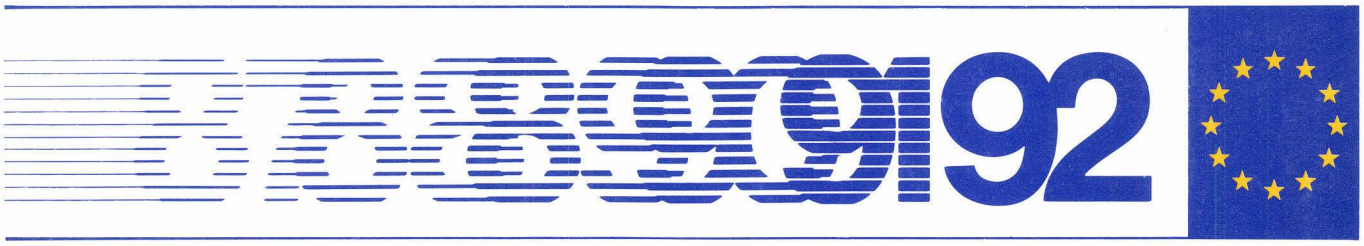
RESEARCH ON THE "COST OF NON-EUROPE"

BASIC FINDINGS

VOLUME 5 PART B



THE "COST OF NON-EUROPE" IN PUBLIC-SECTOR PROCUREMENT

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COMMISSION OF THE EUROPEAN COMMUNITIES

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RESEARCH ON THE "COST OF NON-EUROPE"

BASIC FINDINGS

VOLUME 5 PART B

THE "COST OF NON-EUROPE" IN PUBLIC-SECTOR PROCUREMENT

by

WS Atkins Management Consultants
in association with
Eurequip SA-Roland Berger & Partner-Eurequip Italia

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THE COST OF NON-EUROPE IN PUBLIC SECTOR PROCUREMENT

PART II REPORT

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2.1 Product Reviews

The purpose of this Section is to identify those products for which there might be a significant static price effect (the "price effect list"), and those industries for which there might be an important economies of scale or restructuring effect (the "restructuring" list). The prices of those products on the price effect list, and the structure, costs and development strategies of industries on the economies of scale list, are analysed in the following sections of the Report.

Table 2.1 shows the results of a systematic analysis of supplying sectors, summarised at the 2 digit NACE code level, but considering products at the 3 digit level. The table shows two alternative measures, using the French contract data and the input-output analysis reported in Section 5.3 and 5.4 of the Part I Report, of:

* the share of the product in total public purchasing

* the importance of the public sector as purchaser of the whole branch's output.

These data have been used to measure the relative impact of opening up public purchasing on different product sectors.

2.2 The Price Effect List

The Price Effect List includes products which:

* have a large share in public purchasing, so that price differences lead to significant savings

TABLE 2.1 - EVALUATION OF PRODUCTS FOR POTENTIAL BENEFITS FROM THE INTERNAL MARKET

NACE/Description		% of PP	PP/ output	Static Price Advantage	Accept/ reject	Restructuring/Economies of Scale	Accept/ reject
0: AG, FISH, HUNTING							
01 Agriculture and hunting 02 Forestry 03 Fishing	I-O F	0.6 0.1	1.1 0.1	Insignificant public purchases	0	Produced by small units; weight of pub. purch. is insignificant	0
1: ENERGY AND WATER							
11 Extraction of solid fuels	I-O F	3.5 2.4	53.1 31.3	PP = 30% of output in France; nationalistic policies exist	X	Restructuring likely; new mines are more economic. Also more 3rd country trade - closures expected	X
12 Coke ovens	I-O	0.1	2.3	No significant PP	0	No significant PP	0
13 Extraction of petroleum & gas		0.9	3.0	Competitive world market (also, high transport costs for natural gas)	0	Competitive world market	0
14 Oil refining	I-O F	8.0 16.8	16.1 15.7	Highly competitive world market; price differences from suppliers marginal. Retail price differences are due to excise tax differences	0	Free market - no nationalistic policy	0
15 Nuclear fuels	I-O F	0.3 -	18.0 -	No EC production of ores; EC members do support own processing facilities. No open market, so no observable prices	(X)	Probable processing economies of scale - but no information likely to be available	(X)
16 Power generation	I-O	2.2	11.3	Significant trade unrealistic	0	No significant economies of scale beyond existing size - strategic consideration, fuel transport etc.	0
17 Water supply	I-O	0.4	13.2	Not freely tradeable - high transport cost, strategic arguments	0	No restructuring possible. Geographic constraints	0
2: NON ENERGY MINERALS							
21 Metalliferous ores 211 ferrous 212 non ferrous		-	-	European sources more expensive than other world sources. Some PP by nationalised steel industry but mainly on a commercial basis. There is some support of non-ferrous mixing but no potential for intra-EC trade	0	No restructuring except closure of existing mines in favour of non-EC imports	0
22 Production and preliminary processing of metals 221 iron and steel industry 222 steel tubes 223 cold forming of steel	I-O F	0.3 0.6	1.3 1.8	Steel products are internationally traded commodities. Suppliers are traders who buy internationally. Exceptions may be special steels for armaments and fighting vehicles. But all metals represent only 0.3% of PP, so potential gains are insignificant	0	PP is less than 2% of sector output, so PP has no effect on restructuring. except a) Steel tubes: water sector is a significant purchaser, but there is no evidence of nationalistic buying b) Special steels: for defence, aerospace and nuclear industries. Total purchase of these two items is insignificant	0 X X

TABLE 2.1 - EVALUATION OF PRODUCTS FOR POTENTIAL BENEFITS FROM THE INTERNAL MARKET (Continued)

NACE/Description		% of PP	PP/ output	Static Price Advantage	Accept/ reject	Restructuring/Economies of Scale	Accept/ reject
224 non ferrous metals	F	5.5	22.5	Internationally traded commodity (note: PP share of output is apparently high because local production is small compared to imports)	0	Generally no significant economies of scale. Main products are likely to be gold, other valuable metals for strategic stockpiles, alloys for aerospace and armaments production - a wide range of products, mainly imported	0
	I-O	0.9	0.5				
23 Mining of non metallic minerals		-	-	PP limited to asphalt and road making materials. Other road making materials are high transport cost/low value commodities of local supply	0	No economies of scale	0
24 Manufacture of non-metallic mineral products	I-O	0.5	c 2.0	PP are cement, concrete road making products, concrete street furniture and ceramic sanitary ware. Price differences may exist for cement, for which cartels have existed in the past	X	No restrictions on scale	0
	F	0.6	2.2				
25 Chemical industry	I-O	3.2	5.5	Mainly competitive international markets with mainly private sector purchasers, except:		Main producers of bulk chemicals are international. Chemical products and pharmaceuticals have no restriction on scale: pharmaceuticals is tending to oligopoly	
26 Man-made fibres	F	1.1	2.4				
				. Pharmaceuticals (mainly public sector purchasers and monopoly suppliers)	X		
				. Explosives (nationalised)	X		
3: METAL MANUFACTURE, MECH/ELEC. ENG							
31 Metal articles	I-O	2.1	5.5	Most products have a strong private market, but PP are concentrated in a few products for which there is little private market:-		The heavy fabrication sector is dependent upon public purchases. It is a declining sector and receives government support for restructuring. There is likely to be scope for European restructuring in, eg., power station boiler making	X
	F	1.8	3.3				
				314/315 heavy steel fabrication - bridges - large boilers - nuclear vessels	X		
				314.3 pit propping equipment	X		
				314.4 railway track and fittings	X		
				Total purchases, however, are small (2% of total)			
32 Mechanical engineering	I-O	2.7	5.5	Mainly equipment for industry. Sales to public sector:		May be economies of scale in mining equipment, steel plant, etc - these are also part of the heavy steel fabrication sector (31)	- inc. above
	F	6.5	9.3				
				325.1 mining equipment (coal)	(X)		
				HVAC equipment (offices)	(X)		
				equip. for steel, shipbuilding, car industry.	(X)		
				It is likely that price differences exist for some of these items - but comparisons would be virtually impossible because of specification differences			

TABLE 2.1 - EVALUATION OF PRODUCTS FOR POTENTIAL BENEFITS FROM THE INTERNAL MARKET (Continued)

NACE/Description		% of PP	PP/ output	Static Price Advantage	Accept/ reject	Restructuring/Economies of Scale	Accept/ reject
33 Office machinery 37 Instruments	I-O	1.9 -	13.8 -	Price differences exist because of discriminatory pricing by manufacturers. Trade is impeded by customs regulations and electrical standards, and some discriminatory purchasing. Price differences would not be measurable because of performance differences	(X)	Computers have possible economies of scale in R&D and marketing (because of compatibility). Most instruments manufacture is small-scale and there is extensive trade	X 0
34 Electrical engineering	I-O	4.4	10.4	Public sector purchases		There are possible economies of scale in	
	F (inc 33)	13.5	21.4	341 Cables	X	power generation equipment	X
				342 Power generation equipment	X	telecomms equipment	X
				344 Telecomms equipment	X	and perhaps	
				344 Broadcast equipment	X	broadcast equipment (but relatively	
				347 Elec. services/lighting for offices	0	insignificant and already international	
				347 Road lighting	0	supply)	
				There is nationalistic purchasing, partly due to heritage of equipment & standards			
35 Motor vehicles	I-O	1.8	4.0	Products are freely traded. "National" purchases have a high foreign content. There are price differentials due partly to suppliers' discriminatory pricing policies - so gains from trade are difficult (but PP can be used as a lever to break cartel pricing)	X	Already European scale manufacturing	0
	F	1.9	2.2				
36 Other means of transport	I-O	8.3	56.0	This is the area in which nationalistic purchasing most applies, in particular:		All the three subsectors listed are operating below optimum capacity in EC countries	
	F	10.6	23.9	361 shipbuilding			
				362 railway rolling stock	(X)	shipbuilding	X
				364 aerospace equipment	(X)	railway rolling stock	X
				However, prices cannot be compared because of specification differences	(X)	aerospace	X
37 Instrument engineering				(Included in 33 above). There is generally extensive trade in these items because the sector is very specialised. An area where there may be scope for wider purchasing is Medical Equipment	0		0
4: OTHER MANUFACTURING							
41/2 Food, drink and tobacco	I-O	1.7	1.9	Local supply normally required by public establishment. Wide range of products, each insignificant in total PP		No restriction on scale of production. Public sector is insignificant puchaser	0
	F	0.3	0.3		0		
43/45 Textiles and clothing	I-O	0.7	1.6	Insignificant items in public purchasing, although price differences may exist, eg. for uniforms	0	Public sector is insignificant purchaser except for uniforms. No restriction on scale of production	0
	F	0.6	1.1		(X)		

