongoing restructuring. It became clear that Olivetti needed the additional funds, the technology and the commercial advantages that a partnership with a foreign firm could provide - as AT&T had provided before their alliance fell apart in 1989. In June 1992, De Benedetti's holding company, which had in 1991 a 41.54% stake in Olivetti, agreed to sell 10 per cent of its shares to DEC, Olivetti's

[4] Sources: Browning, 4 April 1991; Bull A/R; Cane, 9 June 1992:27, 10 February 1992:17, 17 February 1992:I, 29 January 1992:24, 5 December 1991:26, 23 April 1991:III; Cane, Alan and John Ridding, 4 October 1993:15; Dawkins, 8 April 1991:16, 11 April 1991:3, 5 February 1992:23, 27 April 1992:8; Dawkins and Leadbeater, 5 April 1991:2; Dryden, 14 March 1991:9; Economist, 8 June 1991:18,20, 4 January 1992:58, 27 June 1992:97; 1 February 1992:90-91, 6 November 1990:113; Financial Times, 28 March 1991:7; Hill, 25 June 1992:2; Hill and Ridding, 7 October 1993:2; Nakamoto and Ridding, 10 December 1993:24; NRC, 21 March 1991:15, 19 October 1993:19; OJ C244 of 23.9.92; Ridding, 19 November 1993:32, 18 February 1994; Ridding and Hill, 19 October 1993:23; Ridding and Kehoe, 16 December 1993:26.

long-time OEM partner, for approximately $ 370 mn in equity capital and access to RISC technology.

Olivetti remained loss-making over 1992 and 1993, but in 1993, its competitiveness as expressed in market shares improved in both European as well as US markets, while its financial position became healthier due to a rights issue. Olivetti hopes to break even by 1995[5].

SGS-Thomson

SGS-Thomson was formed in 1987, when the French defence (CSF) and consumer electronics (TCE) group Thomson merged its civil microelectronics operations with the Italian company SGS-Microelettronica. Although it is by far the smallest company discussed in this thesis (see Figure 1.1), it has been amongst the Top 3 semiconductor suppliers to the European market. Moreover, it has been backed up by two larger groups.

Initially, the defence arm of the state-owned Thomson Group, Thomson-CSF, owned 50 per cent of the venture, while the other 50 per cent was owned by the Italian telecommunications producer STET, which is part of the state-owned holding company IRI (IRI/STET). In 1989, SGS-Thomson acquired the British semiconductor producer Inmos, which was owned by Thorn-EMI. As a consequence, the shareholder structure changed; by 1991, Thomson-CSF held 45 per cent of SGS-Thomson, the Italian partners (IRI/Finmeccanica) 45 per cent, and the UK company Thorn-EMI the remaining 10 per cent.

Since its creation, the merged operations have been subject to substantive

[5] Sources: Cane, 17 March 1992:VII, 1 July 1992:28; Economist, 1 December 1990:108,110; Electronics, 22 March 1993:11, 24 August 1992:14; Financial Times, 18 March 1992:25; Flissi, 14 March 1991:7,9; Olivetti A/R; Simonian, 25/26 September 1993:14, 30 April 1993:23, 11 March 1991:X, 13 May 1992:27.

restructuring programmes, including the closure of redundant factories, the lay-offs of employees, and the move of the labour-intensive production facilities off-shore. Over the period 1987-1992, however, SGS-Thomson either broke even or remained loss-making. Moreover, its financial condition was precarious, as illustrated by total debt to equity ratios of over 200 per cent.

In November 1992, the Italian and French government agreed to provide approximately S 1 bn in funds to meet SGS-Thomson's recapitalization needs and S 1 bn to meet its R&D requirements over a period of five years. As the funds provided would wipe out SGS-Thomson's debts, this action would improve the company's financial situation considerably. Thorn-EMI decided not to inject new capital into the venture, which implies that its stake in the company will fall from 10 to 6 per cent in five years time. Facilitated by SGS-Thomson's timely return to the black, the EC Commission cleared the capital injections as legal investments rather than illegal state aids.

In November 1992, the Italian and French governments also agreed to bring in other industrial partners to increase the shareholders' base of the microelectronics producer. In February 1993, a company was created to hold the 45 per cent French stake in SGS-Thomson. Thomson-CSF owns currently 49 per cent of the holding company, with other French shareholders (France Telecom and CEA-Industrie) accounting for the remaining shares. Eventually, Thomson-CSF's share in the holding company will fall to approximately 25 per cent.

In 1993, SGS-Thomson's profitability increased substantially, partly due to a surge in the market. The future of SGS-Thomson, however, is to a certain degree dependent on the fate of its owners and their ability to invest in SGS-Thomson. In 1992, the Italian government earmarked the portfolio of the heavily indebted state holding IRI for privatization. It is expected that IRI's holdings in the high-technology area will become publicly quoted within two years, but that the state will maintain a controlling stake. Similarly, the new conservative French government has announced its intention to privatize the Thomson group. The latter had been on the 1986-88 conservative government's list of companies proposed for privatization. Although Thomson-CFS has been profitable, the overall group has been loss-making due to the heavy losses in the group's consumer electronics arm Thomson-TCE. In order to shape up the Thomson Group for privatization, the Balladur government has asked the group to consider merging Thomson-CSF with Thomson-TCE[6].

ICL

Similar to Bull and Olivetti, ICL is an undiversified computer company, but relatively small in comparison (see Figure 1.1). For most of the 1980s, ICL was wholly owned by Standard Telephone and Cables Plc (STC), the British-owned telecommunications producer. Following ICL's acquisition in 1984, STC derived the majority of its revenues from its Information Systems group, which comprised ICL. At the end of the 1980s, however, STC sought to hive off its computer subsidiary; in November 1990, the company sold an 80 per cent ownership interest to Fujitsu for S1.3 bn. Fujitsu could provide ICL with the necessary funds, the microelectronics technology and expertise needed, and additional sales outlets for ICL's products. Moreover, it would increase ICL's credibility with both customers and suppliers, and dampen fears about ICL's long-term survival.

ICL's takeover by the Japanese company, however, stirred a row of protests

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[6] Buchan, 26 May 1993; Buchan and Graham, 11 November 1992:2; Dawkins, 3 February 1993:25, 16 November 1992:4, 15 October 1991:27; Dodsworth, 14 September 1988; Friedman, 14 July 1989; Graham, 4 December 1992:20, 7 February 1989; Hudson and Gumbel, 18 April 1994:1; Parkes, 15 January 1993:15; Rawsthorn, 8 July 1993:31; Rawsthorn and Buchan, 27 May 1993:23; Thomson-CSF A/R; Skapinker, 11 May 1990.

amongst the continental European computer vendors, which eventually led to ICL's exclusion from the IT Roundtable. It was felt that the Roundtable's membership should be reserved for truly European-owned firms. On similar grounds, ICL was excluded from three of the five JESSI projects. By 1993, however, the strained relations between ICL and its European counterparts appeared to have relaxed.

Although Fujitsu and ICL cooperate closely in the areas of R&D and marketing, ICL has been operated by Fujitsu at arm's length, as British competition law requires that the interests of the minority shareholder are protected (ICL sources, Interview, October 1993). ICL's minority owner is Northern Telecom, which took over STC shortly after the Fujitsu take-over of ICL. The ownership structure is expected to change in 1995, when Fujitsu will float 25 per cent of its ICL shares on the London Stock Exchange.

Over the early 1990s, ICL engaged in an active acquisition policy, including the takeover of the Finish producer Nokia Data and various smaller software and services companies. In contrast to the IT operations of the continental European computer producers, ICL has been profitable over the early 1990s. Its profitability, however, has been falling. At the end of 1993, the company decided to raise £100 mn through a formal rights issue, financed by Fujitsu, in order to boost its financial position. As Northern Telecom, ICL's minority shareholder, will not contribute, Fujitsu's share in the company will increase to 84 per cent[7].

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[7] Sources: Adonis, Andrew, 30 July 1993:21; Cane, 2 July 1992:25, 3 December 1993:21; Economist, 11 January 1992:67-68, 10 April 1993:73; ICL A/R; Kerres, 30 May 1991:15; Leadbeater, 19 July 1990; Walker, 24 May 1991.

Appendix 1.1

Siemens in $ mn	1987	1988	1989	1990 *(a)*	1991 *(a)*	1992 *(a)*	1993 *(a)*
Sales *(b)*	**28572.8**	**33735.2**	**32514.9**	**39003.1**	**43980.7**	**50326.3**	**49482.4**
Total IT Sales	5703.0	5951.0	6010.6	7735.1	7308.6	8345.1	7225.5
Net Income	**708.3**	**790.3**	**838.8**	**1029.6**	**1079.5**	**1253.2**	**1201.2**
Shareholders' Equity *(c)*	9058.3	10019.3	9869.2	10837.7	11234.3	13039.1	12440.0
Net Income on Equity in %	8.0	8.2	8.7	9.2	9.9	9.6	9.7
Financial Position							
Long-term Debt *(d)*	1119.4	1100.6	995.2	980.3	1226.6	1878.9	1416.4
As % of Shareholders' Equity	12.4	11.0	10.1	9.1	10.9	14.4	11.4
Liquid Assets *(e)*	12805.6	13618.2	11297.3	11942.6	11184.3	12613.5	13220.0
Capital Expenditure *(f)*	**2951.7**	**2960.2**	**4187.2**	**4361.7**	**3370.5**	**5496.2**	**4044.4**
Semiconductors	140.0	110.0	130.0	180.0	160.0	140.0	N/A
Employees (x1000)	**359**	**353**	**365**	**373**	**402**	**413**	**391**
R&D	**3450.6**	**3681.8**	**3656.9**	**4308.6**	**4754.2**	**5375.0**	**4665.5**
As % of Sales	12.1	10.9	11.2	11.0	10.8	10.7	9.4
Employees as % Total Labour	N/A	11.7	11.4	11.6	11.7	11.6	11.9
Semiconductor R&D	90.0	90.0	320.0	340.0	330.0	N/A	N/A
As % of Sc. Sales	13.7	11.5	26.8	28.2	26.1	N/A	N/A

(a) Data include Siemens Nixdorf (SNI). Siemens acquired Nixdorf in 1990

(b) Sales: Net Sales, including revenues from leasing and license agreements

(c) Shareholders' Equity = Capital Stock plus Additional Paid-in Capital plus Retained Earnings plus Unappropriated Consolidated Net Income plus Minority Interests

(d) Long-term Debt: Debt minus Debt due Within One Year

(e) Liquid Assets: Securities and other Liquid Assets

(f) Capital Expenditure: Capital Spending (for property, plant and equipment and for acquisition of investments)

Appendix 1.1

Philips Group in $ mn	1987	1988	1989	1990	1991	1992	1993
Sales *(a)*	**25968.0**	**28322.7**	**26992.5**	**30639.6**	**30473.8**	**33254.0**	**31626.3**
Total IT Sales	2601.6	2794.6	2814.8	3283.9	N/A	N/A	N/A
Net Income	**403.0**	**533.3**	**648.1**	**-2329.7**	**642.8**	**-511.4**	**1056.5**
Shareholders' Equity *(b)*	7642.4	8353.5	7966.0	6134.6	6168.4	5154.0	6155.4
Net Income on Equity in %	5.2	6.6	8.2	- 30.2	10.6	- 9.5	17.2
Financial Position							
Long-term Debt *(c)*	5096.1	6071.7	5724.5	7588.5	6904.3	7211.4	5039.8
As % of Shareholders' Equity	66.7	72.7	71.9	123.7	111.9	139.9	81.8
Liquid Assets *(d)*	907.4	721.7	729.7	1384.1	1034.2	942.1	1248.4
Capital Expenditure *(e)*	**2342.9**	**2093.4**	**1949.5**	**1943.4**	**1580.8**	**1892.1**	**1385.0**
Semiconductors	290.0	290.0	290.0	280.0	150.0	170.0	N/A
Employees (x1000)	**337**	**310**	**305**	**273**	**240**	**252**	**239**
R&D	**2149.8**	**2334.9**	**2149.5**	**2405.5**	**2069.5**	**2079.6**	**1826.3**
As % of Sales	8.3	8.2	8.0	7.9	6.8	6.3	5.8
Employees as % Total Labour	11.9	13.3	13.2	12.2	11.4	10.8	10.3
Semiconductor R&D	220.0	210.0	400.0	430.0	270.0	N/A	N/A
As % of Sc. Sales	13.7	12.1	23.3	22.0	13.4	N/A	N/A

(a) Sales: Net Sales, i.e. total deliveries minus internal deliveries
(b) Shareholders' Equity = Issued, Paid-up Capital plus Share Premium Account plus Revaluation Surplus + Retained Earnings plus (Goodwill + Foreign Exchange Translation Differences)
(c) Long-term Debt = Total Long-term Liabilities, Amount Outstanding
(d) Liquid Assets: Securities and other Liquid Assets
(e) Capital Expenditure = Gross Investments

Appendix 1.1

Groupe Bull in $ mn	1987	1988	1989	1990	1991	1992	1993
Sales *(a)*	**3006.8**	**5293.1**	**5128.7**	**6345.0**	**5930.9**	**5717.2**	**5909.9**
Total IT Sales	3007.5	5296.7	6465.4	6349.6	5929.8	5715.1	5000.0
Net Income	**37.4**	**50.8**	**- 41.9**	**-1245.9**	**-585.3**	**-894.8**	**-583.0**
Shareholders' Equity *(b)*	N/A	N/A	904.7	- 193.4	-139.2	-518.4	66.1
Net Income on Equity in %	N/A	N/A	- 4.6	-	-	-	- 8.8
Financial Position							
Long-term Debt	N/A	N/A	1304.2	1739.1	1393.1	1582.4	735.8
As % of Equity	N/A	N/A	144.2	-	-	-	1113.2
Liquid Assets *(c)*	N/A	N/A	374.5	355.4	296.3	242.5	236.1
Capital Expenditure *(d)*	**N/A**	**N/A**	**N/A**	**497.3**	**432.4**	**383.0**	**315.9**
Employees (x1000)	**26.3**	**45.6**	**43.6**	**44.5**	**39.9**	**35.2**	**31.7**
R&D	**338.6**	**610.9**	**580.3**	**687.5**	**683.2**	**703.4**	**571.0**
As % of Sales	11.3	11.5	11.3	10.8	11.5	12.3	9.7
Employees as % Total Labour	N/A	N/A	N/A	N/A	15.0	N/A	16.0

(a) Sales: Total Revenue, comprising Sales, Rental Service and Other
(b) Shareholders' Equity = Common Stock plus Additional Paid-In Capital plus (Retained Earnings or Deficit) plus (Translation Adjustment)
(c) Liquid Assets: Marketable Securities and Cash
(d) Capital Expenditure: Expenditure for Property and Increase in Investments and Other

Appendix 1.1

Olivetti Group in $ mn	1987	1988	1989	1990	1991	1992	1993
Sales *(a)*	**5686.7**	**6458.9**	**6584.0**	**7593.7**	**6935.6**	**6551.4**	**N/A**
Total IT Sales	4637.2	5427.9	5573.3	6414.5	6050.8	5762.0	5070.2
Net Income	**310.0**	**273.7**	**147.9**	**50.8**	**-370.5**	**-530.5**	**N/A**
Shareholders' Equity *(b)*	2530.1	2590.3	2637.2	2930.4	2484.7	1927.5	N/A
Net Income on Equity in %	12.3	10.6	5.6	1.7	- 14.9	- 27.5	N/A
Financial Position							
Long-term Debt *(c)*	1880.5	2204.1	3156.0	3731.9	3535.0	3255.5	N/A
As % of Shareholders' Equity	74.3	85.1	119.7	127.4	142.3	168.9	N/A
Liquid Assets *(d)*	3147.2	2807.3	3688.3	4145.0	3679.1	3761.1	N/A
Capital Expenditure *(e)*	**411.0**	**468.6**	**334.6**	**349.6**	**234.9**	**373.8**	**N/A**
Employees (x1000)	**58.1**	**57.6**	**56.9**	**53.7**	**46.5**	**40.4**	**N/A**
R&D	**330.6**	**347.2**	**348.5**	**394.0**	**371.6**	**374.9**	**N/A**
As % of Sales	5.8	5.4	5.3	5.2	5.4	5.7	N/A
Employees as % Total Labour	7.0	7.0	7.8	7.7	8.1	9.3	N/A

(a) Sales: Net Revenues
(b) Shareholders' Equity = Share Capital plus Capital in Excess of Stated Value plus Revaluation Reserves + Retained Earning and Other Reserves plus (Treasury Stock Reserved for Employees + Cumulative Translation Adjustments) plus (Net Result for The Year)
(c) Long-term Debt = Banks Plus Bonds
(d) Liquid Assets = Cash + Bank Deposits + Marketable Securities
(e) Capital Expenditure = Increase in Fixed Assets