TABLE 2.1 - EVALUATION OF PRODUCTS FOR POTENTIAL BENEFITS FROM THE INTERNAL MARKET (Continued)

NACE/Description		% of PP	PP/ output	Static Price Advantage	Accept/ reject	Restructuring/Economies of Scale	Accept/ reject
44/45 Leather goods/footwear	I-O F	0.1 0.1	1.4 1.0	Insignificant purchases. Only significant item is army/police boots	0 (X)	No impact, except on specialist boot makers	0
46 Timber and wooden furniture	I-O F	0.6 0.1	3.0 1.5	Insignificant purchases; high transport costs: only PP item of significance is school/office desks	0 (X)	No impact, no restriction on scale	0
47 Paper and printing	I-O F	2.8 0.4	8.6 1.3	Printing and publishing is subject to language barriers. Paper is tradable and price differences may exist but paper is only 15% of category 47	0 (X)	No impact, except on security printing which is insignificant	0
48 Rubber and plastics	I-O F	0.7 0.4	3.8 1.2	Mainly tyres, which are produced by international companies. Price differences exist due to suppliers' price discrimination/retail margins	0 (X)	No impact	0
49 Other manufacturing	I-O F	0.4 -	5.5 -	The statistics here are spurious: purchases are actually insignificant. PP includes pens, stamps and seals	0	No impact	0
5: CONSTRUCTION AND CIVIL ENGINEERING	I-O F	28.6 26.8	32.5 13.9	Price is predominantly made up of non-traded items, local labour, basic materials. Opportunities for trade are only in specialist fields - nuclear installations, airports and ports, etc. - and in border areas		Possible in nuclear installations, ports/airports	X
6: DISTRIBUTIVE TRADES	I-O F	4.5 7.7	3.0 0.2	Non-tradable	0	No economies of scale	0
7: TRANSPORT AND COMMUNICATION	I-O F	5.4 0.8	8.0 0.7	Non-tradable (ownership of carriers - air/land - may be foreign, but supply must be local). Tariffs are fixed for given routes - no price advantage. The main item is communications (54% of total)	0	Possible savings from regrouping airlines but these have shared service/regulated routes - and reorganisation would not respond to PP changes	0
of which 75 air transport	I-O	0.5	8.9				
8: BANKING AND FINANCE, REAL ESTATE							
81/82 Credit and insurance	I-O	1.9	4.5	Subject to financial services barriers, not PP	0	No economies of scale	0

TABLE 2.1 - EVALUATION OF PRODUCTS FOR POTENTIAL BENEFITS FROM THE INTERNAL MARKET (Continued)

NACE/Description		% of PP	PP/ output	Static Price Advantage	Accept/ reject	Restructuring/Economies of Scale	Accept/ reject
83/84 Business services	I-O	4.6	10.2	This includes: real estate agents legal, accountants, consultancy services advertising computer services, photocopying, etc Most of these require proximity of the client/supplier and are not amenable to open tendering. There are also language and legal system barriers. An exception is some consultancy services	X	No economies of scale	0
85 Property rents	I-O	1.4	3.0	Non-tradable	0	No economies of scale	0
9: OTHER SERVICES							
98/92/96//97 Market services	n.e.s	2.7	10.7	Includes: cleaning, cosmetics, social work, prof. associations, hairdressing, photographers, etc. recreation (films, arts, museums) All require proximity	0	No economies of scale	0
Education and research		0.7	26.8	Impossible to measure output	0	Probable economies from rationalising research, but not measureable	(X)
Medical		0.8	3.2	Requires proximity	0	No economies of scale	0

Source: WS Atkins

X = accept
0 = reject
I-O = Input/output analysis data from Part I Report 1984 estimates
F = French analysis by CCM 1983 data

* are tradable

* are not at present freely traded, so that there is a possibility of price differences existing (after allowing for transport/trading costs)

* benefit from nationalistic public purchasing policies, the removal of which might lead to increased trade by the public sector.

The result of this analysis is the list shown in Table 2.2. This is ranked in order of the importance of the product in public procurement, as indicated by the analysis of total purchasing from input-output tables and the French analysis of contracts (taking the two digit NACE code share and estimating the share of the product concerned within the whole 2-digit category). The list includes all products of interest whose share is greater than 0.1% of all public procurement.

The total list covers one third of all public procurement. The remaining two thirds are either non-tradable or weakly tradable so that opening up public procurement will have no effect, or they are commodities or similar products which are already freely traded.

2.3 The Restructuring List

Sectors on the Restructuring List are those shown in Table 2.3, which:

* depend heavily on public sector purchasers

* have few dominant producers, because economies of scale are important

TABLE 2.2 - THE PRICE EFFECT LIST

	NACE	Item	Share of Public Contracts (France '83)			Share of Total Purchasing 1984		
			2-dig share	prod weight	prod share	2-dig share	prod weight	prod share
-	364	Aerospace equipment/arms	10.6%	0.75	8.0%	9.0%	0.75	6.8%
P	257	Pharmaceuticals	7.0%	0.5	3.5%	3.2%	0.5	1.6%
-	32x	All other mechanical engineering	6.5%	0.5	3.3%	2.6%	0.5	1.3%
C/P	342	Power generation equipment	13.5%	0.2	2.8%	4.7%	0.2	0.9%
-	361	Shipbuilding	10.6%	0.25	2.7%	9.0%	0.1	0.9%
C/P	344	Telecom equipment, electro-medical equipment, etc	13.5%	0.4	2.7%	4.7%	0.2	0.9%
C	11	Coal for power stations	2.4%	1	2.4%	3.7%	1	3.7%
C	33	Computer equipment	13.5%	0.15	2.0%	1.8%	0.5	0.9%
P	36	Motor vehicles	2.0%	1	2.0%	1.7%	1	1.7%
P	341	Power cables	13.5%	0.1	1.4%	4.7%	0.1	0.5%
P	347	Lighting (office/street)	13.5%	0.1	1.4%	4.7%	0.1	0.5%
C/P	362	Railway rolling stock	1.9%	0.5	1.0%	9.0%	0.1	0.9%
C	314/315	Heavy steel fabs	1.8%	0.5	0.9%	2.3%	0.5	1.2%
-	256.5	Explosives	7.0%	0.1	0.7%	3.2%	0.1	0.3%
P	467.2	School/office desks/furniture	0.6%	0.9	0.5%	0.7%	1	0.7%
P	453	Uniforms/clothing	0.6%	0.8	0.5%	0.7%	1	0.7%
P	471.3	Paper	0.4%	1	0.4%	0.4%	1	0.4%
P	242.1	Cement	0.6%	0.3	0.2%	0.05%	1	0.05%
-	328.4	HVAC equipment	27.0%	0.0075	0.2%	2.6%	0.05	0.1%
-	325.1	Mining equipment	approx		0.1%		less than	0.1%
-	451	Military/police boots	0.1%	0.8	0.1%	0.1%	1	0.1%
-	325.2	Steel plant		less than	0.1%		less than	0.1%
-	314.3	Pit props		less than	0.1%		less than	0.1%
-	314.4	Railway track		less than	0.1%		less than	0.1%
-	152	Nuclear fuels				0.3%	1	0.3%
	502.7	Spec. civil engineering				26.6%	0.1	2.7%
		Business Services				4.6%	0.1	0.5%

Source: French contract data - CCM; total purchasing - Atkins analyses of input-output tables ESA
P = price enquiry
C = case study interviews

TABLE 2.3 - THE RESTRUCTURING LIST

	NACE	Item	PP in indust output (est.)	% of Purchasing EUR5 - 1984 (estimated)	% of Contracts (France 1983)	Case Study Product
C	11	Coal	60.0%	3.7%	2.4%	power station coal
-	152	Nuclear fuel processing	20.0%	0.3%		-
-	222	Iron and steel tubes	10.0%	0.1%	0.1%	-
-	221	Special steels	10.0%	0.1%	0.1%	-
C	314/315	Heavy steel fabrication	30.0%	1.2%	0.9%	nuclear pressure vessel/power station boiler
C	33	Computers	30.0%	0.9%	2.0%	mainframe computer
C	342	Power generation equipment	90.0%	0.9%	1.4%	turbine generator
C	344	Telephone exchange equipment	90.0%	0.5%	1.0%	switching equipment
C	344	Telephones	varies	0.2%	1.0%	consumer hand set
C	344	Optoelectronics	50.0%	0%	0.1%	lasers
-	361	Naval shipbuilding	100.0%	1.0%	2.7%	-
C	362	Railway locos/rolling stock	90.0%	0.9%	1.0%	electric locomotive
-	364	Aircraft	50.0%	1.0%	5.0%	-
-	364	Avionics	50.0%	1.0%		-

Source: French contract data - CCM; total purchasing - Atkins analyses of input-output tables ESA

* are, therefore, often in a monopoly-monopsony or oligopoly-oligopsony market environment, so that these are the sectors where there are "national champions", and which governments are driven to favouring in order to protect jobs, guarantee security of supply or promote innovation and investment.

Many of these products are "old friends", cited in previous studies on public procurement. They can be divided into two broad groups:

* declining or static industries of strategic importance, for which loss of business might lead to closures:

  - coal
  - iron and steel tubes; special steels
  - heavy steel fabrication
  - power generation equipment
  - shipbuilding
  - railway rolling stock.

* strategic new technologies requiring heavy support for R&D:

  - nuclear fuel processing
  - computers
  - telecommunications
  - optoelectronics, specifically lasers
  - aircraft
  - avionics.

This classification is only loose: there are high technology products and heavy R&D in segments of the mature industries like power generation, naval shipbuilding and high speed railway locomotives.

2.4 Selection of Products for Analysis

2.4.1 Case Studies

Some of the industries in the Restructuring List are defence suppliers and cannot really be researched adequately within the present study. The sharing of defence equipment markets and harmonisation of defence standards is being tackled within NATO and by the Independent European Programme Group (IEPG), which falls outside the scope of the European Communities' internal market programme.

These sectors have not been considered in detail:

* naval shipbuilding
* aircraft
* avionics.

Nuclear fuel processing is also an area not susceptible to analysis by case study interview, and has not been included in detailed studies in Part II.

Furthermore, the two subsectors of the steel industry have very little weight in total purchasing and have not been included.

This leaves the following list of sectors for Case Studies, covering their economies of scale, intra-community price differences, and scenarios for restructuring in the internal market:

* coal
* heavy steel fabrication (power station boilers/nuclear pressure vessels)
* turbine generators
* electric railway locomotives.
* mainframe computers

* central public exchange (CPE) switching equipment
* telephones
* optoelectronics (lasers)

These products cover the critical supply products to the important purchasing sectors of Power Generation (coal, heavy fabrications, turbine generators), Telecommunications (CPE switching, telephones, lasers), and Transport (electric locomotives).

2.4.2 Price Investigations

All of the products on the case study list are also on the price effect list, and the price differences have been investigated in the case study interviews.

Some of the product groups on the price effect list consist of a diversity of products, with no dominant standard products for which meaningful price comparisons could be made - namely broadcast equipment, HVAC equipment, and "other mechanical engineering", which is plant and equipment for a variety of industries.

Those products with weight of 0.1 percent or less of total public procurement will have no significant impact, and have been investigated on an individual basis.

This leaves the following product groups for which the prices paid by the public sector and offered by suppliers have been investigated in the five study countries:

* pharmaceuticals
* cars and vans
* electrical office equipment
* power cables
* street lighting
* office lighting
* school desks
* office desks and furniture

* filing cabinets and shelves
* uniforms
* paper
* cement.

In addition, the following products which are predominently public sector purchases, but are volume purchases with definable typical products, have been the subject of a price investigation.

* electro-medical equipment (X-ray machines/cardiac monitors)
* telephones
* railway wagons
* electrical transformers.

The typical product definitions selected are shown in Appendix I. (Where possible these are product specifications used by Eurostat for collection of price data for calculation of purchasing power parities.) The analysis of prices is discussed in the following section of the Report.

3. PRICE COMPARISONS

3.1 Objectives and Methodology

This section sets out the basic data for estimating the static price advantage from opening up public procurement for the products selected in the "price effect" list in the previous section of the report. These are products with significant levels of public purchasing, and represent those groups of products for which a priori it is likely that potential savings exist.

The approach consists of:

* collecting data on prices of similar products, in the five study countries, from suppliers and from purchasers (subsection 3.3)

* estimation of the savings threshold which foreign suppliers' prices must exceed, in order to cover the additional costs of trading (subsection 3.5 and Appendix II)

* calculation of the apparent potential price saving (subsection 3.6 and Appendix II)

* consideration of special factors which might prevent the apparent savings from being realisable.

The apparent potential savings are summarised in subsection 3.7.

The findings from these price comparisons have been taken together with those from the case studies set out in the following sections of the report. The static price savings for the sample products have then been generalised to the 2-digit NACE level and the gross potential savings estimated.

Some of the conceptual and practical problems of such price comparisons are set out in the following subsection 3.2.

3.2 Practical Problems of Price Comparison

The approach adopted leads to a good indication of the order of magnitude of total potential savings to be expected, even though it is based on a necessarily limited sample of products and observations. It cannot of course be concluded with certainty that any specific purchaser or specific country could make the potential savings estimated for any particular product. It is a stochastic analysis, which gives a good estimate of the aggregate effect, although the errors for individual product groups may be quite large. By basing the total estimates an analysis of over 40 products over the whole spectrum of supplying sectors, the margin of error in the total is reduced.

For individual products, statistically reliable price comparisons cannot be made without an enormous amount of data, which within the context of this study it would be impossible to collect and analyse.

For specific products, reliable comparisons cannot be made in most cases, for a whole series of reasons:

* **The distribution of prices within a country**: Products which have a large number of public sector buyers (e.g. common consumable items like cleaning materials, light bulbs, food, stationery) exhibit wide differences of prices between buyers. A 1982 report on local authority purchasing in the UK showed ranges of 3:1 for some products, and ranges of 2:1 for almost all products. This is due to differences in lot size, frequency/dispersion of delivery, the efficiency of the purchasers, and the state of the market at the moment of ordering. There are probably also wide variations in the specification of the product normally supplied to meet a given

purchase specification; as noted below. Observation of a small number of prices in any country can give quite misleading information.

Products which are infrequent purchases (power stations, weapons systems) are also subject to the influences listed above and observation of a particular price does not necessarily reflect the underlying cost/price relationship.

It should be recalled that even for consumer goods, where markets are much more transparent and competitive, very wide intra-country price differences can exist, both across regions, and between different types of distribution outlet, and of course between differentiated brands.

* **Standards/quality/specification**: These vary even for standard items like detergent powders. For works contracts, services, and non-standard items like defence equipment, the specification documents may run into hundreds of pages, and reliable comparisons, while theoretically possible, would in some cases be impracticable, and in most cases subject to inaccuracies which are likely to be greater than the underlying cost differences. Therefore, such detailed comparisons are not considered feasible for items which are highly differentiated (and in many cases, unique).

  Even for products for which a fairly rigid specification can be given (such as light bulbs, filing cabinets, electrical transformers, paper) there can be very considerable product differentiation, particularly as regards quality, as well as less measurable aesthetic differences, which can support quite significant price differentials.

* **Life cycle costs**: Even for comparable product specifications, differences in initial costs may be due to differences in product performance, in terms of maintenance costs, product life, and operating costs. In evaluating

tenders, purchasers ought to have selected the product with the lowest life cycle cost. Competitive products may then have very different initial costs.

* **The cost of non-traded inputs**: Part of any real cost difference between items is likely to be due to the difference in the cost of non-tradable inputs such as land, local building materials and labour, rather than due to the Non-Europe barriers. This is particularly the case with works contracts, where it is really only the project management and professional services which can be traded - and then subject to language and other natural limitations which are outside the scope of the present internal market programme. Comparison of local prices tells nothing about the scope for trade or potential price changes.

* **Transport costs**: If the above estimation difficulties are overcome, and a valid comparison of local prices has been made, the cost of transport and of trading between each pair of countries (costs of representative, insurance, taxes, communication etc.) have to be estimated in order to assess the possibility of trade and hence the potential price impact. To obtain precise estimates of the mark-up for specific supplies to specific customers would be enormously time consuming, if data were available. Order of magnitude estimates are made in the analysis which follows.

* **Fluctuating exchange rates**: Short term price differentials exist as a result of exchange rate fluctuations, particularly between the pound and EMS currencies. Where exchange rates are floating, public sector purchasers would probably not be in a position to take advantage of observed price differences, because of the exchange risk inherent in long term contracts. This is a different barrier to trade; it is not nationalistic public purchasing.

* **Discounts and bonuses**: Many contracts include incentives for timely delivery or other supplier performance factors. Contract prices do not therefore reflect outturn costs. Prices quoted by suppliers in response to the enquiry carried out by the Consultants may also be misleading, since in many industries there is a system of list prices on which significant discounts are given to dealers and large customers: these discounts are treated as highly sensitive commercial information and so are very rarely revealed.

* **Contracts with mixed goods**: A large proportion of supply contracts, perhaps the majority, are let for a list of mixed goods, for which individual prices are not quoted. In these cases price comparisons using actual observed contract prices are impossible. This proved to be the case with most of the common supplies contracts included in the contract database.

3.3 Data Sources

Several approaches have been considered in order to obtain comparable price data. These include:

* data for 'shopping list' items from the contract database analysed in the Part I Report

* the price indices developed by Eurostat for the purpose of calculating purchasing power parities

* direct price enquiries to purchasers and suppliers

* other studies.

3.3.1 The contract database

The contract questionnaire/shopping list approach did not work out as well as expected as a means of obtaining comparable price data. It forms an invaluable database for looking at the pattern of public

procurement, and has revealed information about the types of contracts let which would not otherwise be available. As a means of comparing prices, however, a number of problems are evident:

* there has been considerable resistance from many authorities to providing the manpower to extract information needed for the questionnaires. Many authorities do not have the data on past contracting activity easily available. The size of the database therefore, although large (over 4,000 records) does not have a large number of observations on any one product

* there is particular difficulty in obtaining price data, and in one member state is protected by law

* in many cases the product specification information given in the questionnaires is insufficient to calculate a unit price which can be compared with other contracts.

3.3.2 Eurostat data

Eurostat price data is collected to calculate purchasing power parities. It mainly covers consumer goods and equipment goods, however, with very few products used by the public sector. The 1986 prices of those products which are of interest are shown in Table 3.1. These are the average of price observations in various types of distribution outlet in 1985, net of duty and VAT and converted in ecus at the mid 1986 exchange rate.