Appendix 1.1

SGS-Thomson in $ mn	1987	1988	1989	1990	1991	1992	1993
Sales	**851**	**1049.7**	**1192.8**	**1350.3**	**1378.9**	**1571.0**	**2400.0**
Net Income	**N/A**	**- 68.8**	**3.3**	**- 96.5**	**-103.0**	**3.0**	**160.0**
Shareholders' Equity *(a)*	N/A	352.7	463.3	461.5	440.8	430.7	N/A
Net Income on Equity in %	N/A	- 19.5	0.7	- 20.9	- 23.4	0.7	N/A
Financial Position							
Debt *(b)*	N/A	774.8	666.1	940.2	875.7	947.2	N/A
As % of Shareholders' Equity	N/A	219.7	143.8	203.7	198.7	219.9	N/A
Liquid Assets *(c)*	N/A	102.2	28.4	53.0	44.5	103.8	N/A
Capital Expenditure	**182**	**180.9**	**235.1**	**265.1**	**174.3**	**161.6**	**N/A**
Employees (x1000)	**17.3**	**17.9**	**19.2**	**21.3**	**17.7**	**17.8**	**N/A**
R&D *(d)*	**155**	**143**	**160**	**N/A**	**N/A**	**N/A**	**N/A**
As % of Sales	18.0	13.6	13.4	N/A	N/A	N/A	N/A
Employees as % Total Labour	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Semiconductor R&D (total)	190.0	220.0	210.0	240.0	250.0	260.0	N/A
As % of Sc. Sales	22.1	20.2	16.1	16.7	17.4	N/A	N/A

(a) Shareholders' Equity = (Common Stock) plus (Paid-in Surplus and Retained Earnings) minus (Cumulative Translation Adjustment) plus (Revaluation Reserve) minus (Treasury Stock)
(b) Debt: includes short term and long-term debt
(c) Liquid Assets: Cash and Cash Equivalents
(d) R&D = Company-funded R&D

Appendix 1.1

ICL in $ mn	1987 *(a)*	1988 *(a)*	1989 *(a)*	1990	1991	1992	1993
Sales *(b)*	**2129.5**	**2433.8**	**2649.5**	**2967.5**	**3290.7**	**4347.2**	**3902.4**
Total IT Sales	2123.9	2425.1	2643.7	2862.9	3308.1	4354.8	3915.7
Net Income *(c)*	**180.2**	**230.0**	**238.9**	**115.9**	**72.1**	**46.1**	**0.9**
Shareholders' Equity	N/A	N/A	N/A	597.3	527.5	466.5	424.9
Net Income on Equity in %	N/A	N/A	N/A	19.4	13.7	9.9	0.2
Financial Position							
Debt *(d)*	N/A	N/A	N/A	82.0	239.5	254.9	150.2
As % of Shareholders' Equity	N/A	N/A	N/A	N/A	45.4	54.7	35.3
Liquid Assets *(e)*	N/A	N/A	N/A	N/A	214.6	213.5	318.7
Capital Expenditure *(f)*	**N/A**	**N/A**	**N/A**	**N/A**	**161.2**	**211.1**	**121.2**
Employees (x1000)	**20.4**	**22.1**	**22.1**	**N/A**	**26.8**	**25.6**	**24.0**
R&D	**N/A**	**N/A**	**N/A**	**383.9**	**390.9**	**426.1**	**311.8**
As % of Sales	N/A	N/A	N/A	12.9	11.9	9.8	8.0
Employees as % Total Labour	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(a) Data 1987-1989 refer to STC Information Systems; *(b)* Sales: Turnover, comprising Revenues from Sales and Hire of DP Equipment and from Software and Services; *(c)* Net Income = 87-89: Profit *before* Tax; 90-93: Profit *after* Tax and Minority Interests; *(d)* Long-Term Debt = Loans and Other Liabilities, Due After More than One Year; *(e)* Liquid Assets: Cash at Bank and in Hand; *(f)* Capital Expenditure = Purchase of Tangible Fixed Assets

Sources: Siemens A/R; Philips A/R; NRC, 25 May 1990:11; Hudson and Gumbel, 18 May 1994:1,4; Bull A/R; Olivetti A/R; Thomson-CSF A/R; ICL PLC A/R; Dataquest in BMFT (June 1993); Datamation, 15 June 1994:46; 15 June 1993; 1 July 1992:61,63; 1 July 1991:61-62; 1 July 1990: 112-2/3; 15 June 1989:56,65,66,83; 1 August 1988:48-2/3; Stopford (1992); Appendix 8.1.

Note: Comparison of the different companies only yields a rough indicator, due to the fact that each company uses a different system of accountancy, based on different currencies, and applying to different fiscal years; With the exception of data on IT revenues, the data have been taken over directly from the annual reports and converted into dollars, unless indicated otherwise. Exchange Rates: see Appendix 5.1

Appendix 1.2

DEFINING INFORMATION TECHNOLOGY

Information Technology (IT) has been an ill-defined concept, the meaning of which varies per application. Datamation (Top 100) and Price Waterhouse (in the Financial Times, 23 April 1991:II) define IT as computer hardware, software, services, datacommunications and other, dataprocessing products. Hardware, in its turn, can be split up into two product categories: processing hardware and peripheral equipment. Processing hardware comprises: (a) mainframes or large-scale computer systems, (b) minis or mid-range systems, and (c) personal computers and workstations or micros. Peripheral equipment refers to devices used for storing, entering and outputting data, such as printers, tape drives and disk drives (Trainor and Krasnewich, 1992:69).

The European Community uses a wider definition in its R&D framework programmes and policy documents. In addition to the "dataprocessing" product categories mentioned above, the EC includes upstream components and downstream applications in its working definition of IT. Components encompass three categories of products: (1) active components, including semiconductors; (2) passive components, and; (3) electromechanical components. Downstream applications comprise, for example, computer-integrated manufacturing and distributed systems (OJ L302, 1987:8-9; L117, 1990:33-34; SEC(91)565:2).

The IT Roundtable, meanwhile, gives the broadest definition of IT, not only including dataprocessing, components and applications, but also telecommunications, consumer and professional electronics (European IT Industry Roundtable, April 1992:2).

As this thesis focuses on the political influence of European-owned IT companies over the EC, it is imperative to incorporate those technologies that the EC has been addressing through its R&TD framework programmes and other policies. In other words, this thesis defines Information Technology as "components" plus "dataprocessing" (computer hardware, software, services, datacommunications, and other dataprocessing products) plus "applications".

These areas are covered by the following European Community's industrial classification code numbers: NACE 345 (electronic components) and NACE 33 (computer and office equipment). The applicable trade classification (SITC Rev.2) codes are: SITC 77 (electronic equipment, including electronic components) and SITC 75 (automatic data processing machines and units, and office machinery). The applicable EC tariff headings are: CN 8541 and 8542 (NIMEXE 85.21) for electronic components and CN 8471 (NIMEXE 84.53) for automatic data processing machines and units thereof. Information technology, as such, has not been awarded a separate NACE, SITC or CN (NIMEXE) classification code.

Appendix 1.3

EC MEMBER STATES: COUNTRY PROFILES (1988-1989)

National Shares in Total EC Semiconductor Production, Consumption, Exports and Imports

	GER	FRA	UK	ITA	NL	OTH	EC12
Production - ICs (%)							
1988	32.0	19.0	22.0	7.0	13.0	7.0	100
Consumption (%)							
1989	28.0	13.0	25.0	11.0	N/A	23.0	100
Exports - Microcircuits (%)							
1988	33.0	20.6	22.8	11.4	6.6	5.6	100
1989	32.9	16.5	25.7	11.2	7.1	6.6	100
Imports - Microcircuits (%)							
1988	25.7	17.1	23.1	18.1	5.2	10.8	100
1989	25.2	14.9	23.7	18.9	5.4	11.9	100

Sources: EC Panorama (1990:12-5); EC Panorama (1991:12-10); UN International Trade Statistics Yearbook (1989).

National Shares in Total EC Dataprocessing Production, Consumption, Exports and Imports

	GER	FRA	UK	ITA	NL	OTH	EC9
Production (%)							
1989	25.3	23.2	24.2	18.2	OTH	9.1	100
Consumption (%)							
1989	28.4	22.5	23.5	12.7	OTH	12.9	100
Exports (%)							
1989	22.0	14.0	24.0	OTH	14.0	26.0	100
Imports (%)							
1989	24.0	17.0	25.0	OTH	14.0	20.0	100

Sources: EC Panorama (1991:12-34,12-35).

Appendix 5.1

OECD AVERAGE EXCHANGE RATES, 1987-1993

1$ equals:

	1987	1988	1989	1990	1991	1992	1993
FF	6.01	5.96	6.38	5.45	5.64	5.28	5.66
L	1296.97	1301.68	1371.69	1190.00	1241.00	1225.00	1573.66
ƒ	2.03	1.98	2.12	1.82	1.87	1.76	1.86
£	0.61	0.56	0.61	0.56	0.57	0.57	0.67
DM	1.80	1.76	1.88	1.62	1.66	1.56	1.65
ECU	0.78	0.8450	0.9082	0.7877			

Sources: Datamation, 15 June 1988:24; 1 August 1988:48-8; 15 June 1989:18; 15 June 1990:24; 1 July 1991:64; 1 July 1992:63; 15 June 1993:7; OECD Monthly Statistics of Foreign Trade, April 1994:113.

Appendix 5.2

WORLD SEMICONDUCTOR PRODUCTION, CONSUMPTION, AND US DOMINANCE IN SUPPLYING MARKETS, 1950s-1960s

World Semiconductor Production by Region of Origin in $ mn, 1958-1970

Year	USA	JAP	EUR	.	UK	GER	FRA
1958	236	19	26	.	8	10	8
1961	607	78	97	.	35	30	32
1964	635	139	179	.	66	61	52
1970	57%	27%	16%	.	N/A	N/A	N/A

Source: Malerba (1985:58;101;153).

Notes:
- EUR = UK + GER + FRA

World Semiconductor Consumption by Region in $ mn, 1956-1972

Year	USA	JAP	EUR	.	UK	GER	FRA
1956	80	5	7	.	2	3	2
1960	560	54	80	.	28	25	27
1965	1064	132	191	.	72	52	67
1970	1547	420	420	.	N/A	N/A	N/A
1972	1708	742	542	.	210	218	114

Sources: Malerba (1985:59;101)

Notes:
- EUR = UK + GER + FRA

US Dominance in Supplying World Semiconductor Markets (Japan, UK, France and Germany): Percentage of Demand Supplied by US Direct Exports, 1960-1970

Year	Import Penetration	Year	Import Penetration
1960	11	1966	27
1961	15	1967	32
1962	16	1968	30
1963	17	1969	37
1964	16	1970	30
1965	23		

Source: Finan in Braun and MacDonald (1978:150).

Appendix 5.3

WORLD SEMICONDUCTOR PRODUCTION, CONSUMPTION AND TRADE, 1975-1992

World Semiconductor Production by Region of Origin in % and $ mn, 1975-1991

Year	USA	JAP	EUR	OTH	WORLD
1975	N/A	N/A	N/A	N/A	N/A
	63.9	19.3	16.7		100.0
1980	11135	3840	1620	320	16915
	65.8	22.7	9.6	1.9	100.0
1983	13620	6210	1975	430	22235
	61.3	27.9	8.9	1.9	100.0
1985	N/A	N/A	N/A	N/A	N/A
	47.0	39.0	11.0	3.0	100.0
1987	N/A	N/A	N/A	N/A	N/A
	39.0	48.0	11.0	2.0	100.0
1988	18586	25942	4917	1414	50859
	36.5	51.0	9.7	2.8	100.0
1989	19978	29809	5443	1983	57213
	34.9	52.1	9.5	3.5	100.0
1990	N/A	N/A	N/A	N/A	N/A
	36.5	49.5	10.5	3.5	100.0
1991	N/A	N/A	N/A	N/A	N/A
	38.0	47.0	14.0*a*	*a*	100.0

Sources: Data 1975: Malerba (1985:153); Data 1980-1983: Integrated Circuit Engineering Corporation in Langlois et al. (1988:27); Data 1985: Integrated Circuit Engineering Corporation in Thomas, 18 December 1986; Data 1987: Dataquest in Kehoe, 8 January 1988; Data 1988-1989: Dataquest in Electronics, August 1990:36; Data 1990: Dataquest in Skapinker, 3 January 1991; Data 1991: estimates based on Dataquest in Tyson (1993:105).

Notes:

a 14 per cent to the share held by European and other (South East Asian) producers

- Data for 1992 and 1993 not available at time of submission

World Semiconductor Consumption by Region of Origin in %, 1989

Year	USA	JAP	EUR	OTH	WORLD
1989	30.0	40.0	18.0	12.0	100.0

Source: EC Panorama (1991:12-10).

Appendix 5.3

The EC Semiconductor Industry: Trade, Import Penetration, Export Orientation, and Value Added (in current value) in Ecu mn, 1981-1992.

Trade	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Extra EC (Active Components)												
EC EXP	1366	1542	1803	2760	2977	2825	3040	3594	4107	4370	4767	N/A
EC IMP	2188	2468	3018	4899	5068	4459	4777	6054	6978	6641	7362	N/A
EC BAL	- 822	- 926	-1215	-2139	-2091	-1634	-1737	-2460	-2871	-2271	-2595	-4045*E*
Extra EC (Semiconductors)												
EC EXP	985	1119	1315	2202	2290	2243	2477	3079	3616	3863	N/A	N/A
EC IMP	1644	1954	2437	4223	4335	3733	4006	5204	6088	5777	N/A	N/A
EC BAL	- 659	- 835	-1122	-2021	-2045	-1490	-1529	-2125	-2472	-1914	-2365	N/A
EC (Active Components)												
CONS	4104	4638	5600	7997	8064	7852	8026	9058	10215	9872	11583*E*	12625*E*
PROD	3282	3712	4385	5858	5973	6218	6289	6598	7344	7601	8019*E*	8580*E*
Extra EC (Active Components)												
M/C (%)	53.3	53.2	53.9	61.3	62.9	56.8	59.5	66.8	68.3	67.3	63.6*E*	N/A
X/P (%)	41.6	41.5	41.1	47.1	49.8	45.4	48.3	54.5	55.9	57.5	59.5*E*	N/A

Sources: Data 1981-1990: EC Panorama 1992:12-4,6,7; Data 1991-1992: EC Panorama 1993: 10-9.