3.3.3 Direct enquiries

In view of the inadequacy of the two sources of data above, which do not cover all the products identified as of prime interest in the 'price effect list' in Section 2, it became necessary to make direct enquiries of purchasers and suppliers in the five study countries. This was done by:

TABLE 3.1 - AVERAGE PRICES OF "EUROSTAT" STANDARD GOODS 1986
(Ecus net of tax and duty)

	Germany	France	Italy	UK	Belgium
Metal Office Furniture					
Fixed armchair	162	133	100	141	118
Storage cabinet	354	364	348	314	300
File cabinet	332	388	462	252	317
Shelf	85	86	57	52	118
Swivel chair	272	224	224	167	252
Office Machinery					
Typewriter I	887	1,035	1,292	1,279	892
Calculator I	131	145	191	100	113
Calculator II	17	24	28	14	-
Paper Shredder	840	805	1,312	-	853
Telephone	103	87	53	29	60
Vehicles					
Average of car	10,367	10,946	11,619	11,973	10,025
Van b6	14,463	12,409	14,909	14,840	12,188
Van b7	10,158	12,269	11,156	11,120	9,134
Bus d8	178,237	199,884	228,174	176,749	-
Bus d14	11,762	16,133	-	14,261	10,684
Electrical Equipment					
Transformer I	3,331	3,328	2,918	4,395	2,849
Electro/graph	1,300	1,364	1,435	1,218	1,413
*Pharmaceuticals	1,513	682	716	1,213	794

Source: Eurostat
*Note : Source for pharmaceuticals: BEUC

* compiling a set of sufficient specifications to define the product, order size and delivery method of each of the products selected for price comparison (see Appendix I)

* recontacting purchasing authorities which had provided data to the contract database, and asking for their current purchase price for the specified goods (without naming suppliers or any other details)

* carrying out a market research survey in the five countries, to identify suppliers, and then obtain quotations for the specified goods from three suppliers (where three exist) after discount to a typical public sector purchaser.

This approach does not entirely overcome the problems identified in sub-section 3.2, since there can still be considerable product differentiation within the specification adopted. In some cases also suppliers will only quote their undiscounted price. Nevertheless, the data are believed to be considerably more reliable than the other sources quoted above and are shown in Table 3.2.

3.4 Comparison of Prices - General Comments

The data shown in Tables 3.2 and 3.3 all indicate that there are indeed very significant price differences recorded between countries.

It is notable that for the products in the direct price enquiries there are significant price differences between quotes within countries.

The non-differentiated products have price ranges between individual quotes of between 1.3 and 1.8 to 1. This range of prices is similar to the range of prices observed for non-differentiated products between local authorities in the UK.

TABLE 3.2 - PRICES OF SAMPLE PRODUCTS TO PUBLIC SECTOR PURCHASERS (FROM DIRECT ENQUIRIES)

(ECUs per unit, net of taxes 1987)

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper	Cemen
Belgium 43.0117											
Purchaser	5.00	570	15902	223	1.96	47	139	166	302	2.14	
Supplier 1	4.47	566	41949	349	4.51	52	275	162	197	4.38	
Supplier 2	4.37	480				44	407	206	160	3.48	
Supplier 3	4.13	629				51	430	388	163	3.20	
Minimum Price	4.13	480	15903	223	1.86	44	199	162	160	3.11	
Mean	4.50	561	28876	286	3.19	49	343	230	205	3.75	
France 6.91563											
Purchaser	10.45	868	20422	260		25	290	205	145	5.32	
Supplier 1	6.36	600	20650		1.21	63	401	205	119	4.80	
Supplier 2	7.22	523	23353		1.32	42	182	159	95	3.18	
Supplier 3		550	16372		1.97	51	588	267	142	5.18	
Minimum Price	6.36	523	16372	260	1.21	25	182	159	95	3.18	
Mean	8.01	635	20199	260	1.50	45	367	234	125	4.12	
Germany 2.07238											
Purchaser	2.32	145	14215	193	1.50	57	289	222	99	4.22	
Supplier 1	10.05	579	15920		1.86	92	331	521	87	4.63	
Supplier 2	4.49	278	24121		1.78	62	772	205	52	4.52	
Supplier 3	9.78	205	23542			63	786	409	99	4.40	
Minimum Price	2.32	145	14215	193	1.50	57	289	205	52	4.22	
Mean	6.41	302	19450	193	1.71	69	445	341	79	4.44	
Italy 1501.61											
Purchaser	15.82	1069	20157		5.32	53	181	261		2.71	
Supplier 1	8.99	832		140	3.86	22	166	411	117	2.97	
Supplier 2	8.99	832		117	3.86	20		255	153	2.66	
Supplier 3	8.66	599		113		27		308	170	2.33	
Minimum Price	8.66	599	20157	113	3.86	20	166	261	117	2.66	
Mean	10.61	833	20157	123	4.35	31	174	316	147	2.91	
UK 0.704028											
Purchaser	0.80	32	15653	70	1.15	21	255	103	92	2.32	
Supplier 1	2.70	39	24979	57	2.10	32	108	146	84	3.31	
Supplier 2	4.22	43	17045	52	3.74	28	624	138	111	4.62	
Supplier 3				107	3.10		223				
Minimum Price	0.80	32	15653	52	1.15	21	108	103	84	2.32	
Mean	2.58	38	19226	71	2.27	24	302	129	95	3.42	

Source : Atkins Survey

TABLE 3.2 - PRICES OF SAMPLE PRODUCTS TO PUBLIC SECTOR PURCHASERS (FROM DIRECT ENQUIRIES) (Continued)
(ECUs per unit, net of taxes 1987)

	Steel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray m/c.	Trans-former	Goods wagon	Telephone
Belgium 43.0117								
Purchaser	6460		9184	2929	158311	9707	62471	44
Supplier 1	6821	8344	9405	2467	158311	8602		35
Supplier 2	6821		9658					
Supplier 3								
Minimum Price	6460	8344	9184	2467	158311	8602	62471	35
Mean	6701	8344	9416	2698	158311	9154	62471	40
France 6.91563								
Purchaser				2784		8040	50610	50
Supplier 1	7814	10079	10491	2909	222207	10845	54225	49
Supplier 2	7695				101220			62
Supplier 3	9426							
Minimum Price	7695	10079	10491	2784	101220	8040	50610	49
Mean	7978	10079	10491	2847	161764	9442	52417	54
Germany 2.07288								
Purchaser	8295	9951	9775	2478	173671	6754	59338	33
Supplier 1	7705	8881	9407	2672	137726	8088	62713	30
Supplier 2	7883	8830	9252	2171	149956	8249	67534	29
Supplier 3	7705	9135	9202	2307	132666	6374	96484	27
Minimum Price	7533	8830	9202	2171	132666	6754	59338	27
Mean	7810	9199	9309	2957	159899	7628	71519	47
Italy 1501.61								
Purchaser				2784		7089	52942	21
Supplier 1	8243	10320	10642	2996	226424	6660	60265	13
Supplier 2	7318	9740	11132	1998				24
Supplier 3	9240	9764	11146					
Minimum Price	7318	9764	10642	1998	226424	6660	53942	13
Mean	7933	9608	10974	2926	226424	6874	58604	21
UK 0.704028								
Purchaser	7582	8218	8745		147762	9218	71020	27
Supplier 1	7649	9225	8325	4558	94587	10653	56816	29
Supplier 2	7649	8615	9522	1243	77696	11079	56816	30
Supplier 3	7649		8325	1569	95167			
Minimum Price	7582	8219	8325	1243	77696	9218	56816	27
Mean	7632	8686	8479	2490	104203	10317	61551	29

Source : Atkins Survey

For differentiated products the observed range of quotes is much larger (around 4:1) and the ratio of prices actually paid ranges from 1.2 to 4.6 to 1.

These general observations lead to a powerful conclusion: there is very considerable scope for savings in public purchasing in these products, but not only as a result of increased international trade. Increased efficiency and transparency in public purchasing ought also to lead to a reduction in the dispersion of prices, and to overall lower prices, within each country.

Increased standardisation might also lead to reduced prices (by increasing competition as well as by adopting the most cost-effective specification), but there will always be differentiated products to meet specific local requirements. Uniforms, despite their name, are a good example. They need to differentiate the personnel of different services, and be adapted to the mode of work and to the climate.

The key question needs to be asked: if it is a product used by both the public sector and the private sector, why should the public sector be able to make a saving through trade which the private sector has not taken advantage of? Why should public purchasing offices be better traders than professional traders are?

A priori, public sector savings would be expected where either:

* there is no significant private sector trade, such as railway wagons, street lamps, or any of the products in our 'economies of scale' case study list, (power generation equipment, coal, telecommunications equipment, railway equipment) or

* the public sector and private sector markets are separated to such a degree that the public sector pays a higher price than the private sector in which case it is essentially a different public sector product, (such a case might occur for example in computers for specific applications) or

* there are restrictions on private sector trade which a powerful central public purchaser could overcome - such as exclusive distributorships on branded goods like cars, or consumer and medical electrical goods.

It is useful to see from Table 3.2 to what extent the public sector pays higher prices than the open market, as indicated by the suppliers' offer prices.

	Number of products for which the public sector purchase price is higher/lower than the mean observation	
	Higher	Lower
Belgium	7	9
France	6	7
Germany	8	10
Italy	7	4
UK	3	15
	31	45

There is no evidence that on the whole the public sector pays higher prices than the private sector.

3.5 Savings Thresholds and Calculation of Savings Factors

To estimate what savings might be made it is necessary to assess for each product what level of price differentials would exist in the absence of any public purchasing restrictions. Price differentials will continue to exist because of:

* transport and trading costs (local representation, publicity and promotion, travel, procurement costs etc.) which exist because of geographical separation even in a barrier-free internal market

* 'normal' product differentiation due to differing local requirements, circumstances, tastes, heritage, or the simple demand for diversity of products and suppliers.

* other barriers to trade, which may be removed as a result of the Internal Market Programme, but the benefits of whose removal cannot be attributed to the opening up of public procurement - for example, border costs, standards, and in some cases "irremovable" barriers such as language or the heritage of infrastructure standards

* exchange rate and trading risks.

To assess the potential saving for each of the sample products, an estimate is first made of the price difference which would need to be offered by a foreign supplier in order to overcome the above effects, and make it worthwhile for a purchaser to buy from abroad. This price differential will be called the "savings threshold".

The savings threshold is calculated as a percentage of the price from a local supplier. Appendix II shows estimates for typical contracts for each of the products on the price effect list. The savings threshold is sensitive to the size of contract, the exact locations of supplier and purchaser, delivery requirements and the characteristics of the product. In general, the threshold will be lower for large contracts because of relatively lower transport and procurement costs. The following analysis is based on typical contract sizes and assumptions about procurement costs, linked to a simple transport model for costs between main industrial regions in each of the five countries (Brussels, Paris, Frankfurt, Milan, and London)

In the estimation of savings thresholds no account has been taken of other barriers to trade, nor of the effects of product differentiation or different national standards. Our estimates of the potential price savings are therefore likely to be overestimates of what would be achieved in practice, because:

* part of the observed price differences is likely to be due to differences in quality and specification

* other barriers prevent the achievement of the apparent potential savings.

In the base case calculations, the potential savings for the typical public sector purchaser of a product is calculated, for products in the Atkins direct price enquiries, by comparing the mean price in each country, with the lowest available mean price. This mean is the average of prices quoted by both suppliers and purchasers. By comparing mean prices, the focus is on the difference between countries, of prices of a relatively 'standard' product. The EUROSTAT data are already mean prices of several quotations. The difference between the price advantage and the savings threshold gives the apparent potential saving for each potential supply country. The highest saving from among the four potential supplying countries gives the maximum apparent potential saving. The detailed calculations are shown in Appendix II. The results are summarised in Table 3.3.

3.6 Comment on Products in Direct Price Enquiries

In this section some further comments are offered on the potential savings indicated for products covered by the Atkins direct price enquiries.

3.6.1 Pharmaceuticals

Two pharmaceutical products were selected for the direct price enquiries: digoxin and paracetamol. The products are not 'typical', but do illustrate the general conclusion that there are often startling differences in drug prices between countries.

Digoxin is a drug used mainly in hospitals, for heart patients; paracetamol is a common pain killer both used in hospitals and sold as a retail non-prescription drug. Both are sold as generics and as branded products. Both the drugs selected happen to show the UK as the low price supplier (see Table 3.4). A different selection of drugs would be likely to show lowest prices occurring in a different

TABLE 3.3 - POTENTIAL STATIC PRICE SAVINGS BY PRODUCT
(percent of present home price - base case hypothesis)

R59	Product sector	% of total purchases	Belgium	France	Germany	Italy	UK	Data source
31	Coal	3.69	0	0	50	0	25	a
151	Cement etc	0.05	0	0	0	0	0	a
170	Chemicals	3.22						
	Pharmaceuticals		9	0	52	0	40	c
190	Metal products	2.27						
	Boilers		0	0	0	0	0	d
	Filing cabinets		20	15	28	0	0	a
	Fixed armchair		0	2	23	0	5	b
	Storage cabinet		0	0	0	0	0	b
	File cabinet		4	19	0	11	0	b
	Shelf		30	0	0	0	0	b
	Swivel chair		16	0	5	0	0	b
	Weighted average		6	3	5	1	0	
210	Agriculture/industry etc	2.62	11	8	10	7	4	e
230	Office machine & instrumentation	1.76						
	Mainframe		0	0	0	0	0	a
	Typewriter I		0	10	0	28	27	b
	Calculator I		4	25	17	43	0	b
	Paper shredder		0	0	0	31	0	b
	Calculator II		0	22	0	33	0	b
	Weighted average		1	12	3	27	5	

TABLE 3.3 - POTENTIAL STATIC PRICE SAVINGS BY PRODUCT - CONTINUED
(percent of present home price - base case hypothesis)

R59	Product sector	% of total purchases	Belgium	France	Germany	Italy	UK	Data source
250	Electrical equipment	4.69						
	Turbine generators		20	5	0	10	0	d
	Cables		28	0	0	0	0	a
	Transformers		12	16	0	0	19	a
	Transformer I		0	6	6	0	29	b
	Telephone switching		60	40	70	50	30	a
	Telephones		20	43	39	0	0	a
	Telephone II		47	63	68	34	0	b
	Laser		0	0	0	0	0	a
	Cardiac mon.		0	0	0	0	0	a
	Electrocardiograph		0	0	0	0	0	b
	X-ray machine		18	30	29	49	0	a
	Street lamp		0	0	0	0	0	a
	Fluorescent tube		0	0	0	9	0	a
	Weighted average		17	14	15	14	7	
270	Motor vehicles	1.70						
	Opel		0	11	9	9	7	a
	Average car		0	4	0	8	12	b
	Fiat		0	12	4	5	0	a
	VW		0	15	4	17	0	a
	Van B6		0	0	11	13	14	b
	Van 87		0	21	5	12	13	b
	Bus D8		0	8	0	19	0	b
	Bus D14		0	30	4	0	21	b
	Weighted average		0	13	4	10	9	

TABLE 3.3 - POTENTIAL STATIC PRICE SAVINGS BY PRODUCT - CONTINUED
(percent of present home price - base case hypothesis)

R59	Product sector	% of total purchases	Belgium	France	Germany	Italy	UK	Data source
290	Other transport	9.01						
	Electric locos		10	0	10	20	0	d
	Goods wagon		13	0	23	5	10	a
	Weighted average		11	0	13	16	3	
410	Textiles and clothing	0.69						
	Uniforms		55	25	0	36	1	a
450	Wooden furniture	0.70						
	School desk		20	7	25	0	0	a
	Office desk		0	0	15	0	0	a
	Weighted average		10	4	20	0	0	
471	Paper and board	0.44						
	Copier paper		0	8	18	0	0	a
430	Leathers, leather & skin goods, footwear	0.13	11	6	11	14	4	e
490	Rubber & plastic products	0.71	11	6	11	14	4	e
510	Other manufacturing products	0.46	11	6	11	14	4	e
530	Building & civil engineering works	26.65	10	10	10	10	10	f

TABLE 3.3 - POTENTIAL STATIC PRICE SAVINGS BY PRODUCT - CONTINUED
(percent of present home price - base case hypothesis)

R59	Product sector	% of total purchases	Belgium	France	Germany	Italy	UK	Data source
710	Business services provided to enterprises	4.63 / 63.41	10	10	10	10	10	f

Sources:
a Atkins direct enquiries 1987
b Eurostat price survey 1986
c BEUC 'A Common Market in Medicines' 1987
d Atkins case study interviews
e Weighted average of other manufacturing sectors
f Atkins hypothesis

Notes:
1 To estimate potential savings for leather goods and footwear, rubber and plastics, and other manufacturing products, a weighted average was used of the potential savings in other manufacturing sectors.
2 A straight estimate of 10% potential savings was made for building and civil works, and business services, for each country
3 The potential savings for coal are taken from the case study

country. Paracetamol is an extreme case. This is one of the most commonly used analgesics in the UK, and largely replaced aspirin many years ago as the recommended drug because of fears of stomach damage caused by aspirin. In other EC countries, however, paracetamol is little used, and in Belgium is almost unknown.

The pharmaceutical industry has very complex pricing policies, since the marginal costs of production are very low compared with both the direct fixed costs of production, and the large overheads for R & D, testing, marketing. Enormous price differences can therefore exist for particular products. A perfectly competitive market in which prices were driven down to marginal costs would be unsustainable since profits would be negative and there would be no contribution to research and development. There are therefore approved lists, with differing degrees of government control over prices. France, for example, exerts control on drug prices to keep them low; Germany permits drug companies to set the prices.

The price enquiry data has not been used for estimation of potential savings. Instead, data has been used from a 1987 report by the Bureau Europeen des Unions de Consommateurs (BEUC), "A Common Market in Medicines?" This report gives the price of a basket of drugs in all European countries and is therefore more representative. It shows a ratio of about 2.5:1 in prices between the highest price country (Germany) and the lowest (Portugal). The prices and potential savings for the five study countries are shown in Table 3.5.

Hospitals and health authorities may buy their bulk supplies of drugs by negotiated contract direct from the original manufacturer at negotiated prices (for a range of drugs), and buy low volume supplies and 'top-up' quantities from a wholesaler, at list prices less a discount (7 percent in the UK from one wholesaler). In these circumstances there is little opportunity for open tendering procedures. International competition ought to operate through wholesalers, but this does not in practice occur. Wholesalers sometimes get approval from the manufacturer to match a particular contract price. The wholesaler could sometimes make a profit by

TABLE 3.4 - POTENTIAL PRICE SAVINGS FOR DIGOXIN AND PARACETAMOL*
(Ecus per 200 tablets, 1987)

	Belgium	France	Germany	Italy	UK
a) Digoxin (200 tablets)					
Mean Price	4.50	8.01	6.41	10.61	2.58
Potential Supplier	UK	UK	UK	UK	-
Price Difference	43%	68%	60%	76%	-
Threshold	59%	41%	74%	70%	-
Potential Saving	0	26%	0	6%	-
b) Paracetamol (10,000 tabs)					
Mean Price	561	635	302	833	38
Potential Supplier	UK	UK	UK	UK	-
Price Difference	93%	94%	87%	95%	-
Threshold	11%	12%	31%	20%	-
Potential Saving	82%	82%	57%	76%	-

Source: Appendix Table II.2
* Note: These data are not used in estimation of potential savings.

TABLE 3.5 - POTENTIAL PRICE SAVINGS FOR BEUC BASKET OF PHARMACEUTICALS

	Belgium	France	Germany	Italy	UK
Price (ecu)	1,514	683	716	1,214	795
Potential supplier	F	F	F	F	F
Price advantage	14%	-	55%	5%	44%
Threshold	5%	-	3%	7%	3%
Potential Saving	9%	-	52%	0%	40%

Source: BEUC 1987 and Appendix Table II.3

buying from wholesalers in other EC countries where the price is lower - even by reimporting drugs exported from the home country in national packaging. One UK wholesaler said he doesn't rock the boat because the effort and paperwork involved is very costly and there is a risk of getting non-authentic supplies; also foreign packaging is not usually acceptable to clients - even when there is 10:1 or more difference in prices. (In practice, a wholesaler who tried parallel importing would probably find his national suppliers refused further business with him).

Unbridled competitive tendering in this situation would be highly undesirable. Undoubtedly prices would be forced down. This competition, however, would not necessarily drive out inefficient producers or make existing producers more efficient. It would probably impinge on research and development and on safety standards.