Notes:
- EXP = Exports • IMP = Imports • BAL = Trade Balance • CONS = Consumption • PROD = Production • M/C = Import/Consumption = Import Penetration • X/P = Export/Production = Export Orientation • V̂A = Value Added
- Statistics refer to active components (which include semiconductors), unless stated otherwise
- Data 1981-1983 apply to the EC10

Appendix 5.4

TOP 20 SEMICONDUCTOR SUPPLIERS TO THE WORLD AND EUROPEAN MARKETS, 1987-1992

World Top 20 Semiconductor Suppliers by Revenues in $ Millions, 1987-1992

Year/Rank	1992	R	1991	R	1990	R	1989	R	1988	R	1987	R
Intel (US)	5064	*1*	4019	*3*	3171	*5*	2430	*8*	2350	7	1491	*10*
NEC (J)	4976	*2*	4774	*1*	4322	*1*	5015	*1*	4543	*1*	3368	*1*
Toshiba (J)	4765	*3*	4579	*2*	4202	*2*	4930	*2*	4395	*2*	3029	*2*
Motorola (US)	4635	*4*	3802	*4*	3539	*3*	3319	*4*	3035	*4*	2431	*4*
Hitachi (J)	3902	*5*	3765	*5*	3516	*4*	3974	*3*	3506	*3*	2618	*3*
Texas Instr.(US)	3052	*6*	2738	*6*	2574	7	2787	*6*	2741	*5*	2127	*5*
Fujitsu (J)	2583	7	2705	7	2599	*6*	2963	*5*	2607	*6*	1801	*6*
Mitsubishi (J)	2307	*8*	2303	*8*	2108	*8*	2579	7	2312	*8*	1492	*9*
Philips (NL)	2108	*9*	2022	*10*	1955	*9*	1716	*10*	1738	*10*	1602	7
Matsushita (J)	1929	*10*	2037	*9*	1826	*10*	1882	*9*	1883	*9*	1457	*11*
Nat. Semi. (US)	N/A		1602	*11*	1653	*11*	1618	*11*	1650	*11*	1506	*8*
Samsung (SK)	N/A		1473	*12*	1315	*13*	1260	*14*	905	*18*	327	*20*
SGS-Thomson (F/I)	N/A		1436	*13*	1441	*12*	1301	*13*	1087	*12*	859	*13*
Sanyo (J)	N/A		1362	*14*	1196	*15*	1365	*12*	1083	*14*	851	*14*
Sharp (J)	N/A		1318	*15*	1194	*16*	1230	*15*	1036	*15*	590	*18*
Siemens (G)	N/A		1263	*16*	1204	*14*	1194	*16*	784	*20*	657	*16*
AMD (US)	N/A		1226	*17*	1053	*17*	1100	*18*	1084	*13*	986	*12*
Sony (J)	N/A		1196	*18*	1010	*18*	1077	*19*	950	*16*	574	*19*
Oki (J)	N/A		981	*19*	954	*19*	1154	*17*	947	*17*	651	*17*
Rohm (J)	N/A		934	*20*	[759	*21*]	N/A		N/A		N/A	
AT&T (US)	N/A		N/A		N/A		873	*20*	859	*19*	802	*15*

Appendix 5.4

Year/Rank	1992	1991	1990	1989	1988	1987
Cum. T10	35321	32744	29812	31595	29110	21465
Cum. T20	N/A	45535	41591a	43767	39495	29219
Others	30266	14101*E*	N/A	13446	11364	N/A
Total World	65587	59636*E*	N/A	57213	50859	N/A

Sources: 1992 data: Dataquest in Kehoe, 9 February 1993:13; 1991 and 1990 data: Dataquest in Nakamoto, 2 September 1992:15; 1989 data: Dataquest in CEC SEC(91) 565 final:36 and Electronics*, August 1990; 1988 data: Dataquest in* Electronics*, August 1990; 1987 data: Flamm, 1990:264.*

Notes:
[ ] Not in Top 20
a Top 20 = Revenues of the Top 19 firms + Rohm
E Estimate based on reverse calculation, through calculating the sum of each Top 10 player's ((sales/market share) x 100), and dividing this by 10

Appendix 5.4

Top 20 Semiconductor Suppliers to the European Market by Revenues in $ Millions, 1987-1992

Year/Rank	1992	R	1991	R	1990	R	1989	R	1988	R	1987	R
Philips (NL)	N/A		1172	*1*	1330.5	*1*	963.4	*1*	1002	*1*	969	*1*
Siemens (G)	N/A		958	*2*	1110.6	*2*	935.9	*2*	571	*5*	446	*5*
SGSThomson (F/I)	N/A		887	*3*	1046.1	*3*	749.8	*3*	650	*2*	535	*2*
Motorola (US)	N/A		770	*4*	881.3	*4*	657.3	*4*	616	*4*	501	*4*
Texas Inst.(US)	N/A		760	*6*	733.8	*5*	647.4	*5*	636	*3*	525	*3*
Intel (US)	N/A		629	*5*	716.5	*6*	529.6	*6*	485	*6*	295	*7*
Toshiba (J)	N/A		509	*7*	564.4	*7*	422.8	*8*	349	*9*	164	*13*
NEC (J)	N/A		452	*8*	480.4	*8*	428.3	*7*	370	*8*	258	*8*
Nat.Semic.(US)	N/A		408	*9*	470.0	*9*	381.0	*9*	390	*7*	382	*6*
Hitachi (J)	N/A		318	*10*	314.5	*11*	290.7	*10*	N/A		181	*12*
AMD (US)	N/A		307	*11*	314.5	*10*	286.3	*11*	279	*10*	246	*9*
Samsung (SK)	N/A		263	*12*	218.9	*15*	200.4	*14*	N/A		N/A	
ITT (US)	N/A		240	*13*	267.2	*12*	250.0	*12*	N/A		243	*10*
GEC Plessey (UK)	N/A		221	*14*	250.0	*13*	N/A*a*		N/A*a*		N/A*a*	
Telefunken (G)	N/A		220	*15*	245.4	*14*	214.7	*13*	N/A		194	*11*
Mitsubishi (J)	N/A		179	*16*	155.5	*18*	200.4	*15*	N/A		N/A	
Harris (US)	N/A		150	*17*	191.2	*17*	145.3	*17*	N/A		N/A	
Fujitsu (J)	N/A		147	*18*	200.5	*16*	198.2	*16*	N/A		77	*17*
Analog Dev.(US)	N/A		136	*19*	118.7	*19*	[94.7	*21*]	N/A		77	*16*
Oki (J)	N/A		104	*20*	N/A		N/A		N/A		N/A	
LSI Logic (US)	N/A		N/A		97.9	*20*	[72.7	*23*]	N/A		N/A	
GE Solid (US)	N/A		N/A		N/A		N/A		N/A		122	*14*
Plessey (UK)	N/A		N/A*a*		N/A*a*		N/A		N/A		92	*15*
ABB (CH)	N/A		N/A		N/A		N/A		N/A		72	*18*
Ferranti (UK)	N/A		N/A		N/A		N/A		N/A		65*a*	*19*
HP (US)	N/A		N/A		N/A		N/A		N/A		51	*20*

Appendix 5.4

Year/Rank	1992	1991	1990	1989	1988	1987
US (%)	N/A	37.4	40.7	36.9	42.0	49.8
Japan (%)	N/A	18.6	13.7	19.0	14.2	5.7
Europe (%)	N/A	44.0	45.6	44.1	43.9	44.3
Cum. T10 in $mn	N/A	6863.0	7648.1	6006.2	5069.0	4400.0
US (%)	N/A	38.5	39.1	40.0*b*	N/A	44.4
Japan (%)	N/A	19.4	17.7	20.1*b*	N/A	12.4
Europe (%)	N/A	39.2	41.0	37.3*b*	N/A	43.2
Other (%)	N/A	3.0	2.3	2.6*b*	N/A	0.0
Cum. T20 in $mn	N/A	8830.0	9707.9	7668.9*b*	N/A	5495.0
EUR Market in $mn	N/A	11370.0	12284*E*	8808.6	N/A	N/A

Sources: 1991 Data: Dataquest in Nakamoto, 28 May 1992:6 and Nakamoto, 13 January 1992; 1990 Data: EC Panorama, 1992:12-5/6; Data 1989: EC Panorama, 1991:12-11; Data 1988: The Economist, 18 February 1989:74; Data 1987: Dataquest in Dodsworth, 13 December 1988.

Notes:
- ● Statistics denoted in ECUs have been converted into dollars on the basis of Annex.01
- [ ] Not in Top 20
- *a* In 1987, Ferranti was taken over by Plessey which, in its turn, was acquired by Siemens and GEC.
- *b* Top 20 = Revenues of the Top 17 firms plus AD and LSI Logic
- *E* Estimate based on reverse calculation, through calculating the sum of each Top 10 player's ((sales/market share) x 100), and dividing this by 10

Appendix 5.5

WORLD MEMORY AND MICROPROCESSOR PRODUCTION BY REGION, 1990

Share in World Production (in %), 1990

	USA	JAP	EUR	OTH
DRAMs	17.2%	64.5%	4.2%	14.0%
EPROMs	41.0%	49.5%	7.0%	3.5% *(a)*
MICROPROCESSORS	74.3%	9.2%	2.3%	14.2% *(a)*

Sources: Data DRAMs: Dataquest in Butler and Kehoe, 14 July 1992:17; Data EPROMs and Microprocessors: Dataquest in Tyson (1992:125,127).

Note:
(a) This category may include smaller American, Japanese and European as well as South East Asian suppliers

Appendix 5.6

WORLD COMPUTER PRODUCTION, CONSUMPTION AND US DOMINANCE IN SUPPLYING MARKETS, 1950s-1960s

World Computer Production by Region of Origin in $ mn, 1958-1964

Year	USA	JAP	EUR	.	UK	GER	FRA
1958	324	-	52	.	15	27	10
1961	546	13	193	.	74	48	71
1964	977	71	332	.	124	102	106

Source: Freeman, Harlow and Fuller (1965:43-44).

Note: EUR = UK + G + F

World Computer Consumption: Computer Use per Million People by Region, 1950-1970

Year	USA	JAP	EUR	.	UK	GER	FRA
1950	0.01	0.0	0.02	.	0.05	0.0	0.0
1955	1.5	0.0	0.2	.	0.3	0.1	0.1
1960	29.9	0.9	4.4	.	4.1	5.4	3.6
1965	127.1	19.0	33.3	.	29.2	39.2	30.9
1970	361.2	77.4	112.4	.	113.1	115.4	108.1

Sources: Flamm (1988:135); Statistical Abstracts of France, the UK, Germany, Japan and the US.

Note: EUR = UK + G + F

US Dominance in Supplying World Computer Markets: Percentage of Demand Supplied by US Firms, 1961-1971

Year	USA	JAP	EUR	.	UK	GER	FRA
1961	100	56	45	.	17	70	49
1966	100	35	58	.	51	72	51
1971	100	32	59	.	50	78	50

Source: Flamm (1988:135).

Notes:
- EUR = UK + G + F
- USA 1971 Data = Estimate. Percentage was probably less than 100

Appendix 5.7

WORLD COMPUTER PRODUCTION, CONSUMPTION AND TRADE, 1975-1993

World Computer Production by Region of Origin in % and $ mn, 1975-1993

Year	USA/CAN	JAP/SEASIA	EUR	WORLD
1975	N/A	N/A	N/A	N/A
	89.5	6.5	4.0	100.0
1984	105571.3	12084.7	14427.3	132083.3
	79.9	9.2	10.9	100.0
1985	115566.5	18517.2	16747.0	180830.7
	76.6	12.3	11.1	100.0
1986	123600.3	30580.7	22704.7	176885.7
	69.9	17.3	12.8	100.0
1987	132986.3	39906.0	35989.6	208881.9
	63.7	19.1	17.2	100.0
1988	149120.7	53907.4	40094.3	243122.4
	61.3	22.2	16.5	100.0
1989	158980.9	58740.2	38052.2	255773.3
	62.2	23.0	14.9	100.0
1990	174968.1	64139.5	39404.0	278511.6
	62.8	23.0	14.2	100.0
1991	180357.2	77530.3	31302.2	289921.6
	62.2	26.7	10.8	100.0
1992	199795.8	83609.3	34588.2	317993.3
	62.8	26.3	10.9	100.0
1993	213781.4	93618.2	30598.3	337997.9
	63.3	27.7	9.1	100.0

Sources: Data 1975: Malerba, Torissi and von Tunzelman (1991:107-108); Data 1984-1992: Datamation, 1 June 1985:50,52; 15 June 1986:56-59; 15 June 1987:42-45; 15 June 1988:29; 15 June 1989:11; 15 June 1990:202-203; 15 June 1991:11; 15 June 1992:13; 15 June 1993:13; 15 June 1994:46.

Notes:
- Data 1975: North American Data = 100% - (SE Asian% + EUR%)
- Data 1984+: World Computer Production = IT Revenues Top 100 IT Firms
- Statistics incorporate data on computer hardware, software, services and datacommunications
- ICL has been incorporated into the European share, also after its takeover by Fujitsu. If ICL is included into the Japanese share, the latter would increase to 24.1 per cent in 1990, 27.9 per cent in 1991, 27.7 per cent in 1992 and 28.9 per cent in 1993, while the European share would decline to 13.1 per cent in 1990, 9.7 per cent in 1991, 9.5 per cent in 1992 and 7.9 per cent in 1993

Appendix 5.7

World Computer Consumption by Region in %, 1989-1992

Year	USA	JAP	EUR	RoW	WORLD
1989	39.0	26.0	32.0	3.0	255.8 $bn
1992	35.3	17.4	36.5	10.8	351.4 ECUbn

Source: 1989: Datamation, 15 June 1990:27; 1992: IDC in EITO (1993:210).

Notes:
- 1989 World Computer Consumption = IT Sales Top 100 IT Firms
- Statistics incorporate data on computer hardware, software, services and datacommunications

Appendix 5.7

The EC Computer Industry: Trade, Import Penetration, Export Orientation, and Value Added (at current prices) in Ecu mn, 1980-1992.

Trade	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Extra EC													
EC EXP	2809	3277	3669	4612	6525	8316	7753	7752	8211	9327	9190	9907*E*	10502*E*
EC IMP	4537	5803	7133	9113	12875	14448	13663	15229	18966	21444	21695	23772*E*	26200
EC BAL	-1728	-2526	-3464	-4501	-6349	-6133	-5910	-7477	-10755	-12117	-12505	-13865*E*	-15698
EC													
CONS	15467	17272	23432	28592	36464	42514	42068	43817	53364	57636	59370	62377	67761*E*
PROD	13739	14746	19968	24091	30115	36381	36158	36340	42609	45519	46865	48512	52083*E*
Extra EC													
M/C (%)	29.3	33.6	30.4	31.9	35.3	34.0	32.5	34.8	35.5	37.2	36.5	38.1*E*	N/A
X/P (%)	20.4	22.2	18.4	19.1	21.7	22.9	21.4	21.3	19.3	20.5	19.6	20.4*E*	20.2%
VA	6582	7249	9763	10719	13203	15265	15619	16148	18145	19410	20668	19285	N/A

Sources: Data 1980-1981: EC Panorama, 1991:12-28/36; Data VA: EC Panorama 1992:12-13; Data 1982-1992: EC Panorama 1993:10-14.

Notes:

- EXP = Exports • IMP = Imports • BAL = Trade Balance • CONS = Consumption • PROD = Production • M/C = Import/Consumption = Import Penetration • X/P = Export/Production = Export Orientation • VA = Value Added
- Statistics incorporate data on computer and office equipment

Appendix 5.8

MARKET SHARES OF THE LEADING 15 FIRMS BY PRODUCT SEGMENT AND REGION OF ORIGIN, 1985-1992

Mainframes, in % of Datamation Top 100 Revenues

	1992	1991	1990	1989	1988	1987	1986	1985
Top 15								
USA	44.5	44.1	N/A	N/A	53.5	57.1	68.0	78.4
J/SEA	45.5	44.2	N/A	N/A	36.7	32.2	22.4	14.5
EC	9.1	9.6	N/A	N/A	8.3	8.4	7.7	5.2
Non-Top 15	0.9	2.1	N/A	N/A	1.5	2.2	1.9	1.9

Minicomputers, in % of Datamation Top 100 Revenues

	1992	1991	1990	1989	1988	1987	1986	1985
Top 15								
USA	53.1	54.7	N/A	N/A	57.6	55.0	50.7	63.0
J/SEA	30.8	30.6	N/A	N/A	13.3	12.7	10.9	2.6
EC	11.9	8.0	N/A	N/A	6.5	5.4	9.2	6.7
Non-Top 15	4.2	6.7	N/A	N/A	22.6	26.9	29.2	27.7

Microcomputers, in % of Datamation Top 100 Revenues

	1992		1991		1990	1989	1988	1987	1986	1985
Top 15	PC	WS	PC	WS						
USA	51.9	66.5	50.7	61.2	N/A	N/A	62.6	63.8	64.1	74.6
J/SEA	21.2	25.7	21.3	26.7	N/A	N/A	12.4	11.2	10.3	4.0
EC	6.7	-	5.6	1.6	N/A	N/A	7.9	7.3	6.6	7.3
Non-Top 15	20.2	7.8	22.4	10.5	N/A	N/A	17.1	17.7	19.0	14.1

Sources: Datamation, 15 June 1993:22; 15 June 1992:26; 15 June 1990: 184,185,187,189; 15 June 1989:150,152,154; 15 June 1988: 156,157,160; 15 June 1987:30,31; 15 June 1986:44,45.

Notes: PC Personal Computer, WS Workstation

Appendix 5.9

WORLD TOP 20 COMPUTER SUPPLIERS, TOP 10 COMPUTER SUPPLIERS TO THE EUROPEAN MARKET AND TOP 10 EUROPEAN-GROWN COMPUTER PRODUCERS, 1987-1993

World Top 20 Computer Suppliers by Dataprocessing Revenues in $ Millions, 1987-1993

Year/Rank	1993	R	1992	R	1991	R	1990	R	1989	R	1988	R	1987	R
IBM(US)	62716.0	1	64520.0	1	62840.0	1	67090.0	1	60805.0	1	55002.8	1	50485.7	1
Fujitsu (J)	21871.9	2	20142.2	2	19330.9	2	12361.5	3	11378.9	4	10999.1	3	8740.0	4
NEC (J)	16674.8	3	15395.0	3	15317.6	3	12350.3	4	11480.4	3	10475.7	4	8230.5	5
HP (US)	15600.0	4	12688.0	5	10726.0	5	9300.0	7	7800.0	7	6300.0	7	5000.0	9
DEC (US)	13637.0	5	14162.0	4	14237.8	4	13072.3	2	12936.7	2	12284.7	2	10391.3	2
Hitachi (J)	12629.1	6	11450.0	6	10310.2	6	9590.9	5	8719.0	6	8247.6	6	6273.7	6
AT&T (US)	9860.0	7	10450.0	7	8169.0	7	2900.0	18	2865.0	17	[2445.0	21]	[2000.0	23]
Toshiba (J)	8819.7	8	7448.7	10	5115.9	13	4764.5	13	4595.1	13	4226.6	13	3441.3	11
EDS (US)	8507.3	9	4870.0	15	3666.1	16	2870.0	19	[2477.9	23]	[1907.6	27]	[1440.5	31]
Apple (US)	7900.0	10	7173.7	11	6496.0	10	5740.0	11	5372.3	11	4434.1	12	3041.2	13
Siemens (G)	7225.5	11	8345.1	8a	7308.6	9a	7735.1	8a	6010.6	9	5951.0	8	5703.0	7
Unisys (US)	7200.5	12	7832.0	9	8000.0	8	9302.0	6	9390.0	5	9100.0	5	8742.0	3
Compaq (US)	7200.0	13	4100.0	18	3271.4	19	3598.0	16	2876.1	16	[2065.6	24]	[1224.1	37]
Olivetti(I)	5070.2	14	5762.0	12	6050.8	11	6414.5	9	5573.3	10	5427.9	9	4637.2	10
Matsush.(J)	5050.7	15	5060.8	14	5068.8	14	3731.0	15	3663.7	15	3441.0	14	2628.5	17
Canon (J)	5033.0	16	4633.6	16	3751.5	15	4669.2	14	3783.3	14	3391.6	15	1673.4	27
Bull (F)	5000.0	17	5715.1	13	5929.8	12	6349.6	10	6465.4	8	5296.7	11	3007.5	14
Sun (US)	4493.0	18	3832.0	19	3454.7	17	[2762.8	22]	[2062.5	27]	[1461.6	37]	[755.9	56]
Microst.(US)	4110.0	19	3253.0	20	[2275.9	24]	[1480.0	42]	[952.8	50]	[718.6	66]	[456.7	78]
ICL (J/UK)	3915.7	20	4354.8	17	3308.1	18	2862.9	20	[2643.4	22]b	[2425.1	22]b	2123.9	20b
NCR (US)	N/Ad		N/Ad		N/Ad		5617.0	12	5319.0	12	5324.0	10	5075.7	8

Annex 5.9

Year/Rank	1993	R	1992	R	1991	R	1990	R	1989	R	1988	R	1987	R
Philips (NL)	N/A*c*		N/A*c*		N/A*c*		3283.9	*17*	2814.8	*18*	2794.6	*19*	2601.6	*18*
Nixdorf (G)	N/A*a*		N/A*a*		N/A*a*		N/A*a*		2792.6	*19*	3044.9	*18*	2821.5	*16*
Control Data (US)	N/A		[517.0	*97*]	[1172.6	*46*]	[1121.9	*50*]	[1691.0	*35*]	3524.3	*16*	3000.9	*15*
Wang (US)	904.2	*65*	[1490.0	*42*]	[1940.0	*31*]	[2363.0	*24*]	[2697.0	*21*]	3074.4	*17*	3045.7	*12*
Xerox (US)	3330.0	*22*	[3016.0	*23*]	2930.0	*20*	[2800.0	*21*]	2790.0	*20*	2650.0	*20*	2415.0	*19*
Cum. T10	178215.8		172433.0		162736.1		153566.2		140559.3		129112.8		113279.1	
Cum. T20	232514.4		221188.0		205283.2		193602.7		177431.2		164991.0		141406.2	
Cum. T100	337997.9		317993.3		289921.6		278511.6		255773.3		243122.4		208881.9	

Sources: 1993 data: Datamation, 15 June 1994:45; 1992 data: Datamation, 15 June 1993:13; 1991 data: Datamation, 15 June 1992:13; 1990 data: Datamation, 15 June, 1991:11; 1989 data: Datamation, 15 June, 1990:32; 1988 data: Datamation, 15 June, 1989:11; 1987 data: Datamation, 15 June, 1988:29.

Notes:

- ● Statistics incorporate data on computer hardware, software, services and datacommunications
- a Data for the period 1990-1992 refer to Siemens/Nixdorf (SNI). Nixdorf was taken over by Siemens in 1990
- b Data for the period 1987-1989 refer to STC and include ICL's revenues. STC sold a majority stake of ICL to Fujitsu in 1990
- c Philips and Mannesmann sold their computer divisions to Digital (US), while Nokia Data was taken over by ICL. Nokia Data was formed in 1988, when Nokia took over Ericsson's data systems business
- d AT&T acquired NCR in 1991
- [ ] Not in Top 20

Appendix 5.9

Top 20 Computer Suppliers to the European Market by European Dataprocessing Revenues in $ Millions, 1987-1993

Year/Rank	1993	1992	1991	R	%TR	1990	R	%TR	1989	R	%TR	R88	1987	R	%TR
IBM (US)	N/A	N/A	25136.0	*1*	40	26836.0	*1*	40	21281.8	*1*	35	*1*	18332.5	*1*	36
Siemens (G)	N/A	N/A	6943.2	*2*	95	6961.0	*2*	90	5409.6	*2*	90	*2*	4961.6	*2*	87
DEC (US)	N/A	N/A	6549.4	*3*	46	6490.4	*3*	42	4915.9	*3*	38	*3*	3533.0	*4*	34
Olivetti (I)	N/A	N/A	5082.6	*4*	84	5324.1	*4*	83	4514.4	*4*	81	*4*	3802.5	*3*	82
Bull (F)	N/A	N/A	4269.5	*5*	72	4508.2	*5*	71	4073.2	*5*	63	*5*	2345.8	*6*	78
HP (US)	N/A	N/A	3968.6	*6*	37	3534.0	*6*	38	2886.0	*6*	37	*8*	1800.0	*9*	36
Fujitsu (J)	N/A	N/A	2899.6	*7*	15	[1483.4	N/A]		N/A			N/A	N/A		
ICL (J/UK)	N/A	N/A	2845.0	*8*	86	2290.3	*9*	80	2167.6*b*	*9*	82	*10*	1720.4*b*	*10*	81
Unisys (US)	N/A	N/A	2400.0	*9*	30	2883.6	*7*	31	2723.1	*7*	29	*7*	2272.9	*7*	26
Apple (US)	N/A	N/A	1883.8	*10*	29	1607.2	*12*	28	1235.6	*13*	23	*17*	[547.4	*21*]	18
Compaq (US)	N/A	N/A	1635.7	*11*	50	1691.1	*11*	47	1179.2	*15*	41	*25*	N/A		
AT&T (US)	N/A	N/A	1470.4	*12*	18	N/A			N/A			N/A	N/A		
Canon (J)	N/A	N/A	1087.9	*13*	29	1354.1	*14*	29	945.8	*16*	25	*16*	N/A		
Sun (US)	N/A	N/A	1036.4	*14*	30	828.9	*19*	30	N/A			N/A	N/A		
Finsiel (I)	N/A	N/A	1015.6	*15*	100	861.2	*18*	100	[636.0	*23*]	96	N/A	N/A		
Xerox (US)	N/A	N/A	966.9	*16*	33	980.0	*17*	35	892.8	*18*	32	N/A	N/A		
Commodore (US)	N/A	N/A	903.5	*17*	87	[746.8	*23*]	75	[597.9	*25*]	69	N/A	N/A		
Andersen (US)	N/A	N/A	881.4	*18*	39	N/A			N/A			N/A	N/A		
Wang (US)	N/A	N/A	698.4	*19*	36	[756.2	*22*]	32	836.1	*19*	31	*19*	822.3	*19*	27
Prime (US)	N/A	N/A	691.2	*20*	50	N/A			N/A			N/A	N/A		
Philips (NL)	N/A	N/A	N/A*c*			2495.8	*8*	76	2054.8	*10*	73	*9*	2055.2	*8*	79
NCR (US)	N/A	N/A	N/A*d*			1966.0	*10*	35	1702.1	*11*	32	*11*	1583.6	*11*	31
CGS (F)	N/A	N/A	N/A			1465.9	*13*	87	893.8	*17*	81	*21*	[545.8	*22*]	80
Alcatel (F)	N/A	N/A	N/A			1341.9	*15*	71	1476.2	*12*	82	*12*	1272.3	*13*	62
Nokia (FIN)	N/A	N/A	N/A*c*			1279.9	*16*	100	1180.0	*14*	99	*14*	N/A*c*		

Appendix 5.9

Year/Rank	1993	1992	1991	R	%TR	1990	R	%TR	1989	R	%TR	R88	1987	R	%TR
Memorex (NL)	N/A	N/A	N/A			831.7	*20*	42	[678.7	*22*]	33	N/A	832.9	*18*	80
Nixdorf (G)	N/A	N/A	N/A*a*			N/A*a*			2597.1	*8*	93	*6*	2652.2	*5*	94
Mannesmann (G)	N/A	N/A	N/A			N/A			753.6	*20*	92	N/A	617.0	*20*	90
Ericsson (Sw)	N/A	N/A	N/A*c*			N/A*c*			N/A*c*			N/A	1284.9	*12*	85
Inspector.(CH)	N/A	N/A	N/A			N/A			N/A			N/A	1033.0	*14*	84
SG (F)	N/A	N/A	N/A			N/A			N/A			N/A	970.1	*15*	100
Atlantic (UK)	N/A	N/A	N/A			N/A			N/A			N/A	892.7	*16*	93
Honeywell (US)	N/A	N/A	N/A			N/A			N/A			N/A	885.4	*17*	43
US (%)	N/A	N/A	64.4			65.4			60.4			N/A	59.7		
Japan (%)	N/A	N/A	4.7			0.0			0.0			N/A	0.0		
Europe (%)	N/A	N/A	30.9*b*			34.6*b*			39.6			N/A	40.3		
Cum. T10 in $mn			61977.7			62289.4			52623.5			N/A	43476.1		
US (%)	N/A	N/A	66.6			61.5			59.1			N/A	54.5		
Japan (%)	N/A	N/A	5.5			1.8			1.5			N/A	0.0		
Europe (%)	N/A	N/A	27.9			36.7			39.4			N/A	45.5		
Cum. T20 in $mn			72365.1			74513.3			63718.7			N/A	53670.3		

Sources: 1991 Data: Datamation, 1 July 1992:63; 1990 Data: Datamation, 15 June, 1991:11; 1989 and 1988 Rank (data not available): Datamation, 1 July 1990:112-2/3; 1987 Data: Datamation, 1 August 1988:48-2/3.

Notes: see below

Appendix 5.9

Notes:

●	Statistics incorporate data on computer hardware, software, services and datacommunications
a	Data for the period 1990-1992 refer to Siemens/Nixdorf (SNI). Nixdorf was taken over by Siemens in 1990
b	Data for the period 1987-1989 refer to STC and include ICL's revenues. The European share in the cumulative T10 and T20 includes ICL
c	Philips and Mannesmann sold their computer divisions to Digital (US), while Nokia Data was taken over by ICL. Nokia Data was formed in 1988, when Nokia took over Ericsson's data systems business
d	NCR was taken over by AT&T in 1991. AT&T subsequently became the 12th largest supplier to the European computer market
[ ]	Not in Top 10
R88	Rank in 1988
%TR	European computer revenues as % of total dataprocessing revenues

Appendix 5.10

WORLD HARDWARE MARKETS BY SEGMENT, 1987-1992

Share in Cumulative Revenues of Datamation Top 100 Firms, in (%)

	1992	1991	1990	1989	1988	1987
Hardware						
Processing	63.1	63.9	61.6	62.1	59.0	57.6
Peripheral	36.9	36.1	38.4	37.9	41.0	42.4
Total HW (in $ bn)	174.9	167.9	161.8	148.6	142.2	123.0
Processing Hardware						
Mainframes	25.9	25.7	26.8	30.5	33.3	37.2
Minis	19.9	20.5	21.5	22.4	27.0	31.6
PCs	41.2	41.1	41.1	39.3	35.7	31.3
Workstations	13.0	12.7	10.6	7.8	4.1	
Total PHW (in $ bn)	110.4	107.3	99.7	92.3	83.9	70.8

Sources: Datamation, 15 June 1993:23; 15 June 1992:27.

Notes:
HW Hardware
PHW Processing Hardware

Appendix 5.11

TOP 10 OF EUROPEAN-GROWN COMPUTER PRODUCERS AND HARDWARE PRODUCERS BY PRODUCT CATEGORY AND THE SUPPLY STRUCTURE OF THE EUROPEAN-GROWN COMPUTER MNEs, 1987-1993

Top 10 of European-Grown Computer Producers and Smaller European-Grown Computer Producers by Product Category, in $ Millions and %, 1987-1993

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Siemens (G)													
1993	1	7225.5	N/A			N/A		N/A		N/A		N/A	
1992	1	8345.1	4849.4	*58.1*	1	1058.4	*12.7*	2245.0	*26.9*	192.4	*2.3*	-	
1991	1	7308.6	4445.5	*60.8*	1	964.4	*13.2*	1748.0	*23.9*	150.7	*2.1*	-	
1990	1	7735.1	4753.0	*61.5*	1	925.9	*12.0*	1932.7	*25.0*	123.5	*1.6*	-	
1989	1	6010.6	N/A			N/A		N/A		N/A		N/A	
1988	1	5951.0	2847.4	*47.9*	3	626.4	*10.5*	1138.9	*19.1*	1338.3	*22.5*	-	
1987	1	5703.0	2748.6	*48.2*	1	550.8	*9.7*	1001.5	*17.6*	1402.1	*24.6*	-	
Olivetti (I)													
1993	2	5070.2	N/A			N/A		N/A		N/A		N/A	
1992	2	5762.0	2824.7	*49.0*	2	707.8	*12.3*	1135.9	*19.7*	128.7	*2.2*	964.9	*16.8*
1991	2	6050.8	3198.9	*52.9*	2	630.8	*10.4*	1094.5	*18.1*	164.1	*2.7*	962.5	*15.9*
1990	2	6414.5	3553.9	*55.4*	3	621.3	*9.7*	1106.6	*17.3*	221.4	*3.5*	911.4	*14.2*
1989	3	5073.3	N/A			N/A		N/A		N/A		N/A	
1988	2	5427.9	3160.7	*58.2*	1	414.4	*7.6*	926.6	*17.1*	232.9	*4.3*	690.3	*12.7*
1987	2	4637.2	2731.2	*58.9*	2	347.9	*7.5*	776.5	*16.8*	164.3	*3.5*	617.3	*13.3*
Bull (F)													
1993	3	5000.0	N/A			N/A		N/A		N/A		N/A	
1992	3	5715.1	2800.4	*49.0*	3	571.5	*10.0*	1886.0	*33.0*	-		457.2	*8.0*

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Bull (F) *Continued*													
1991	3	5929.8	2942.7	*49.6*	3	593.0	*10.0*	1779.0	*30.0*	-		415.1	*7.0*
1990	3	6349.6	3619.2	*57.0*	2	635.0	*10.0*	1650.9	*26.0*	-		444.5	*7.0*
1989	1	6465.4	N/A			N/A		N/A		N/A		N/A	
1988	3	5296.7	3021.0	*57.0*	2	583.0	*11.0*	1692.7	*32.0*	-			
1987	3	3007.5	2521.3	*83.8*	3	193.3	*6.4*	292.9	*9.7*	-		-	
ICL (J/UK)													
1993	4	3915.7	N/A			N/A		N/A		N/A		N/A	
1992	4	4354.8	1981.1	*45.5*	4	692.4	*15.9*	1317.4	*30.3*	-		381.9	*8.8*
1991	4	3308.1	1339.2	*40.5*	4	625.6	*18.9*	966.1	*29.2*	-		377.2	*11.4*
1990	5	2862.9	1266.1	*44.2*	6	492.0	*17.2*	967.0	*33.8*	76.0	*2.7*	61.8	*2.2*
1989	6	2643.4	N/A			N/A		N/A		N/A		N/A	
1988	6	2425.1	1870.9	*77.2*	5	232.2	*9.6*	226.8	*9.4*	95.2	*3.9*	-	
1987	6	2123.9	1645.5	*77.5*	5	207.0	*9.8*	192.1	*9.0*	79.3	*3.7*	-	
Gap Gemini (F)													
1993	5	1946.9	N/A			N/A		N/A		N/A		N/A	
1992	5	2252.9	-			360.5	*16.0*	1892.5	*84.0*	-		-	
1991	5	1776.3	-			284.2	*16.0*	1492.1	*84.0*	-		-	
1990	8	1684.9	-			33.7	*2.0*	1465.9	*87.0*	-		33.7	*2.0*
1989	10	1103.4	N/A			N/A		N/A		N/A		N/A	
1988	12	976.5	N/A			N/A		N/A		N/A		N/A	
1987	14	682.3	N/A			N/A		N/A		N/A		N/A	
Memorex (NL)													
1993	6	1070.9	N/A			N/A		N/A		N/A		N/A	
1992	6	1408.4	995.7	*70.7*	5	18.7	*1.3*	394.0	*28.0*	-		-	
1991	6	1533.1	1140.1	*74.4*	5	3.7	*0.2*	389.3	*25.4*	-		-	
1990	6	1951.2	1324.8	*67.9*	5	-		401.1	*20.6*	-		225.3	*11.6*