Possibly, harmonisation of different countries' drug lists would lead to economies of scale and more orderly markets. This is not a direct result of more open public purchasing, although it might be a necessary condition for wider tendering with adequate safeguards. Prices would probably settle at a level below the present average, but not at the level of the lowest.

It nevertheless remains true that in theory, at present, purchasers could make enormous savings on some drugs by buying from overseas in sufficiently small quantities not to upset the system.

3.6.2 Power cables

Power cables are a standardised product, with strict specifications laid down by the power utilities. The standard cross-sections and number of strands vary between countries, but the manufacturers can quite easily switch production between different specifications. It is a competitive industry with a mature technology.

The observed price differences are of the order of 20 percent (see Table 3.6). The price is usually linked to a specified steel and aluminium price. Different base dates or material sources could account for a large part of this difference.

TABLE 3.6 - POTENTIAL PRICE SAVINGS FOR POWER CABLES
(Ecus per 10 km, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	28876	20199	19450	20157	19226
Potential Supplier	UK	UK	UK	UK	-
Price Difference	33%	5%	1%	5%	-
Threshold	7%	9%	12%	17%	-
Potential Saving	27%	0	0	0	-

Source: Appendix Table II.2

Transport costs are high, and quality assurance very important. No significant savings are indicated, except for Belgium (but based on only one suppliers price which may be erroneous).

3.6.3 Street lamps

The product specification chosen (from the Eurostat database) was only familiar to one producer in Belgium and one in the UK. Street lamp specifications vary considerably, and it is not known how close the specifications are in some cases. The highest price quoted (for Germany) is actually for a much higher specification, heavier duty, complete assembly with mast and control gear - probably increasing the cost by four or five times the given specification.

In view of this great variability no firm conclusions on relative savings can be drawn from the data. It would appear, however, that there could be economies from greater standardisation of street lighting types (see Table 3.7).

TABLE 3.7 - POTENTIAL PRICE SAVINGS FOR STREET LAMPS
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	286	260	193	123	71
Potential Supplier	UK	UK	UK	UK	-
Price Difference	75%	73%	63%	42%	-
Threshold	32%	33%	38%	50%	-
Potential Saving	43%	39%	25%	0	-

Source: Appendix Table II.2

3.6.4 Fluorescent tubes

The standard lengths and wattages of fluorescent tubes vary between countries. Prices have been taken for either 65W (F, D, I) or 80W (B, UK).

The prices show a marked difference, with prices relatively high in the UK, Belgium and Italy (3 to 5 ecus) and low in France and Germany (1 to 2 ecus). There seems to be no obvious technical reason for this difference. It is likely, however, that sourcing of supplies is restricted by the design of light fittings. The cost of transport is relatively high, because of the high volume/cost ratio and breakages. It may be that the high priced tubes are imported.

Because fluorescent tubes are a low value product with small order sizes, the savings threshold is very high. This gives no potential savings (see Table 3.8).

TABLE 3.8 - POTENTIAL PRICE SAVINGS FOR FLUORESCENT TUBES
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	3.19	1.50	1.71	4.35	3.27
Potential Supplier	F	-	F	F	F
Price Difference	53%	-	12%	66%	54%
Threshold	82%	-	148%	69%	81%
Potential Saving	0	-	0	0	0

Source: Appendix Table II.2

3.6.5 School desks

There is a ratio of nearly 3:1 between the highest and lowest mean country prices, and 4.6:1 between individual quotes. There are differences in construction methods between products, and hence probably major differences in product life as well as appearance.

Belgium and Germany appear to be high price countries. In France, suppliers quote high prices, but the price paid by UGAP (the Government central purchasing agency) is low. The reverse applies in Italy, but the purchasing authorities questioned may have been exceptional. The UK is the low price country for both quotes and price paid.

The cost of school desks is low and transport costs would be high - comparable to the ex-works price for long distances. The only potential for trade is likely to be in border areas. The supplier is also frequently expected to provide a repair service, so there is a strong incentive for local purchasing. With the savings thresholds estimated there is no potential saving (see Table 3.9).

TABLE 3.9 - POTENTIAL PRICE SAVINGS FOR SCHOOL DESKS
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	49	45	69	31	24
Potential Supplier	UK	UK	UK	UK	-
Price Difference	50%	47%	65%	21%	-
Threshold	70%	94%	103%	374%	-
Potential Saving	0	0	0	0	-

Source: Appendix Table II.2

3.6.6 Office desks

Office desks are a much higher value product than school desks, so the transport costs are less of a barrier. There is a considerable private sector trade in office furniture, mainly because of design differences. This degree of differentiation is reflected in a 4.2:1 range of price quotes, although there is only 1.7:1 range of prices paid.

In all cases it appears that the public purchaser gets desks at below the price offered by other suppliers. It can be seen from Table 3.10 that the public purchasers would be able obtain only small savings from the sampled suppliers in any other country in spite of the range of prices (unless present discounts were available from overseas suppliers.) Since the savings threshold is high, due to high transport costs, there is no potential saving, (except a possibly spurious result for Germany).

For Eurostat data on office chairs see Appendix II.

TABLE 3.10 - POTENTIAL PRICE SAVINGS FOR OFFICE DESKS
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	343	367	445	174	303
Potential Supplier	I	I	I	-	I
Price Difference	49%	53%	61%	-	43%
Threshold	88%	74%	48%	-	129%
Potential Saving	0	0	13%	-	0

Source: Appendix Table II.2

3.6.7 Filing cabinets

Filing cabinets show a similar picture to office desks, but there are some potential savings, indicated in Table 3.11. For further Eurostat data on filing cabinets, storage cabinets and shelves, see Appendix II.

TABLE 3.11 - POTENTIAL PRICE SAVINGS FOR FILING CABINETS
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	230	234	341	316	129
Potential Supplier	UK	UK	UK	UK	-
Price Difference	44%	45%	62%	59%	-
Threshold	26%	32%	36%	62%	-
Potential Saving	18%	13%	26%	0	-

Source: Appendix Table II.2

3.6.8 Uniforms

The variability of materials quoted is large and probably accounts for most of the price variations observed. Transport costs would be low, but trading costs could be very high if order size is low. The assumed 13 percent saving threshold for large orders indicates potential savings of up to 50 percent for some countries (see Table 3.12).

It is clear, however, that in practice such savings are highly unlikely to be achieved, since the uniformed services of any country, particularly the armed services, would not accept foreign uniforms.

TABLE 3.12 - POTENTIAL PRICE SAVINGS FOR UNIFORMS
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	205	125	79	147	95
Potential Supplier	FRG	FRG	-	FRG	FRG
Price Difference	61%	37%	-	46%	17%
Threshold	9%	13%	-	12%	17%
Potential Saving	52%	24%	-	34%	0

Source: Appendix Table II.2

3.6.9 Copier paper

Paper is a commodity, already fairly extensively traded. The spread of quotes is quite low, at 1.8:1, but for bulk contracts purchasers would probably seek quite small savings. Transport costs are probably only around 10 percent of the offer price, and a typical savings threshold is 19 percent.

This indicates some potential savings of up to 16 percent as shown in Table 3.13.

TABLE 3.13 - POTENTIAL PRICE SAVINGS FOR COPIER PAPER
(Ecus per 500 sheets, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	3.35	4.12	4.44	2.91	3.42
Potential Supplier	I	I	I	-	I
Price Difference	13%	29%	35%	-	15%
Threshold	29%	23%	18%	-	35%
Potential Saving	0	7%	16%	-	0

Source: Appendix Table II.2

3.6.10 Cement

Cement is also a commodity, but the public sector is not a very significant purchaser (most construction being done by contractors; cement may be mainly bought for individual contracts which have free issue materials). Transport costs are very high, so, excluding 'dumping' which is sometimes a characteristic of the cement market, there are no potential savings indicated (see Table 3.14).

TABLE 3.14 - POTENTIAL PRICE SAVINGS FOR CEMENT
(Ecus per tonne bulk delivery, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	65	69	72	52	67
Potential Supplier	I	I	I	-	I
Price Difference	21%	25%	29%	-	23%
Threshold	172%	149%	115%	-	214%
Potential Saving	0	0	0	-	0

Source: Appendix Table II.2

3.6.11 Vehicles

Vehicle prices, with discounts, have been collected for 3 vehicle types. Additional price data for 1986 for a large number of vehicle types were also obtained from the Eurostat price data.

Vehicle prices have levelled out in recent years. The data shows relatively high prices in Italy in June 1987, and low prices in Belgium and UK (see Tables 3.15 to 3.17).

It should be noted that in comparing vehicle prices, specific models have been compared. Within each country a very free and competitive market exists, and consumers have very good information on prices and performance factors, so that the producers and distributors set prices which fairly accurately reflect the consumers' assessment of relative values, (which may, however, include preference factors for non- quantitative aspects such as scarcity and national pride). If public purchasers buy only from national manufacturers they are restricting their field of choice from within the spectrum of products on offer, but given the wide range of models offered by all the major manufacturers this has only a marginal effect on optimality of their choice. They would not make any significant gain by buying a foreign make from a national dealer. (In fact most data on fleet operations show that "national" makes are more cost effective because of the lower cost of spares, which is largely determined by stock holding costs.)

The price analysis here measures the extent to which an efficient large buyer could beat the trade barriers - ie. exclusive dealerships and complicated export formalities - which keep differentials between the average car prices in different countries. This is one of the potential benefits of public purchasing power, rather than a cost of nationalistic purchasing.

There is little saving opportunity on single orders, but for large purchases there are savings up to 16 percent indicated by the direct price enquiries. Rather larger differentials existed in 1986, as shown by the Eurostat data (see Table 3.3).