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Memorex (NL) *Continued*													
1989	7	2056.6	N/A			N/A		N/A		N/A		N/A	
1988	7	2078.5	1392.8	*67.0*	7	-		417.1	*20.1*	-		268.6	*12.9*
1987	10	1041.1	681.6	*65.5*	9	-		198.0	*19.0*	-		161.5	*15.5*
Finsiel (I)													
1993	7	1027.5	N/A			N/A		N/A		N/A		N/A	
1992	7	1200.0	-			633.0	*52.8*	567.0	*47.3*	-		-	
1991	7	1015.6	-			609.4	*60.0*	406.2	*40.0*	-		-	
1990	11	861.2	-			525.2	*61.0*	336.0	*39.0*	-		-	
1989	14	662.5	N/A			N/A		N/A		N/A		N/A	
1988	17	545.4	N/A			N/A		N/A		N/A		N/A	
1987	19	424.1	N/A			N/A		N/A		N/A		N/A	
BT (UK)													
1993	10	731.3	N/A			N/A		N/A		N/A		N/A	
1992	8	857.6	-			-		450.3	*52.5*	407.4	*47.5*	-	
1991	8	823.6	-			-		432.1	*52.5*	391.5	*47.5*	-	
1990	12	776.8	-			-		403.9	*52.0*	372.9	*48.0*	-	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988		N/A	N/A			N/A		N/A		N/A		N/A	
1987		N/A	N/A			N/A		N/A		N/A		N/A	
Sema Group (UK)													
1993	8	749.3	N/A			N/A		N/A		N/A		N/A	
1992	9	732.3	-			68.0	*9.3*	664.3	*90.7*	-		-	
1991	11	640.5	-			640.5	*100*	-		-		-	
1990	16	533.4	-			533.4	*100*	-		-		-	
1989	19	378.6	N/A			N/A		-		N/A		N/A	
1988	21	375.1	N/A			N/A		-		N/A		N/A	

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Sema Group (UK) *Continued*													
1987		N/A	N/A			N/A		N/A		N/A		N/A	
Comparex (G)													
1993	9	736.4	N/A			N/A		N/A		N/A		N/A	
1992	10	731.9	592.7	*81.0*	6	-		139.2	*19.0*	-		-	
1991	9	752.3	631.9	*84.0*	6	-		120.4	*16.0*	-		-	
1990	14	689.4	578.6	*83.9*	10	-		110.8	*16.1*	-		-	
1989	16	566.0	N/A			N/A		N/A		N/A		N/A	
1988	15	614.5	N/A			N/A		N/A		N/A		N/A	
1987	18	530.8	N/A			N/A		N/A		N/A		N/A	
Remaining 1991 Top 10 Computer Firms													
Racal (UK)													
1993	14	583.6	N/A			N/A		N/A		N/A		N/A	
1992	12	690.7	-			-		-		690.7	*100*	-	
1991	10	679.0	-			-		-		679.0	*100*	-	
1990	13	693.0	-			-		-		693.0	*100*	-	
1989	15	573.9	N/A			N/A		N/A		N/A		N/A	
1988	16	554.1	N/A			N/A		N/A		N/A		N/A	
1987	16	549.1	N/A			N/A		N/A		N/A		N/A	
Remaining 1990 Top 10 Computer Firms													
Philips (NL)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Philips (NL) *Continued*													
1991		N/A	N/A			N/A		N/A		N/A		N/A	
1990	4	3283.9	2075.8	*63.2*	4	104.3	*3.2*	472.3	*14.4*	510.7	*15.6*	120.8	*3.7*
1989	4	2814.8	N/A			N/A		N/A		N/A		N/A	
1988	5	2794.6	1626.2	*58.2*	6	184.6	*6.6*	417.3	*14.9*	460.3	*16.5*	106.2	*3.8*
1987	5	2601.6	1411.9	*54.3*	6	162.9	*6.3*	385.1	*14.8*	518.3	*19.9*	123.4	*4.7*
Alcatel (F)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991		N/A	N/A			N/A		N/A		N/A		N/A	
1990	7	1890.0	911.0	*48.2*	7	91.0	*4.8*	94.2	*5.0*	793.8	*42.0*	-	
1989	8	1800.3	N/A			N/A		N/A		N/A		N/A	
1988	8	1716.0	828.4	*48.3*	8	106.5	*6.2*	-		721.9	*42.1*	59.2	*3.5*
1987	7	2052.1	853.1	*41.8*	7	103.8	*5.1*	-		1037.6	*50.6*	57.6	*2.8*
Nokia (FIN)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991		N/A	N/A			N/A		N/A		N/A		N/A	
1990	9	1279.9	691.7	*54.0*	9	59.1	*4.6*	352.6	*27.6*	91.0	*7.1*	85.5	*6.7*
1989	9	1191.9	N/A			N/A		N/A		N/A		N/A	
1988	11	1165.1	721.2	*61.9*	9	59.1	*5.1*	203.0	*17.4*	58.1	*5.0*	123.1	*10.6*
1987	22	375.3	N/A			N/A		N/A		N/A		N/A	
Mannesmann (G)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991		N/A	N/A			N/A		N/A		N/A		N/A	
1990	10	893.2	759.2	*85.0*	8	-		134.0	*15.0*	-		-	

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Mannesmann (G) *Continued*													
1989	11	819.1	N/A			N/A		N/A		N/A		N/A	
1988	14	779.0	N/A			N/A		N/A		N/A		N/A	
1987	13	686.0	N/A			N/A		N/A		N/A		N/A	
Remaining 1987/88 Top 10 Computer Firms													
Nixdorf (G)													
1993		N/A	N/A			N/A		N/A		N/A			
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991		N/A	N/A			N/A		N/A		N/A		N/A	
1990		N/A	N/A			N/A		N/A		N/A		N/A	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988	4	3044.9	2100.5	*69.0*	4	418.6	*13.8*	346.9	*11.4*	178.9	*5.9*	-	
1987	4	2821.5	1945.6	*69.0*	4	405.8	*14.4*	295.3	*10.5*	174.8	*6.2*	-	
Ericsson (Sw)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991		N/A	N/A			N/A		N/A		N/A		N/A	
1990		N/A	N/A			N/A		N/A		N/A		N/A	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988		N/A	N/A			N/A		N/A		N/A		N/A	
1987	8	1511.6	755.8	*50.0*	8	-		-		529.0	*35.0*	226.8	*15.0*
Inspectorate (CH)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991		N/A	N/A			N/A		N/A		N/A		N/A	

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Inspectorate (CH)													
1990		N/A	N/A			N/A		N/A		N/A		N/A	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988	9	1230.3	44.4	*3.6*	-	N/A		N/A		N/A		1185.9	*96.4*
1987	9	1225.0	61.3	*5.0*	-	N/A		N/A		N/A		1163.7	*95.0*
Remaining European Top 10 Hardware Producers (RH)													
Getronics (NL)													
1993	11	703.8	N/A			N/A		N/A		N/A		N/A	
1992	14	584.3	240.3	*41.1*	7	25.6	*4.4*	232.9	*39.9*	85.4	*14.6*	-	
1991	14	442.5	132.7	*30.0*	10	-		274.4	*62.0*	35.4	*8.0*	-	
1990		N/A	N/A			N/A		N/A		N/A		N/A	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988		N/A	N/A			N/A		N/A		N/A		N/A	
1987		N/A	N/A			N/A		N/A		N/A		N/A	
Amstrad (UK)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992	24	214.1	214.1	*100*	8	-		-		-		-	
1991	21	313.4	289.2	*92.3*	7	13.3	*4.2*	10.9	*3.5*	-		-	
1990	17	518.7	509.8	*98.3*	11	8.9	*1.7*	-		-		-	
1989	12	717.0	N/A			N/A		N/A		N/A		N/A	
1988	13	841.8	N/A			N/A		N/A		N/A		N/A	
1987	17	533.0	N/A			N/A		N/A		N/A		N/A	
Tulip (NL)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992	25	185.6	185.6	*100*	9	-		-		-		-	

Appendix 5.11

Year	RDP	Total DP Revenue	Hardware Total	% T	RH	Software Total	% T	Services Total	% T	Datacomms Total	% T	Other Total	% T
Tulip (NL) *Continued*													
1991	25	215.5	215.5	*100*	8	-		-		-		-	
1990		N/A	N/A			N/A		N/A		N/A		N/A	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988		N/A	N/A			N/A		N/A		N/A		N/A	
1987		N/A	N/A			N/A		N/A		N/A		N/A	
Sligos (F)													
1993	12	675.2	N/A			N/A		N/A		N/A		N/A	
1992	13	689.1	82.5	*12.0*	10	68.9	*10.0*	537.7	*78.0*	-		-	
1991	12	569.3	85.4	*15.0*	NT	56.9	*10.0*	427.0	*75.0*	-		-	
1990	15	538.7	79.6	*14.8*	NT	53.1	*9.9*	406.0	*75.4*	-		-	
1989		N/A	N/A			N/A		N/A		N/A		N/A	
1988		N/A	N/A			N/A		N/A		N/A		N/A	
1987		N/A	N/A			N/A		N/A		N/A		N/A	
Norsk Data (N)													
1993		N/A	N/A			N/A		N/A		N/A		N/A	
1992		N/A	N/A			N/A		N/A		N/A		N/A	
1991	24	282.0	154.5	*54.8*	9	22.7	*8.0*	104.8	*37.2*	-		-	
1990	20	383.5	212.0	*55.3*	12	31.2	*8.1*	140.3	*36.6*	-		-	
1989	20	358.1	N/A			N/A		N/A		N/A		N/A	
1988	18	450.2	N/A			N/A		N/A		N/A		N/A	
1987	20	422.6	N/A			N/A		N/A		N/A		N/A	

Sources: 1987 Data: Datamation, 15 June 1988; 1988 Data: 1 July 1989; 1990 Data: Datamation, 1 July 1991:64; 1991 Data: Datamation, 1 July 1992:62; 1992 Data: Datamation, 1 July 1993; 1993 Data: 15 June 1994:46.

Notes: see below

Appendix 5.11

Top 10 of European-Grown Hardware Producers, in $ Millions and %, 1987-1993

Year	RH	HW Total	Peripherals Total	Peripherals % HW	Processing Total	Processing % HW	Mainframes Total	Mainframes % HW	Minis Total	Minis % HW	PCs Total	PCs % HW	Workstations Total	Workstations % HW
Siemens (G)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	1	4849.4	1770.4	36.5	3079.0	63.5	962.2	19.8	1026.3	21.2	705.6	14.6	384.9	7.9
1991	1	4445.5	1773.0	39.9	2712.5	61.0	964.4	21.7	934.3	21.0	602.8	13.6	211.0	4.8
1990	1	4753.0	1994.4	40.9	2808.6	59.1	1018.5	21.4	925.9	19.5	709.9	14.9	154.3	3.3
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	3	2847.4	1566.1	55.0	1281.3	45.0	683.4	24.0	284.7	10.0	313.2	11.0	-	
1987	1	2748.6	1502.3	54.7	1246.3	45.3	695.5	25.3	311.6	11.3	239.2	8.7	-	
Olivetti (I)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	2	2824.7	895.3	31.7	1929.4	68.3	104.5	3.7	476.2	16.9	1348.7	47.8	-	
1991	2	3198.9	1018.6	31.8	2180.3	68.2	115.6	3.6	478.6	15.0	1586.1	49.6	-	
1990	3	3553.9	1113.8	31.3	2440.1	68.7	121.8	3.4	526.6	14.8	1791.7	50.4	-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	1	3160.7	999.7	31.6	2161.0	68.4	119.2	3.8	614.3	19.4	1427.5	45.2	-	
1987	2	2731.2	855.5	31.3	1875.7	68.7	95.8	3.5	603.9	22.1	1176.0	43.1	-	
Bull (F)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	3	2800.4	914.4	32.7	1886.0	67.4	857.3	30.7	342.9	12.3	685.8	24.5	-	
1991	3	2942.7	1067.4	36.3	1875.3	63.7	630.2	21.4	355.6	12.1	889.5	30.2	-	
1990	2	3619.2	1333.4	36.8	2285.8	63.2	825.4	22.8	317.5	8.8	1142.9	31.6	-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	2	3021.0	1325.0	43.9	1696.0	56.1	901.0	29.8	477.0	15.8	318.0	10.5	-	
1987	3	2521.3	1172.1	46.5	1349.2	53.5	962.6	38.2	193.3	7.7	193.3	7.7	-	

Appendix 5.11

Year	RH	HW Total	Peripherals Total	% HW	Processing Total	% HW	Mainframes Total	% HW	Minis Total	% HW	PCs Total	% HW	Workstations Total	% HW
ICL (J/UK)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	4	1981.1	-		1981.1	*100*	531.2	*26.8*	713.5	*36.0*	736.4	*37.2*	-	
1991	4	1339.2	-		1339.2	*100*	582.0	*43.5*	268.8	*20.1*	297.4	*22.2*	191.0	*14.3*
1990	6	1266.1	260.8	*20.6*	1005.3	*79.4*	392.0	*31.0*	351.3	*27.8*	159.0	*12.6*	103.0	*8.1*
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	5	1870.9	813.7	*43.5*	1057.2	*56.5*	658.4	*35.2*	398.8	*21.3*	-		-	
1987	5	1645.5	715.0	*43.5*	930.5	*56.6*	596.8	*36.3*	333.7	*20.3*	-			
Memorex (NL)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	5	995.7	757.3	*76.1*	238.4	*23.9*	-		-		238.4	*23.9*	-	
1991	5	1140.1	888.2	*77.9*	251.9	*22.1*	-		-		207.6	*18.2*	44.3	*3.9*
1990	5	1324.8	1111.5	*83.9*	213.3	*16.1*	-		-		213.3	*16.1*	-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	7	1392.8	1339.1	*96.1*	53.7	*3.9*	53.7	*3.9*	-		-		-	
1987	9	681.6	681.6	*100*	-		-		-		-		-	
Comparex (G)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	6	592.7	326.5	*55.1*	266.2	*44.9*	266.2	*44.9*	-		-		-	
1991	6	631.9	346.0	*54.8*	285.9	*45.2*	285.9	*45.2*	-		-		-	
1990	10	578.6	329.2	*56.9*	249.4	*43.1*	249.4	*43.1*	-		-		-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Getronics (NL)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	7	240.3	113.9	*47.4*	126.4	*52.6*	-		-		69.5	*28.9*	56.9	*23.7*

Appendix 5.11

Year	RH	HW Total	Peripherals Total	% HW	Processing Total	% HW	Mainframes Total	% HW	Minis Total	% HW	PCs Total	% HW	Workstations Total	% HW
Getronics (NL) *Continued*														
1991	10	132.7	88.5	*66.7*	44.2	*33.3*	-		-		26.6	*20.0*	17.6	*13.3*
1990		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Amstrad (UK)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	8	214.1	11.6	*5.4*	202.5	*94.6*	-		-		202.5	*94.6*	-	
1991	7	289.2	17.6	*6.1*	271.6	*93.9*	-		-		271.6	*93.9*	-	
1990	NT	509.8	10.7	*2.1*	499.1	*97.9*	-		-		499.1	*97.9*	-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Tulip (NL)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	9	185.6	-		185.6	*100*	-		-		185.6	*100*	-	
1991	8	215.5	-		215.5	*100*	-		-		215.5	*100*	-	
1990		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Sligos (F)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992	10	82.5	N/A		82.5	*100*	-		-		82.5	*100*	N/A	
1991	NT	85.4	N/A		85.4	*100*	-		-		85.4	*100*	N/A	
1990	NT	79.6	N/A		79.6	*100*	-		-		79.6	*100*	N/A	

Appendix 5.11

Year	RH	HW Total	Peripherals Total	Peripherals % HW	Processing Total	Processing % HW	Mainframes Total	Mainframes % HW	Minis Total	Minis % HW	PCs Total	PCs % HW	Workstations Total	Workstations % HW
Sligos (F) *Continued*														
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Remaining 1991, 1990 and 1987 Top 10 Hardware Producers														
Norsk Data (N)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991	9	154.5	-		154.5	*100*	-		140.3	*90.8*	14.2	*9.2*	-	
1990	NT	212.0	-		212.0	*100*	-		212.0	*100*	-		-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Philips (NL)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1990	4	2075.8	1164.2	*56.1*	911.6	*43.9*	-		335.0	*16.1*	576.6	*27.8*	-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	6	1626.2	902.9	*55.5*	723.3	*44.5*	-		414.8	*25.5*	308.5	*19.0*	-	
1987	6	1411.9	839.2	*59.4*	572.7	*40.6*	-		375.2	*26.6*	197.5	*14.0*	-	
Alcatel (F)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991		N/A	N/A		N/A		N/A		N/A		N/A		N/A	

Appendix 5.11

Year	RH	HW Total	Peripherals Total	Peripherals % HW	Processing Total	Processing % HW	Mainframes Total	Mainframes % HW	Minis Total	Minis % HW	PCs Total	PCs % HW	Workstations Total	Workstations % HW
Alcatel (F) *Continued*														
1990	7	911.0	781.0	*85.7*	130.0	*14.3*	-		-		130.0	*14.3*	-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	8	828.4	710.1	*85.7*	118.3	*14.3*	-		-		118.3	*14.3*	-	
1987	7	853.1	691.7	*81.1*	161.4	*18.9*	-		-		161.4	*18.9*	-	
Nokia (FIN)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1990	9	691.7	32.2	*4.7*	659.5	*95.3*	-		182.1	*26.3*	304.5	*44.0*	172.9	*25.0*
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988	9	721.2	298.6	*41.4*	422.6	*58.6*	19.1	*2.7*	65.7	*9.1*	337.8	*46.8*		
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Mannesmann (G)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1990	8	759.2	446.6	*58.8*	312.6	*41.2*	-		312.6	*41.2*	-		-	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
Nixdorf (G)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1990		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	

Appendix 5.11

Year	RH	HW Total	Peripherals Total	% HW	Processing Total	% HW	Mainframes Total	% HW	Minis Total	% HW	PCs Total	% HW	Workstations Total	% HW
Nixdorf (G) *Continued*														
1988	4	2100.5	1280.3	*61.0*	820.2	*39.1*	131.1	*6.2*	484.1	*23.1*	205.0	*9.8*	-	
1987	4	1945.6	1250.9	*64.3*	694.7	*35.7*	128.1	*6.6*	566.6	*29.1*	-		-	
Ericsson (Sw)														
1993		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1992		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1991		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1990		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1989		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1988		N/A	N/A		N/A		N/A		N/A		N/A		N/A	
1987	8	755.8	241.2	*31.9*	514.6	*68.1*	-		229.8	*30.4*	284.8	37.7	-	

Sources: 1987 Data: Datamation, 15 June 1988; 1988 Data: Datamation, 15 June 1989; 1990 Data: Datamation, 1 July 1991:64; 1991 Data: Datamation, 1 July 1992:62; 1992 Data: Datamation, 1 July 1993.