TABLE 3.15 - POTENTIAL PRICE SAVINGS FOR OPEL ASCONA
(Ecus per vehicle, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	6701	7978	7810	7933	7632
Potential Supplier	-	B	B	B	B
Price Difference	-	16%	14%	16%	12%
Threshold	-	5%	5%	7%	5%
Potential Saving	-	11%	9%	9%	7%

Source: Appendix Table II.2

TABLE 3.16 - POTENTIAL PRICE SAVINGS FOR FIAT DUCATO
(Ecus per vehicle net of tax, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	8344	10079	9199	9608	8686
Potential Supplier	-	B	B	B	B
Price Difference	-	17%	9%	13%	4%
Threshold	-	6%	6%	8%	6%
Potential Saving	-	12%	3%	5%	0

Source: Appendix Table II.2

TABLE 3.17 - POTENTIAL PRICE SAVINGS FOR VW TRANSPORTER
(Ecus per vehicle, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	8416	10491	9309	10974	8479
Potential Supplier	-	B	B	B	B
Price Difference	-	20%	10%	23%	1%
Threshold	-	6%	6%	8%	6%
Potential Saving	-	14%	4%	16%	0

Source: Appendix Table II.2

3.6.12 Cardiac monitor

The cardiac monitor is obviously a highly differentiated product, and subject to continual new product development. Quotations were taken for one of two similar models as far as possible. The prices are in fact very similar between countries, with the exception of the UK, which is probably a lower specification. With the estimated saving threshold there are no potential savings (see Table 3.18).

TABLE 3.18 - POTENTIAL PRICE SAVINGS FOR CARDIAC MONITOR
(Ecus per machine, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	2698	2847	2957	2926	2490
Potential Supplier	UK	UK	UK	UK	-
Price Difference	8%	13%	16%	15%	-
Threshold	42%	41%	40%	42%	-
Potential Saving	0	0	0	0	-

Source: Appendix Table II.2

3.6.13 X-ray screening unit

A particular brand was specified and quotations obtained for this, and also for similar models. Average prices are similar between countries, except for a higher price in Italy (see Table 3.19) although prices for the identical product varied as follows:

	Price (Ecus)	App. Saving
B :	138,311	-
F :	222,307	38%
FRG :	183,320	25%
I :	226,426	39%
UK :	-	-

This indicates a discriminatory pricing policy, so that considerable savings could theoretically be made if hospitals were able to buy from foreign distributors (in this case, in Belgium). In practice this is not possible, since health authorities only make occasional purchases of X-ray units, and although the price is significant, purchasing from abroad would involve a great deal of time and expense. Distributors would probably not respond to international tenders, and they are likely to have exclusive selling rights in their own country. The purchaser would therefore have to make the purchase in the low-price country and arrange shipment himself.

This is not a problem of public procurement. There is another barrier which enables price differences to exist - probably (this is conjecture) exclusive dealerships.

For calculation of the savings, it has been assumed that there are no obstacles to purchasing from abroad. The indicated savings of up to 47 percent are probably, therefore, not achievable.

TABLE 3.19 - POTENTIAL PRICE SAVINGS FOR X-RAY MACHINE
(Ecus per machine, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	138000	162000	160000	226000	104000
Potential Supplier	UK	UK	UK	UK	-
Price Difference	25%	36%	35%	54%	-
Threshold	8%	7%	8%	7%	-
Potentiial Saving	17%	28%	27%	47%	-

Source: Appendix Table II.2

3.6.14 Electrical transformer

Some estimates have been made to calculate equivalent prices for a hypothetical 1,000kVa transformer, since standards vary between countries.

Germany and Italy appear to have low prices, around 25 percent below the other three. There are competing manufacturers of transformers who could manufacture to other countries' standards with probably little extra cost. This is a product where nationalistic purchasing is known to apply, and its removal would probably lead to savings. The savings threshold is quite low, mainly comprising, transport costs, and this indicates savings of up to 18 percent (see Table 3.20). For further Eurostat price data on a similar transformer see Appendix II.

3.6.15 Goods wagon

The International Union of Railways (UIC) has recently produced standard specifications for railway wagons. These, however, have not yet been fully adopted by individual railways, who in any case would have differing 'add-on' options. Quotations were obtained for

TABLE 3.20 - POTENTIAL PRICE SAVINGS FOR TRANSFORMERS
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	9154	9442	7628	6874	10317
Potential Supplier	I	I	I	-	I
Price Difference	25%	27%	10%	-	33%
Threshold	14%	13%	12%	-	15%
Potential Saving	11%	15%	0	-	18%

Source: Appendix Table II.2

the specification used by Eurostat for price comparisons, which differs slightly from the UIC standard. In most cases suppliers had to estimate the price, since they had not produced the quoted specification.

Prices obtained were within a range of 1.7:1 with actual prices paid being in a 1.4:1 range. Since transport costs are low, this indicates some scope for savings. With a 5 percent saving threshold, potential savings are up to 22 percent based on mean quoted prices, although some of the prices estimated by suppliers may not be reliable (see Table 3.21).

TABLE 3.21 - POTENTIAL PRICE SAVINGS FOR GOODS WAGON
(Ecus per wagon net of tax, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	63500	52400	71500	58600	61600
Potential Supplier	F	-	F	F	F
Price Difference	17%	-	27%	11%	15%
Threshold	5%	-	5%	6%	5%
Potential Saving	13%	-	22%	5%	10%

3.6.16 Telephones

Telephone handsets have historically had widely differing specifications between countries, in some cases being over-designed. Freeing the telephone markets has led to more appropriate standards with consequent lower prices, and also to a wide range of models. The market is discussed in detail in Case Study 7. For Eurostat data on telephone prices see Appendix II.

TABLE 3.22 - POTENTIAL PRICE SAVINGS FOR TELEPHONES
(Ecus per item, 1987)

	Belgium	France	Germany	Italy	UK
Mean Price	40	54	47	21	27
Potential Supplier	I	UK	I	-	I
Price Difference	48%	62%	56%	-	23%
Threshold	29%	21%	19%	-	53%
Potential Saving	19%	41%	37%	-	0

Source: Appendix Table II.2

The quotations obtained show wide variability (4.3:1) which will largely be accounted for by product differentiation. Ignoring differentiation, savings of up to 42 percent are indicated (see Table 3.22 above).

3.6.17 Office electrical equipment

Eurostat data for typewriters, calculators and papershredders is given in Appendix II.

4. CASE STUDY 1: COAL

4.1 Industry Structure

There is very little intra-European trade in coal, but large imports from third countries.

Only the UK and Federal Republic of Germany have large coal mining industries and are practically self sufficient in coal. The French industry is contracting, and other EC countries import most of their requirements from non EC countries.

Production of hard coal in EC states in 1986 was as follows:

	Million tonnes hard coal production 1986
UK	105
FRG	87
Spain	16
France	14
Belgium	6
Total EEC	228

Source: Kempense Steenkolenmijnen Annual Report 1986

4.2 Competitiveness

Both UK and Germany have price agreements and subsidies which enable the power industry to purchase national coal, the production cost of which exceeds world prices.

German coal, on the whole, costs more than British coal. Each of the mining companies, mainly private, has a 'just price' set by an official body (the BAW) based on a cost formula (the 'Schwantag formel': this is itself a powerful barrier to other EC coal producers who have not attempted the complex process of getting their 'just price' calculated by BAW). The German electricity companies have an agreement to purchase a minimum quantity of coal from the German coal mining industry. They receive a subsidy calculated on the difference between the 'just price' they pay, and an average of the prices of imported oil and coal. This subsidy on steam coal (the Kohlepfennig) is charged to customers and is currently 7.5% of the electricity price: equivalent to around half of the coal price. The objective is to prevent Germany becoming totally dependent on foreign energy sources. German coal would also be of strategic importance to other EC countries in times of crisis (Germany, along with other non-EC countries, supplied the UK during the miners' strike of 1984).

The 'just price' set for six major coal companies in 1986 ranged from 250 DM/t to 306 DM/t. The estimated average prices and Kohlepfennig in 1987 are as follows:

	DM/t	Ecu/t
German coal	265	128
Kohlepfennig subsidy	130	63
Net paid by electricity companies	135	65
Imported coal	110	53
Imported oil (per tonne coal equivalent)	160	77

In the UK, the Central Electricity Generating Board (CEGB) and South of Scotland Electricity Board (SSEB) have agreements which expose British Coal (BC) to competition with world prices at the margin. CEGB's agreement covering 1986 to 1991 defines three tranches with an average price around £40 per tonne (56.8 ecus/t):

* 50mt (declining) at pithead prices averaging £46.80/tonne (66.5 ecus/t)

* 12mt at prices reflecting the average of imported oil and coal (currently £33/tonne - 46.9 ecus/t)

* the rest (10-25mt) at prices reflecting the cost of imported coal deliveries to a coastal site (£29.50/tonne in mid 1987 - 41.9 ecus/t).

British Coal is investing in new efficient pits and closing old uneconomic ones. The Plan for Coal stipulates that new investment should be made only where costs will be below £1 per gigajoule, equivalent to about £25/tonne (36 ecus/t), which is below mid 1987 imported coal costs.

4.3 Effects of Opening Up Public Procurement

Coal may need to be a special case of public procurement because of the ECSC treaties. If opened up to the full force of international competition, however, there is likely to be little effect on intra-EC trade, because transport costs make even the coal from efficient UK pits uncompetitive with 3rd country imports to Continental Europe; but there would be some increase in third country imports.

Transport costs and port capacity are, however, a natural barrier to imports. It costs £14.75 per tonne (21 ecus/t), for example, from Bristol to the Didcot power station, which puts imported coal prices to inland power stations close to the top tranche price from British Coal. Coal power station capacity in the UK and Germany is mainly close to mines and distant from ports.

Germany, with higher cost mines, is probably more vulnerable than the UK: by the Rhine, imported coal can probably undercut most of the Ruhr production. In the UK, on the other hand, it is estimated the imports would rise from the present 12mt to between 20mt and 30mt, an increase in import penetration of about 10 percent. This

would save around 2½ percent of the power industry's coal bill, if averaged price coal (£40) was replaced by imports at £30 - a 25 percent price reduction.

In Belgium, pits are closing and the power industry only takes a third of the industry's production. Prices are around 3,000 BF/t (70 ecus/t), at which price it is apparently competitive with imported coal to power stations. This price, however, includes very high production subsidies, but no supply agreements or consumer subsidies. Changes in procurement practice would not therefore have any effect on trade (although removal of subsidies to mining companies obviously would).