Notes:

RDP	Rank based on DP revenues
RH	Rank based on hardware revenues
DP	Dataprocessing, i.e. hardware (mainframes, minicomputers, PCs, workstations, peripherals), software, datacomms, and services (incl. maintenance)
HW	Hardware
NT	Not in Top 10

- Siemens: Data for the period 1990-1992 refer to SNI
- 1987-1989 data ICL = 1987-1989 data STC
- 1987-88: PC statistics may include data on workstations

Appendix 5.11

Supply Structure of the European-Grown Computer Multinationals

		SIEMENS	OLIVETTI	BULL	PHILIPS	ICL
DP/TR	87	19.9%	81.5%	100.0%	10.0%	62.9%
	90	19.8%	84.5%	100.0%	10.7%	96.5%
	92	16.6%	88.0%	100.0%	N/A	100.0%
HW/DP	87	48.2%	58.8%	83.8%	54.3%	77.5%
	90	61.5%	55.4%	57.0%	63.2%	44.2%
	92	58.1%	49.0%	49.0%	N/A	45.5%
MF/DP	87	12.2%	2.1%	32.0%	-	28.1%
	90	13.2%	1.9%	13.0%	-	13.7%
	92	11.5%	1.8%	15.0%	N/A	12.2%
MI/DP	87	5.5%	13.0%	6.4%	14.4%	15.7%
	90	12.0%	8.2%	5.0%	10.2%	12.3%
	92	12.3%	8.3%	6.0%	N/A	16.4%
PC/DP	87	4.2%	25.4%	6.4%	7.6%	-
	90	9.2%	27.9%	18.0%	17.6%	5.6%
	92	8.5%	23.4%	12.0%	N/A	16.9%
WS/DP	87	-	-	-	-	-

	90	2.0%	-	-	-	3.6%
	92	4.2%	-	-	N/A	-
PE/DP	87	26.3%	18.3%	39.0%	32.3%	33.7%
	90	25.8%	17.4%	21.0%	35.5%	9.1%
	92	21.2%	15.5%	16.0%	N/A	-
SW/DP	87	9.7%	7.5%	6.4%	6.3%	9.8%
	90	12.0%	9.7%	10.0%	3.2%	17.2%
	92	12.7%	12.3%	10.0%	N/A	15.9%
SV/DP	87	17.6%	16.8%	9.7%	14.8%	9.0%
	90	25.0%	17.3%	26.0%	14.4%	33.8%
	92	26.9%	19.7%	33.0%	N/A	30.3%
DC/DP	87	24.6%	3.5%	-	19.9%	3.7%
	90	1.6%	3.5%	-	15.6%	2.7%
	92	2.3%	2.2%	-	N/A	-
OTH/DP	87	-	13.3%	-	4.7%	-
	90	-	14.2%	7.0%	3.7%	2.2%
	92	-	16.8%	8.0%	N/A	8.8%

Sources: Appendix 5.11; Datamation/Annual Reports

Appendix 5.11

DP/TR	Share of Dataprocessing (DP) Revenues in Total Revenues from Net Sales
HW/DP	Share of Hardware Revenues in Dataprocessing
MF/DP	Share of Mainframes in Dataprocessing
MI/DP	Share of Minis in Dataprocessing
PC/DP	Share of PCs in Dataprocessing
WS/DP	Share of Workstations in Dataprocessing
SW/DP	Share of Software in Dataprocessing
SV/DP	Share of Services in Dataprocessing
DC/DP	Share of Datacommunications in Dataprocessing
OTH/DP	Share of Other Operations in Dataprocessing

- 1987-88: PC statistics may include data on workstations
- SNI: Data for 1987 refer to Siemens
- 1987 data ICL = 1987 data STC

Top 10 Hardware Data:

The Hardware Top 10 ranking is based on the hardware revenues of the European Top 25 firms listed in this Appendix. In theory, it is possible that firms, whose dataprocessing revenues are too low to rank them in the Top 25, nevertheless have hardware revenues which equal or are larger than those of the 10 largest hardware selling Top 25 firms. Analysis of the Datamation European Top 25 data shows that in 1990, non-Top 25 firms could not possibly have had higher hardware revenues than the 10 largest hardware selling Top 25 firms, even if they would produce only hardware, as their total dataprocessing revenues were far below the hardware sales of the 10th largest hardware producer. In 1991, however, the European Top 25 producers only yielded the eight largest hardware producers. Based on the Top 25 data, no. 9 and 10 in the European Hardware Top 10 would be Norsk Data and Getronics. However, in their case, it is theoretically possible that a lower ranked producer has had the same or more hardware sales as these companies; if, for instance, the 26th largest producer had dataprocessing revenues of approximately 180 $m and 170 $m would be derived from the sales of hardware, this producer would have had more hardware revenues than either Norsk Data or Getronics. The same applies for Amstrad, Tulip and Sligos in the 1992 Top 10. It is not possible to determine the 10th largest hardware producer for the years 1987 and 1988 as the available data is not sufficient.

Appendix 5.12

WORLD COMPUTER MARKETS BY SEGMENT, 1987-1992

Share in Cumulative Revenues of Datamation Top 100 Firms, in %

	1992	1991	1990	1989	1988	1987
Hardware	55.0	57.9	58.1	58.1	58.5	58.9
Processing HW	*63.1*	*63.9*	*61.6*	*62.1*	*59.0*	*57.6*
Peripherals	*36.9*	*36.1*	*38.4*	*37.9*	*41.0*	*42.4*
Software	11.6	11.5	10.2	9.7	8.8	8.1
Services	24.4	22.1	21.6	20.4	20.0	20.6
Datacomms	5.5	5.3	6.3	7.7	7.3	7.1
Other	3.5	3.2	3.8	4.1	5.4	5.3
Total ($ bn)	318.0	290.0	278.5	255.8	243.1	208.9

Sources: Datamation, 15 June 1993:23; 15 June 1992:27.

Note:
- Services include maintenance

Appendix 5.13

EUROPEAN-GROWN COMPUTER MNEs: DEPENDENCY ON THE EUROPEAN MARKET, 1987-1993

Dependency on the European Market, 1987-1993 in percentage.

		1987	1988	1989	1990	1991	1992	1993
Sie:	DS/S	48.6	51.8	46.5	46.4	45.6	46.5	45.7
	ES/S	76.0	77.0	75.5	75.0	76.0	75.0	71.0
	ECS/TCS	87.0	89.0	90.0	90.0	95.0	N/A	N/A
Phi:	DS/S	6.5	6.6	6.0	6.5	5.6	5.4	5.0
	ES/S	61.4	61.2	57.0	60.9	59.0	60.3	54.5
	ECS/TCS	79.0	79.0	73.0	76.0	N/A	N/A	N/A
Bul:	DS/S	N/A	N/A	N/A	N/A	35.0	38.0	N/A
	ES/S	N/A	N/A	74.0	69.7	71.0	74.0	72.2
	ECS/TCS	78.0	59.0	63.0	71.0	72.0	N/A	N/A
Oli:	DS/S	50.8	50.2	49.5	50.3	48.3	49.4	N/A
	ES/S	79.9	79.5	77.5	77.6	77.3	76.9	N/A
	ECS/TCS	82.0	81.0	81.0	83.0	84.0	N/A	N/A
ICL:	DS/S	73.2	69.3	66.2	N/A	N/A	N/A	N/A
	ES/S	86.8	81.4	78.8	N/A	85.4	86.9	84.2
	ECS/TCS	81.0	85.0	82.0	82.0	86.0	N/A	N/A

Sources: Siemens Annual Reports; Philips Annual Reports; Bull Annual Reports; The Olivetti Group (Olivetti, 1991); Olivetti Group Consolidated Financial Accounts; ICL PLC Accounts and Review of Operations; Stopford, 1992; Datamation, 1 July 1992:61,63; 1 July 1991:61-62; 1 July 1990:112-2/3; 15 June 1989:56,65,66,83,86; 1 August 1988:48-2/3; 1 August 1987:58,59.

Notes:

DS Domestic Sales
ES European Sales
S Sales (see Appendix 1.1)
ECS European Computer Sales (EC+EFTA)
TCS Total Computer Sales
Si Siemens
B Bull
I ICL
● 1980-89 Data ICL = Data STC

Appendix 6.1

TRIAD POWERS: COMPARISON, 1990

	Pop (1990) x1000	%	GDP (1990) $ mn	%	PCap $	Exp (1990) $ mn	%	Imp (1990) $ mn	%
EEC	327898	39.8	6023164	36.9	18369	1341970	55.0	1407160	54.7
of which is extra-EC						*520957*	*21.3*	*576696*	*22.4*
USA	249975	30.4	5464793	33.4	21861	393592	16.1	516987	20.1
Japan	123537	15.0	2940366	18.0	23802	286949	11.8	234800	9.1
Total DC	823697	100.0	16347426	100.0		2440900	100.0	2574800	100.0

Sources: United Nation Conference on Trade and Development (1993). Handbook of International Trade and Development Statistics 1992. New York: UN.

Notes:

DC	Developed Market Economy Countries
E	Estimate
GDP	Gross Domestic Product
PCap	Per Capita
Pop	Population

This table compares the EC with the USA and Japan and not with the (North) American bloc and the South East Asian trading area, as these two countries dominate their respective trading blocs. In 1991, the USA accounted for 78 per cent of the Western Hemisphere's GDP while Japan accounted for 64 per cent of the South East Asian GDP. This compares with Germany, Europe's largest economy, accounting for 22 per cent of Europe's GDP (Wolf, 13 December 1993:27). Note that one should compare the American and Japanese trade statistics with the EC's extra-regional trade statistics. Estimation of EC extra-regional imports and exports on the basis of Eurostat percentages extra/intra-regional trade for 1990.

Appendix 6.2

EC MEMBER STATES: FINANCIAL PERFORMANCE CRITERIA, 1987-1992

Growth in Gross Domestic Product (in % Change on Preceding Year at Constant Prices), 1987-1992

	1987	1988	1989	1990	1991	1992
Belgium	2.0	5.0	3.8	3.4	1.9	1.0
Denmark	0.3	1.2	0.8	1.7	1.2	1.0
Germany	1.4	3.7	3.4	5.1	3.7	1.7
Greece	-0.7	4.1	3.5	-0.2	1.8	1.5
Spain	5.6	5.2	4.8	3.6	2.4	1.2
France	2.2	4.3	3.8	2.2	1.1	1.9
Ireland	5.0	4.9	6.5	8.3	2.5	2.9
Italy	3.1	4.1	2.9	2.2	1.4	1.1
Luxembourg	2.9	5.7	6.7	3.2	3.1	2.2
NL	0.8	2.6	4.7	3.9	2.2	1.3
Portugal	5.3	3.9	5.2	4.4	1.9	1.7
UK	4.8	4.3	2.1	0.5	-2.2	-0.9
Total	2.9	4.1	3.4	2.8	1.4	1.1

Source: Scott, 1993:91.

Gross Public Debt as Per Centage of Nominal GDP, 1987-1992

	1987	1988	1989	1990	1991	1992
Belgium	131.8	133.2	130.4	130.3	132.2	134.4
Denmark	55.9	58.0	58.3	59.7	60.6	62.2
Germany	44.3	44.8	43.9	44.1	41.8	44.0
Greece	64.7	71.5	76.3	80.7	82.9	84.3
Spain	47.9	43.7	43.1	44.0	46.3	48.4
France	47.2	46.8	47.5	46.7	48.6	50.1
Ireland	120.6	118.2	108.0	103.1	101.2	98.1
Italy	92.6	94.8	97.9	100.5	102.7	108.4
Luxembourg	N/A	N/A	N/A	N/A	N/A	N/A
NL	75.2	77.5	77.8	77.3	77.0	78.3
Portugal	N/A	N/A	N/A	N/A	N/A	N/A
UK	48.9	42.5	37.0	34.9	36.5	41.9

Source: Scott, 1993:94

Appendix 6.2

Budget Balances as Per Centage of Nominal GDP, 1987-1992

	1987	1988	1989	1990	1991	1992
Belgium	- 7.5	- 6.7	- 6.7	- 5.7	- 6.6	- 6.7
Denmark	2.4	0.6	- 0.5	- 1.4	- 2.0	- 2.3
Germany	- 1.9	- 2.2	0.1	- 2.0	- 3.2	- 3.2
Greece	-11.6	-13.8	-17.7	-18.8	-15.4	-13.4
Spain	- 3.1	- 3.3	- 2.8	- 4.0	- 4.9	- 4.6
France	- 1.9	- 1.7	- 1.1	- 1.4	- 1.9	- 2.8
Ireland	- 8.9	- 4.8	- 1.8	- 2.5	- 2.1	- 2.7
Italy	-11.0	-10.7	- 9.9	-10.9	-10.2	-10.5
Luxembourg	2.4	3.1	5.3	5.0	- 0.8	- 0.4
NL	- 5.9	- 4.6	- 4.7	- 4.9	- 2.5	- 3.5
Portugal	- 6.8	- 5.4	- 3.4	- 5.5	- 6.4	- 5.6
UK	- 1.3	1.0	0.9	- 1.3	- 2.8	- 6.1
Total	- 4.1	- 3.6	- 2.8	- 4.1	- 4.7	- 5.4

Source: Scott, 1993:95

Appendix 7.1

CHANNELS OF CORPORATE POLITICAL ACTIVITY: PROFILES

BOS	**Bull/Olivetti/Siemens Nixdorf**
Founded	1991
Location	-
Members	Remaining "indigenous" European computer manufacturers Bull, Olivetti and Siemens Nixdorf (SNI). Together, the companies represent approximately 27% of the European public procurement market.
Structure	Specific initiatives.
Decision	-
Objective	The three constituting companies seek to cooperate on a number of specific issue areas, and to jointly lobby the EC and its Member States to promote their case.
Issues	*(1) Trans European Networks:* (a) August 1991: agreement in principle to submit joint responses to EEC calls for tenders concerning TENs; (b) TEIS. Trans European Information Systems (TEIS): a Brussels-based consortium set up in 1992 seeking to develop applications for public authorities that will run on the common hardware and software platforms of the three founding companies. By doing so, TEIS seeks to strengthen the overall market share of the three founding companies in the public sector. TEIS operates like a company with a supervisory board (manned by BOS executives), a management board (manned by BOS managers from sales and marketing), and a director. *(2) Software:* European Method and Software Centre (EMSC): a Pozzuoli-based software competence centre seeking to define a common computer platform, which will secure the interoperability of the three companies' products. The companies will also jointly develop software. *(3) Joint Promotion*
Sources	Groupe Bull, Annual Report 1991; The Olivetti Group report 1991; TEIS master plan; BOS sources, Interviews, 1993; Cane, 23 June 1992:26; Simonian, 16 April 1992, 29 October 1991.

CEN **European Committee for Standardization**

Founded 1961

Location Brussels, Belgium

Members National standardization bodies of Austria (ÖN), Belgium (IBN), Denmark (DS), Finland (SFS), France (AFNOR), Germany (DIN), Greece (ELOT), Iceland (STRI), Ireland (NSAI), Italy (UNI), Luxembourg (ITM), the Netherlands (NNI), Norway (NSF), Portugal (IPQ), Spain (AENOR), Sweden (SIS), Switzerland (SNV) and the UK (BSI). Affiliated standardization bodies include EWOS.

Structure (1) General Assembly; (2) Administrative Board; (3) Certification Committee; (4) Technical Board; (5) Technical Sector Boards; (6) Technical Committees; (7) Programming Committees.

Decision Standard formulation: consensus process involving all interested parties. Decisions on standards: voting procedure. Several majority criteria must be met to ensure that there is no sustained opposition against the proposed standard.

Objective Planning, drafting and adoption of voluntary European standards in various areas, excluding those pertaining to electrotechnology and telecommunications.

Issues Mechanical engineering; building and civil engineering; health technology, biology and biotechnology; information technology; environment; health and safety at workplace; gas and other energies; transport and packaging; consumer goods, sports, leisure; food; chemistry; materials; quality, certification and testing.

Cooperation with ETSI and CENELEC in ITSTC (see CENELEC)

Sources CEN brochures "Setting Europe's New Standards", "CEN Makes Sense for Europe"; "More about CEN"; CEN sources, Interview 2;1993.

CENELEC European Committee for Electrotechnical Standardization

Founded	1973
Location	Brussels, Belgium
Members	National Electrotechnical Committees of Austria (ÖVE), Belgium (CEB,BEC), Denmark (DEK), Finland (SESKO), France (UTE), Germany (DKE), Greece (ELOT), Iceland (STRI), Ireland (ETCI), Italy (CEI), Luxembourg (Service de l'Énergie de l'État), the Netherlands (NEC), Norway (NEK), Portugal (IPQ), Spain (AENOR), Sweden (SEK), Switzerland (CES) and the UK (BEC). Affiliated membership: Czech Republic, Hungary, Poland, Romania, Slovenia, Turkey. Affiliated standardization bodies include ECMA.
Structure	(1) General Assembly; (2) Administrative Board; (3) Technical Board and Technical bodies; (4) European Electrotechnical Sectoral Committee for testing and certification (ELSECOM) and Electronic Components Committee; (5) Central Secretariat.
Decision	Standard formulation: consensus process involving all interested parties. Decisions on standards: voting procedure. Several majority criteria must be met to ensure that there is no sustained opposition against the proposed standard.
Objective	Preparation of a coherent set of voluntary electrotechnical standards.
Issues	Priority areas of standardization: those areas that determine the free movement of goods and services and/or are directly or indirectly related to EEC Directives and EC or EFTA standardization mandates, including: Agreed EC or EFTA mandates for standardization of information technology equipment, in close collaboration with CEN and ETSI within the framework of the Information Technology Steering Committee (ITSTC). ITSTC seeks to promote OSI (Open Systems Interconnection) base standards in Europe; (2) to develop functional standards necessary for an effective application of OSI; and (3) to develop a general framework for the certification of standardized hardware.
Sources	CENELEC Annual Report 1992; CEC Directory of European Community Trade and Professional Associations, 5th edition; CENELEC brochures "Electrotechnical Standards for Europe", "The Way Forward" and "What is CENELEC?"; CENELEC sources, Interview 25;1993.

ECMA **European Computer Manufacturers' Association**

Founded 1961

Location Geneva, Switzerland

Members Companies which develop, manufacture and market dataprocessing machines or groups of machines used to process digital information for business, scientific, control or other similar purposes in Europe.

In 1993: 40 members, i.e. Alcatel, Apple, BASF, BT, Bull, Callscan, Compaq, Data General, Digital, Ericsson, Exabyte, GPT, Hitachi, Hoechst, HP, IBM, ICL, JVC, Kao, Kodak, Maxtor, Mitsubishi, NCR, NEC, Northern Telecom, Océ, Panasonic, Philips, Rank Xerox, Ricoh, SNI, Sony, Storage Tek, Sun, Tandem, TEAC, Telenorma, 3M, Toshiba, Unisys.

Structure (1) General Assembly; (2) Management; (3) Secretariat; (4) Coordinating Committee; (5) Technical Committees; (6) Task Groups.

Decision Two third majority required for promulgation of standards and technical reports.

Objective (1) To develop standards and technical reports in order to facilitate and standardize the use of information processing and telecommunications systems; (2) to promulgate various standards applicable to the functional design and use of information processing and telecommunications systems. The standards developed by ECMA are subsequently fed into the formal European and international standardization channels.

Issues Data presentation, data communication, peripherals, software engineering, physical media, general (safety, acoustics, et cetera)

Sources ECMA Memento 1992, 1993; ECMA sources, Interview 35;1993.

EECA **European Electronic Component Manufacturers Association**

Founded 1973

Location Brussels, Belgium

Members Nationally organized electronic component manufacturers associations of Belgium (Fabrimétal); Germany (ZVEI FV23); France (SYCEP-SITELESC); Italy (ANIE Gr29); the Netherlands (FAPEL); Spain (ANIEL GrII); and the United Kingdom (ECIF).

These national member organizations represent nearly 500 electronic components manufacturers with a combined workforce of over 250.000 persons. (The EC estimates that the employment provided by the electronic components industry totals approximately half a million). The national organizations may have foreign-owned members. Example: ECIF.

Structure (1) General Assembly and Council; (2) President's Committee; (3) Secretariat; (4) Specialist committees, and product committees and working groups. Specialist committees (COM): Technical Committee, Foreign Trade Committee, Economic and Statistics Committee. Product committees and working groups: Colour Picture Tubes, Semiconductors, Connectors, Hybrid Circuits, Printed Circuit Boards.

Decision Majority voting.

Objective EECA seeks to promote the harmonious development, viability and independence of the European electronic component manufacturing industry, to enable it to function competitively and efficiently in the world market place.

Issues *(1) Trade with third countries:* Customs tariffs; duty suspension procedures; rules of origin; unfair trade practices; customs nomenclature; market access to third countries.

(2) Standardization, quality assurance, and certification: Adoption and promotion of the CECC System of quality approval for electronic components.

(3) Other issues: Guidelines concerning inward investment into the EC electronic components industry; analysis of semiconductor manufacturing costs in the Triad; statistical information gathering and analysis; et cetera.

Sources EECA information brochure; EECA European Electronic Components Industry Report 1992; EECA press release October 1993; EECA mimeo "Inward Investment: Guidelines on Behalf of the EC Electronic Components Industry"; CEC Directory of European Community Trade and Professional Associations, 5th edition; Panorama of EC Industry 1993; Communication with EECA, August 1990 and March 1994; EECA sources, Interview 31;1993.

ERT **European Round Table of Industrialists**

Founded 1983

Location Brussels, Belgium

Members 40 to 50 industrial leaders (CEOs) in personal capacity. The CEOs come from non state-owned firms with headquarters in Europe (not EC only). CEOs of US companies are not accepted as members.

The industrial leaders represent companies operating in a wide range of industries, with a combined turnover of 500 bn ECU and roughly 3 mn employees. In Nov. 1992, these were: Amorim Group, Anova, Austrian Industries, BAT Industries, Bolloré Technologies, BSN, Carlsberg, CEPSA, Daimler-Benz, Fiat, Générale de Belgique, Gevaert, GPA Group, Hoechst, Hoffmann-La Roche, Iberdrola, ICI, Krupp, Lafarge Coppée, Lyonnaise des Eaux-Dumez, Nestlé, Olivetti, Petrofina, Philips, Pilkington, Pirelli, Profilo Group, Robert Bosch, Saint-Gobain, Sofina, Solvay, Statoil, Telefónica, Thyssen, Titan Cement, Total, Trafalgar House, Unilever, and Volvo.

Structure (1) Steering Committee; (2) Plenary session of Members; (3) Secretariat; (4) Policy Groups, International Group and Expert Groups. Policy Groups: competition policy, education and infrastructure. International Group: Central and Eastern Europe, GATT-US-Japan, and North-South relations; Expert Groups: environment, industrial relations and social policy, export controls and youth activities.

Decision Adoption of ERT publications on the basis of consensus, indicating that the publications have the backing of all members. The views expressed in the ERT publications, however, remain the responsibility of the authors, and do not represent a unanimous view of ERT Members.

Objective The ERT seeks to create the right environment for European industry to achieve economic growth and prosperity. It expresses its views through official publications and informal opinions.

Issues *(1) European Strategic Issues:* Completion of Single European Market; Economic crisis of the early 1990s; European agenda for the 1990s.

(2) Education

(3) Employment: Unemployment; labour markets.

(4) Export Controls: COCOM; Single European Export Control System.

(5) Infrastructure: Transportation; business communications.

(6) Other: R&D; energy; competition policy; environment; labour relations; quality management; et cetera.

Sources ERT information brochure; ERT publications; ERT sources, Interview 37;1993; Communication 43;1994.

ETSI **European Telecommunications Standards Institute**

Founded 1988

Location Sophia Antipolis, France

Members Approximately 300 members representing the leading European telecommunications interests, from 27 European countries (EC, EFTA, Turkey, Malta, Cyprus, Eastern European countries).

Membership (1993) comprises predominantly manufacturers (60.42%). Additionally, membership of public network operators (14.21%), users (7.55%), administrations and national standardization bodies (10.27%), and research bodies, public service providers and others (7.55%).

Additionally: (a) Associate membership for interested parties from non-European countries; (b) Observer category; (c) Counsellors: EC Commission and EFTA Secretariat.

Structure (1) General Assembly; (2) Technical Assembly; (3) Technical Committees; (4) Sub Technical Committees, Experts' or Rapporteurs' Groups, or Project Teams; (5) Secretariat.

Technical Committees: (1) Network Aspects; (2) Business Telecommunications; (3) Signalling Protocols and Switching; (4) Transmission and Multiplexing; (5) Terminal Equipment; (6) Equipment Engineering; (7) Communications Networks and Systems Interconnection; (8) Radio Equipment and Systems; (9) Special Mobile Group; (10) Satellite Earth Stations and Systems; (11) Methods for Testing and Specification; (12) Human Factors; (13) Joint ETSI/ECMA Committee; (14) Security Algorithms Group of Experts; (15) ETSI/EBU Joint Technical Committee; (16) Intellectual Property Rights Committee; (17) Strategic Review Committee; (18) Programme Advisory Committee.

Decision Standards Approval Procedure including (1) public enquiry: proposed standards are sent out to the national standardization bodies; and (2) weighted national voting: draft accepted if more than 50% of the national bodies have replied and the positive votes exceed 71%.

Objective To set uniform telecommunications standards for Europe allowing national networks and services to be linked and ensuring interoperability of equipment.

Issues *(1) Mobile Services*

(2) Integrated Services Digital Network (ISDN)

Sources ETSI Publications Catalogue (June 1994); ETSI general information brochure; ETSI brochure "The Making of a European Telecommunications Standard"; International Herald Tribune, October 14, 1993 (supplement: advertising section); ETSI, Communication 45;1994.

EUROBIT **European Association of Manufacturers of Business Machines and Information Technology Industry**

Founded 1974

Location Frankfurt, Germany

Members Nationally organized business machines, information technology and telecommunications terminal equipment manufacturers associations from Denmark (ESKOFOT); Germany (VDMA FG BIT; ZVEI FV I+K); France (SFIB); Ireland (IBETA); Italy (ASSINFORM); Spain (SEDISI); Sweden (LKD); Switzerland (VSM); and the United Kingdom (EEA).

These national member organizations represent together almost 100% of the European manufacturing capability in the field of business machines, information technology and telecommunications equipment, and a total of approximately 500,000 employees. The national organizations may have foreign-owned members. Example: EEA.

Structure (1) General Assembly; (2) Council and Steering Committee; (3) Secretariat; (4) Working groups and ad-hoc groups. Working Groups (WGs): Industrial Policy Group, Working Group on Customs Matters, Working Group on Postal Franking Machines. Ad hoc Groups: GATT Issues; IT Systems Security; Statistics and Market Research; IC User Group.

Decision Consensus and majority voting.

Objective EUROBIT seeks to protect and promote the interests of its members in Europe and throughout the world.

Issues *(1) Industrial Policy:* Harmonization, liberalization, deregulation, EC initiatives and their effect on the Single European Market, technological developments, conformance testing and certification, in the field of information technology, telecommunications and standardization.

(2) EC Customs: Tariff structure, tariff classification, duty suspension procedures, customs valuation, other customs-related issues.

(3) Postal Franking Machines: Structural reorganization of the European PTTs, regulations on service of franking machines, restrictive practices preventing the expansion of the franking machines market.

(4) Other Issues: Framework conditions for the supply of semiconductors from European and other sources; standardized security criteria for IT systems; statistical information gathering and analysis; et cetera.

Sources EUROBIT information brochure; CEC Directory of European Community Trade and Professional Associations, 5th edition; Communication with EUROBIT, March 1994; EUROBIT sources, Communication 17;1993; EEA information brochure.

EWOS	**European Workshop for Open Systems**
Founded	1987
Location	Brussels, Belgium
Members	Open forum for computer hardware and software manufacturers, network providers, public and private users, academia. About 70% of membership are manufacturers. Early 1990s: circa 100 corporate members.
Structure	(1) Steering Committee (including representatives of ECMA, SPAG, CEN, CENELEC and the CEC); (2) Technical Assembly; (3) Expert Groups; (4) Secretariat.
Decision	Voting on proposals for functional standards: two-third majority required for adoption.
Objective	Producing proposals for functional standards (OSI Profiles), which are subsequently fed into the formal European and international standardization channels; Definition of corresponding conformance testing specifications.
Issues	Profiles for electronic mail, file transfer, distributed database, network management, et cetera.
Sources	EWOS brochure; CEN brochure "More about CEN"; CENELEC brochure "Electrotechnical standards for Europe"; EWOS sources, Interview 38;1993.

ORGALIME **Liaison Organisation for the European Mechanical, Electrical, Electronic Engineering and Metalworking Industries**

Founded 1947

Location Brussels, Belgium

Members Nationally organized mechanical, electrical and electronic engineering and metalworking associations from Austria (Fachverband der Eisen- und Metallwaren industrie Österreichs, FEEI, Fachverband der Maschinen- und Stahlbau Industrie Österreichs); Portugal (FENAME); Belgium (Fabrimétal); Denmark (DI); Germany (VDMA, Wirtschaftsverband Stahlverformung; ZVEI); Finland (FIMET, SETELI); France (FIM, FIEE); Ireland (EIA); Italy (ANIE, AMMA); Luxembourg (GCFL); the Netherlands (FME, Metaalunie); Norway (TBL); Spain (Confemetal); Sweden (Sveriges Verkstadsindustrier VI); Switzerland (VSM); and the UK (BEAMA, METCOM).

These national member organizations represent approximately 30.000 companies, providing employment to 6.7 mn persons in the European Community. The national organizations may have foreign-owned members.

Structure (1) Presidents' Committee; (2) Executive Committee; (3) Secretariat; (4) Three liaison committees, four working groups, and ad-hoc groups. Liaison committees (COM): Mechanical Engineering Liaison COM, Electrical and Electronic Liaison COM, Metalworking Industries Liaison COM. Working Groups: Legal WG, Trade WG, Economist WG, Environmental WG.

Decision No majority voting; decisions are taken by consensus.

Objective ORGALIME seeks to inform its members about new EC initiatives which could affect the engineering industries, build an industry consensus on relevant issues, and present this consensus view to the EC institutions.

Issues *(1) Industry:* Technical harmonisation; product liability; general product safety; public purchasing; SMEs; safety and health.

(2) Trade: GATT negotiations; relations with Japan, the US and Eastern Europe; anti-dumping; counterfeiting.

(3) Environmental Issues: Waste management; emissions; equipment for environmental control.

(4) Competition: Patent; know-how; agency; distributor; subcontracting agreements; block exemptions.

(5) Statistics: Harmonized system; combined nomenclature; statistics.

(6) Research and Development: EC programmes.

(7) Energy: Energy policy; efficient utilisation; conservation; clean technology.

Sources ORGALIME information brochure and inserts, January 1993; CEC Directory of European Community Trade and Professional Associations, 5th edition; ORGALIME sources, Interview 23;1993.

UNICE **Union of Industrial and Employers' Confederations of Europe**

Founded 1958

Location Brussels, Belgium

Members Nationally organized central industry and employers' federations from Austria (VÖI); Belgium (FEB/VBO); Cyprus (DEB); Denmark (FDI, DEC); Finland (FEC, CFI); France (CNPF); Germany (BDA, BDI); Greece (FIG); Iceland (VSI, FII); Ireland (CII, FIE); Italy (Confindustria); Luxembourg (FEDIL); Malta (MFOI); the Netherlands (VNO, NCW); Norway (CNBI); Portugal (AIP, CIP); San Marino (ANIS); Spain (CEOE); Sweden (SI, SAF); Switzerland (VORORT, ZVSAO); Turkey (TISK, TUSIAD); and the United Kingdom (CBI). The national federations cover, by definition, a broad range of industries. The national organizations may have foreign-owned members, provided certain conditions are met. For example: CBI.

Structure (1) Council of Presidents; (2) Committee of Permanent Delegates; (3) Executive Committee; (4) Secretariat; (5) 55 working groups within five policy committees (COM): Economic & Financial Affairs, External Relations, Social Affairs, Industrial Affairs, and Company Affairs COMs.

Decision Consensus and majority voting.

Objective UNICE seeks to keep abreast of EC policy developments that interest its members; provide a framework which enables industry and employers to examine European policies and proposed legislation; prepare joint positions; and promote its positions at Community and national level.

Issues *(1) Economic and financial affairs:* Economic policy; monetary and financial matters; regional policy; economic and fiscal conditions.

(2) External relations: EC trade policy; relations with Japan, the US and Eastern Europe; GATT negotiations; customs legislation.

(3) Social affairs: EC social policy; industrial relations; employment; vocational training; health/safety and social protection; Social Dialogue at EC level; interaction with Council of Europe & Int. Organization of Employers on social issues.

(4) Industrial affairs: Energy; telecommunications; research and development; transport; environment; SMEs; public purchasing.

(5) Company affairs: Competition policy; company law; intellectual property; consumer policy and marketing; civil and commercial law; insurance legislation; multinational companies; technical barriers to trade.

Sources UNICE information brochure; UNICE preliminary views and positions on the Community's Research and Technological Development Programme, June 1989, December 1992, April 1992, and March 1993; Collie, 1993:216; CEC Directory of European Community Trade and Professional Associations, 5th edition; UNICE sources, Interview 4;1993.

Appendix 8.1

LABOUR PRODUCTIVITY, 1987-1993

	Semiconductors			Computers		
	TR $mn	L x1000	PROD $/pp	TR $mn	L x1000	PROD $/pp
Siemens						
1987	657	R	R	5703.0	N/A	N/A
1988	784	e	i	5951.0	N/A	N/A
1989	1194	d	s	6010.6	N/A	N/A
1990	1204	u	i	7735.1*a*	51.9*a*	149038.5*a*
1991	1263	c	n	7308.6*a*	51.6*a*	141639.5*a*
1992	N/A	e	g	8345.1*a*	48.4*a*	172419.4*a*
1993	N/A	d		7225.5*a*	43.3*a*	166870.7*a*
Philips						
1987	1602	N/A	N/A	2601.6	N/A	N/A
1988	1738	N/A	N/A	2794.6	N/A	N/A
1989	1716	N/A	N/A	2814.8	N/A	N/A
1990	1955	27.0*E*	72407.4	3283.9	17.0*E*	193170.6
1991	2022	N/A	N/A	N/A	N/A	N/A
1992	2108	20.0*E*	105400.0	N/A	8.5*E*	N/A
1993	N/A	N/A	N/A	N/A	N/A	N/A
Groupe Bull						
1987				3007.5	26.3	114353.6
1988				5296.7	45.6	116155.7
1989				6465.4	43.6	148289.0
1990				6349.6	44.5	142687.6
1991				5929.8	39.9	148616.5
1992				5715.1	35.2	162360.8
1993				5907.9	31.7	186369.1
Olivetti						
1987				4637.2	58.1	79814.1
1988				5427.9	57.6	94234.4
1989				5573.3	56.9	97949.0
1990				6414.5	53.7	119450.7
1991				6050.8	46.5	130124.7
1992				5762.0	40.4	142623.8
1993				N/A	N/A	N/A
SGS-Thomson						
1987	859	N/A	N/A			
1988	1087	17.9	60726.3			
1989	1301	19.2	67760.4			
1990	1441	21.3	67652.6			
1991	1436	17.7	81129.9			
1992	N/A	17.8	N/A			
1993	N/A	N/A	N/A			
ICL						
1987*b*				2123.9	20.4	104112.8
1988*b*				2425.1	20.1	120651.7
1989*b*				2643.4	N/A	N/A
1990				2862.9	N/A	N/A
1991				3308.1	26.8	123436.6
1992				4354.8	25.6	170109.4
1993				3915.7	24.0	163154.2

Sources: Appendices 5.4 and 5.9; Annual Reports Philips, Siemens, Olivetti, Bull, ICL and Thomson-CSF; Chapter 5.

Notes: TR Total Revenues; L Labour force; PROD Productivity (TR/L); E Estimate; *a* Data applicable to SNI; *b* Data 1987-1989 applicable to STC

Appendix 8.2

EMPLOYMENT, 1987-1993

Employees x 1000	1987	%	1988	%	1989	%	1990	%	1991	%	1992	%	1993	%
Siemens	359	100.0	353	100.0	365	100.0	373	100.0	402	100.0	413	100.0	391	100.0
Germany	229	63.8	223	63.2	227	62.2	230	61.7	243	60.5	253	61.3	238	60.9
Rest of Europe }										(21.)		(20.)		(20.0)
Rest of World }	130	36.2	130	36.8	138	37.8	143	38.3	159	39.5	160	38.7	153	39.1
Philips	337	100.0	310	100.0	305	100.0	273	100.0	240	100.0	252	100.0	239	100.0
Netherlands	N/A		N/A		65	23.8	N/A		N/A		N/A		N/A	
Rest of Europe }														
Rest of World }	N/A		N/A		240	76.2	N/A		N/A		N/A		N/A	
Groupe Bull	26	100.0	46	100.0	44	100.0	45	100.0	40	100.0	35	100.0	31.7	100.0
France	N/A		N/A		N/A		N/A	41.	16	41.3	N/A	42.	N/A	43.0
Rest of Europe	N/A		N/A		N/A		N/A	28.	11	27.6	N/A	28.	N/A	28.5
Rest of World	N/A		N/A		N/A		N/A	31.	12	31.1	N/A	30.	N/A	28.5
Olivetti	58	100.0	58	100.0	57	100.0	54	100.0	47	100.0	40	100.0	N/A	
Italy	N/A	51.	N/A	50.	N/A	49.	N/A	50.	22	48.3	20	49.4	N/A	
Rest of Europe	N/A	29.	N/A	30.	N/A	28.	N/A	27.	14	29.0	11	27.5	N/A	
Rest of World	N/A	20.	N/A	20.	N/A	23.	N/A	23.	11	22.7	9	23.1	N/A	
SGS-Thomson	N/A		18	100.0	19	100.0	21	100.0	18	100.0	18	100.0	N/A	
France/Italy	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
Rest of Europe/World	N/A		N/A		N/A		N/A		N/A		N/A		N/A	
ICL	20	100.0	20	100.0	N/A		N/A		27	(Av:23)	26	(Av:27)	24	100.0
UK	N/A		N/A		N/A		N/A		14	61.1	14	52.5	13	52.7
Rest of Europe }														
Rest of World }	N/A		N/A		N/A		N/A		9	38.9	13	47.5	12	47.3

Sources: Annual Reports Siemens, Philips, Olivetti, Bull, ICL, Thomson-CSF; NRC, 25 May 1990:11; Stopford (1992).

Notes: Av = average number of employees

Appendix 8.3

CONTRIBUTIONS TO EXPORT/FDI, 1987-1991

	Siemens	Philips	Bull	Olivetti	ICL
Total Non-European Dataprocessing Sales in $ mn					
1987	741.4	546.4	661.7	834.7	403.5
1988	654.6	586.9	2171.7	1031.3	363.8
1989	601	760	2392.2	1058.9	475.8
1990	771.1	788.1	1841.4	1090.4	572.6
1991	365.4	N/A	1660.3	968.2	463.1
Non-European Dataprocessing Sales as % of Total Dataprocessing Sales					
1987	13	21	12	18	19
1988	11	21	41	19	15
1989	10	27	37	19	18
1990	10	24	29	17	20
1991	5	N/A	28	16	14

Sources: Datamation, 15 June 1992; 15 June 1991;15 June 1990:32; 15 June 1989; 15 June 1988.

Appendix 8.4

ALTERNATIVE SOURCES OF CORPORATE ASSETS, 1984-1991

Corporate Assets	VA '91 ECU mn	INV '89 ECU mn	EMPL '91	RTA 84-88	Extra-EC X'91, ECUmn	Extra-EC TB'91 ECU mn
Energy (N11,12,13,14,15,16)	**N/A**	**N/A**	**N/A**	**N/A**	**270*a***	**- 617*a***
Non-Energy Mining and Quarrying (N21,23)	**8228**	**N/A**	**188200**	**N/A**	**N/A**	**- 6632**
Ferrous Metals (N221,222,223)	**27756**	**N/A**	**600000**	**N/A**	**13849**	**+ 6639**
Non-Ferrous Metals (N224)	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**
Non-Metallic Minerals (N24)	**39520**	**N/A**	**944000**	**N/A**	**7113**	**+ 3500**
Chemicals (N25)	**105790**	**N/A**	**1787000**	**N/A**	**47780**	**+ 12184**
• Basic Industrial Chemicals (N251/2/3)	44048	N/A	632800	1.15	20968	+ 1396
• Petrochemicals (N252)	26000	N/A	N/A	N/A	16057	+ 1986
• Pharmaceuticals (N257)	26365	N/A	425700	N/A	9113	+ 4369
Metal Products (N31)	**71478**	**N/A**	**2185000**	**N/A**	**13756**	**+ 4843**
Mechanical Engineering (N32)	**88904**	**N/A**	**2371000**	**1.10**	**68398**	**+ 35419**
• Machine Tools (N322)	10901	N/A	169000	N/A	4484	+ 1900
• Machinery for Mining, et al. (N325)	15430	N/A	397600	N/A	9500	+ 4827

Appendix 8.4

Corporate Assets	VA '91 ECU mn	INV '89 ECU mn	EMPL '91	RTA 84-88	Extra-EC X'91, ECUmn	Extra-EC TB'91 ECU mn
Electrical Engineering (N34:341,342,343.1/.2,346,347)	**56588**	**N/A**	**1912200**	**N/A**	**23673**	**+ 12342**
● Electrical Machinery (N342)	21304	N/A	N/A	0.90	11152	+ 2687
Electronic Engineering (N33,344,345,345.1/2)	**72756**	**N/A**	**1532000**	**N/A**	**30574**	**- 26542**
● Electronic Components (N345)	N/A	N/A	235000	0.67*b*	5193	- 8334
● Computer and Office Equipment (N33)	19285	2381	261300	0.67*b*	9907	- 13865
● Consumer Electronics (N345.1/2)	13774	N/A	378800	0.66	8399	- 13166
● Telecommunications Equipment (N344)	39696	N/A	252000	1.03	5215	+ 383
Transport Equipment (N35,36)	**111760**	**17061**	**2629000**	**N/A**	**52882**	**+ 7809**
● Motor Vehicles (N351,352)	57553	N/A	1184000	1.09	25132	+ 6647
● Motor Vehicle Parts/Access. (N353)	N/A	N/A	1000000	N/A	5685	+ 2473
Instrument Engineering (N37)	**11265**	**N/A**	**335500**	**N/A**	**8224**	**- 3050**
Food, Drink and Tobacco (N41,42)	**96572**	**N/A**	**2455900**	**N/A**	**26115**	**+ 5437**
● Meat (N412)	12614	N/A	447800	N/A	3797	+ 28
● Diary Products (N413)	9437	N/A	247700	N/A	3729	+ 2967
● Industrial Baking (N419)	10257	N/A	480500	N/A	752	+ 553
● Brewing and Malting (N427)	8985	N/A	139000	N/A	1108	+ 994
Textiles, Leather, Footwear, Clothing (N43,44,45)	**53752**	**N/A**	**3021000**	**N/A**	**27374**	**- 13107**
● Textiles (N43)	31636	N/A	1529000	N/A	15578	- 2916
● Clothing (N453)	15337	N/A	1149100	N/A	6683	- 10004
Wood Processing (N46)	**11953**	**N/A**	**436000**	**N/A**	**2019**	**- 7778**

Appendix 8.4

Corporate Assets	VA '91 ECU mn	INV '89 ECU mn	EMPL '91	RTA 84-88	Extra-EC X'91, ECUmn	Extra-EC TB'91 ECU mn
Pulp, Paper, Printing, Publishing (N47)	**62208**	**N/A**	**1469000**	**N/A**	**9661**	**- 10435**
● Pulp, Paper and Board (N471)	9885	N/A	186400	N/A	2518	- 12811
● Paper and Board Converting (N472)	14626	N/A	403600	N/A	3173	+ 271
● Printing and Publishing (N473,474)	37697	N/A	879400	N/A	3970	+ 2104
Other Industrial Sectors						
● Rubber (N481,482)	12361	N/A	361700	N/A	3510	+ 774
● Furniture (N316.6,467)	18323	N/A	610400	N/A	5036	+ 1922

Sources: Eurostat in EC Panorama 1993; Patel and Pavitt (1991:42-43); EC Panorama bimonthly supplements 5/93,3/93.

Notes:

a	Not in ECU mn, but in x1000 toe.
b	Electronics capital goods
EMPL	Employment
EX	Extra-EC
INV	Investment
N	NACE (see Appendix 1.2)
RTA	Revealed Technology Advantage Index[1]
TB	Trade Balance
VA	Value-Added
X	Exports

[1] RTA: A country's or region's share of US patents in a technological field, divided by its share of total US patents in all fields. RTA > 1 shows a country's or region's strength in a technology. RTA < 1 shows a country's or region's relative weakness (Patel and Pavitt, 1991:45).

Appendix 9.1

EC BUDGET EXPENDITURES: STRUCTURE, 1980-1992

Budget Items in ECU mn and as % of total budgetary expenditures, 1980-1992

	1980 ECU mn	%	1983 ECU mn	%	1985 ECU mn	%	1987 ECU mn	%
EAGGF Guarantee	11283.2	69.3	15788.2	64.9	19725.9	70.2	22951.8	64.9
EAGGF Guidance *(a)*	601.9	3.7	749.7	3.1	738.6	2.6	888.6	2.5
Fisheries	43.7	0.3	54.8	0.2	81.8	0.3	157.8	0.4
Regional Policy and Transport	1103.3	6.8	2409.5	9.9	1725.5	6.2	2687.3	7.6
Social Policy	771.8	4.7	1020.9	4.2	1490.7	5.3	2852.5	8.1
Energy	40.3	0.2	828.0	3.4	126.2	0.4	89.7	0.3
Research	249.8	1.5	423.3	1.7	510.6	1.8	720.2	2.0
Development Cooperation	508.9	3.1	810.8	3.3	1084.7	3.9	793.8	2.3
Administration	819.7	5.0	1110.4	4.6	1296.0	4.6	1683.4	4.8
Other	867.8	5.3	1117.8	4.6	1318.7	4.7	2499.3	7.1
Total	**16290.4**	**100**	**24313.0**	**100**	**28098.7**	**100**	**35324.4**	**100**

Sources: Court of Auditors Annual Reports in Tsoukalis, 1991:239; Official Journal, 12 December 1988:213; 12 December 1989:217; 12 December 1990:18; 13 December 1991:12; 15 December 1992:12; 16 November 1993:12.

Notes:

a Including specific measures
b New groupings of budget items, not fully comparable to groupings used between 1980-1990
c 1991 and 1992: Structural Operations
d 1991 and 1992: Social Operations
e 1991 and 1992: Energy and EURATOM

	1988 ECU mn	%	1989 ECU mn	%	1990 ECU mn	%	1991*b* ECU mn	%	1992*b* ECU mn	%
EAGGF Guarantee	26389.6	63.9	24460.4	59.5	24979.5	57.7	31527.8	58.6	31234.3	53.3
EAGGF Guidance *(a,c)*	1194.6	2.9	1419.1	3.5	1928.7	4.5				
Fisheries *(c)*	260.0	0.6	261.9	0.6	325.6	0.8				
Regional Policy *(c)* and Transport	3348.5	8.1	4144.3	10.1	4901.9	11.3	13857.7	25.8	18466.1	31.5
Social Policy *(d)*	2501.3	6.1	2964.1	7.2	3546.3	8.2	355.7	0.7	478.6	0.8
Energy *(e)*	130.8	0.3	115.0	0.3	115.1	0.3	115.7	0.2	141.9	0.2
Research	962.9	2.3	1239.8	3.0	1429.4	3.3	1559.6	2.9	2027.6	3.5
Development Cooperation	1041.3	2.5	1063.8	2.6	1225.1	2.8	2221.3	4.1	2027.4	3.5
Administration	1899.8	4.6	2051.7	5.0	2298.1	5.3	2519.2	4.7	2847.5	4.9
Other	3550.1	8.6	3410.9	8.3	2575.1	5.9	1640.4	3.1	1349.8	2.3
Total	41278.9	100	41131.0	100	43324.8	100	53796.6	100	58573.2	100

Sources: see above.

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