4.4 Scenario

The above considerations suggest the following scenario.

* Static price effect:

  UK : 25% saving in coal prices; on 10 percent of consumption

  FRG : 50% saving in coal prices (the present subsidy); on 90 percent of the production

  Others: no significant change

  No change in intra-EC trade.

This assumes no change in the existing direct and indirect subsidies to coal mining companies. The only effect of internal market legislation is on the purchaser.

* Restructuring effect:

  UK : accelerated closure of 10 percent of British Coal capacity

FRG : closure of most German pits

Others: accelerated closure of remaining pits.

These restructuring effects would support the same price effects outlined above, and would accelerate the loss of employment already taking place.

5. CASE STUDY 2: HEAVY FABRICATIONS (BOILERS AND PRESSURE VESSELS)

5.1 Industry Structure

5.1.1 The product

This and the following case study (on turbine generators) examine two key products supplied to the power generation industry. The product concerned here is the heavy steel fabrication part of power station equipment - the steam raising plant which includes conventional power station boilers (oil or coal) and also pressure vessels for nuclear power stations. This is one part of the heavy fabrication industry, which can be defined as the manufacture of equipment from steel plate, with the capability of welding steel over 5cm thick.

The industry also manufactures offshore oil and gas installations, steel furnaces, process plant, bridges and similar structures, and is closely related to shipbuilding. The boiler makers are a specialised part of the industry, however. In France and Italy they are part of integrated power station building companies. Repair and refurbishment (captive markets) are a significant part of the business.

5.1.2 Markets

The industry has been in crisis for several decades, because its market changes faster than it can adapt. In the 1970s it was adapting to new technology, particularly the move to large power station units, and there was new investment in coastal sites and in capacity for handling larger items. It is at present still in

upheaval, to adapt to the reduced power station building programmes resulting from the 1973 and 1979 oil price rises. The industry was cushioned from the effect of reduced power station building, by the new markets for offshore equipment.

Because their home markets fluctuate, all the major companies depend heavily on exports to fill their order books. Exports are mainly to developing countries, and the European, Japanese and American suppliers traditionally compete fiercely for those orders, with government support through tied aid and export finance.

In spite of the reorganisation and reinvestment in the past, there are still too many firms and too many inefficient plants in Europe. Their scale of operation is lower than competitors in the US and Japan, and there is massive over-capacity. This is now compounded by two new factors:

* the Chernobyl aftermath, which cut back the replacement of conventional by nuclear capacity (but is likely to help conventional boiler manufacturers vis-a-vis nuclear specialists)

* the entry of low cost producers from China, India and South Korea into the export markets.

It is estimated that world capacity is now 10 times the demand. Capacity utilisation in Europe averages around 30 percent.

There is no trade between the major EC producers (France, Germany, Italy and the UK), although all compete for smaller markets, like the Netherlands and Greece, as well as for non-European markets. The adjustment problem, however, is European, not just European Community. The major players include Sweden, Austria and Switzerland.

5.1.3 Firms

Within the EC, the principal firms are:

Belgium:

* **Cockerill Mechanical Industries (CMI)**: this is a subsidiary of the Belgian steel company Cockerill-Sambre. CMI manufactures power station boilers and nuclear pressure vessels, as well as equipment for the metallurgical and mechanical engineering industries, diesel engines, diesel railway locomotives and armaments (cannons). CMI manufactures boilers under the C-E licence, but also has a Babcock licence for boiler repair. They claim a technological lead in fluidised bed boilers.

There is a second boiler manufacturer, Brouhan, reported to have about a quarter of the Belgian market, making it a very small producer.

France:

* **Framatome**: which provides turnkey PWR nuclear power stations and has its own fabricating facilities. It took over the boilermaking and energy activities of Creusot-Loire when the latter was broken up in 1985. (Creusot-Loire was previously a major shareholder in Framatome). The French nuclear programme is now virtually complete, so Framatome must compete in export markets and perhaps diversify into non-nuclear markets. It is a partly public sector company, with CGE (Compagnie Generale d'Electricite) and CEA (Commission a l'Energie Atomique) as main shareholders and a small shareholding by EdF. CGE was privatised in May 1987, leaving state participation in Framatome at 45 percent. It has enjoyed virtually sole access to the French power equipment market, but subcontracts some fabrications and heavy electrical equipment to Alsthom (another CGE subsidiary) and Jeumont-Schneider.

* Stein Industrie, part of **Alsthom**: which is a 'national champion' par excellence, supplying power generation equipment, railway equipment and locomotives, telecommunications and defence equipment.

Germany:

* **Deutsche Babcock**: which is an independent licensee of Babcock technology. It manufactures steam raising plant at four group companies. The group also produces process plant and compressors, and is in the construction industry.

* **Steinmueller**: which is a private company and seen as a major competitor by other European firms.

Brown Boveri provide turnkey power station packages but do not manufacture the boilers. There are also two other fabricators who are not well known outside Germany:

* **EVT** in Stuttgart: which is jointly one third owned by Combustion Engineering, MAN and Krupp. (Krupp's share is subject to a disputed sale to France's Stein Industrie)

* **Lentjes**: which is a private company.

Italy:

* **Ansaldo** (with its subsidiary Termosud): which is an IRI company, is an integrated power station equipment supplier, making nuclear and conventional steam generators, turbine generators, transformers, and also electric motors. Ansaldo is currently undergoing a major rationalisation and cost reduction investment programme.

* **Franco Tosi**: which is privately owned, and is another integrated power station equipment supplier, probably more efficient than Ansaldo at present, but in a weaker market position.

* **Sulzer**: produce complete equipment packages for smaller municipal power stations, and also hydroelectric equipment. Boilers are manufactured at a plant in Vicenza recently acquired from the Swiss Wyss-de Pretto.

UK:

* **Babcock Power**: which is predominantly a boiler manufacturer and one of the three world licensors (along with Foster Wheeler and Combustion Engineering of USA). Babcock is also involved in process plant manufacture. The parent, Babcock International, is currently (August 1987) the subject of a takeover bid from outside the industry, after the collapse of rumoured bids from (among others) the turbine-generator manufacturer GEC.

* **NEI**: which is the only UK supplier of complete power station equipment packages. It is a diversified heavy engineering group, formed by the merger of various firms in the 1970s.

* **GEC Energy Systems**: which has a small niche for certain fabrications for nuclear power stations, based on its AGR reactor experience.

* **Foster Wheeler Power Products**: which is the principal European subsidiary of one of the major US boilermakers, which is also a diversified process plant manufacturer and contractor. They have sold no boilers in Europe or the UK since the 1960s but have a large share of the UK repair and retrofit market, and of export sales.

5.2 Competitiveness

Comparison of prices in the utility boiler business is impossible, since prices bid for particular contracts are largely unrelated to total costs. The European manufacturers compete against each other mainly in overseas markets, rarely in Europe. The prices are distorted because:

* there is often aid, cheap export finance, or hidden subsidies

* export work is priced below home work: marginal costs are well below total costs because the industry has endemic over-capacity. Exports are used to keep order books steady, and the price bid reflects the urgency of the need to win orders to keep the work force occupied

* pricing strategy depends on an assessment of how strong the competition is, and of what the customer is prepared to pay.

There is frequently a 2:1 range between bids for a specific job, but no pattern as to who bids high and who bids low. In the home markets there is no standard of comparison, but the consensus of opinion seems to be that there is very little difference in prices in the major markets - although German prices may be slightly higher than French, Italian and UK prices, and Belgian prices much higher. In terms of cost, however, the German, French and UK manufacturers are believed to be most efficient, with Italian manufacturers being cushioned by subsidies. German producers are probably the most cost efficient of all, despite higher labour cost, because of higher capacity utilisation and more modern facilities: this however could quickly change. All agree, however, that the Japanese and the newer producers (India, China, South Korea) are a serious threat.

5.3 Economies of Scale

Because all firms are working below capacity, there are significant short run economies of scale.

It is generally agreed that doubling output would be assimilated by all the leading firms within their existing facilities, and would lead to unit cost reductions of about 20%. Table 5.1 shows the reported cost structure for five firms.

TABLE 5.1 - COST STRUCTURE IN BOILERS/PRESSURE VESSELS FABRICATION
(% of production cost 1987)

	Firm:-					
	A	B	C	D	E	Average
Labour	30	53	)	62	65	52
			) 73			
Materials	35	32	)	16	15	24
Overheads	25	11	18	15	15	17
R&D	10	4	9	7	5	7
	100	100	100	100	100	100

Source: WS Atkins interviews

This indicates the short run economies of scale shown in Table 5.2, which confirm the opinions reported above, that doubling output reduces average costs by 20 percent.

TABLE 5.2 - SHORT RUN ECONOMIES OF SCALE IN BOILERS/PRESSURE VESSELS
(Cost and volume indices; current output = 100)

Output:	100	110	200
Costs:			
Labour*	52	55.6	84.5
Materials	24	26.4	48.0
Overheads	17	17.0	17.0
R&D*	7	7.4	10.6
Total Cost	100	106.4	160.1
Average Cost	1	0.97	0.80
Incremental Cost/Unit	-	0.64	0.60

Source: WS Atkins

NOTE: Labour cost $\propto$ (volume)$^{0.7}$; R&D $\propto$ (volume)$^{0.6}$

$(1.1)^{0.6} = 1.059$ $2^{0.6} = 1.52$

$(1.1)^{0.7} = 1.069$ $2^{0.7} = 1.62$

Table 5.2 also shows that boilers might be sold in the export market at down to 60% of average cost - hence the 2:1 range of price quotes reported in overseas tenders.

Long run economies of scale are likely to be insignificant, however. Reorganisation and restructuring in the 1970s has brought the main producers' plant up to an efficient scale, and eliminated small inefficient works. The efficient scale is dictated principally by the maximum size of units which have to be handled. Production is always on a single-unit, project basis with no economies of series production. The direction of technical progress is likely to be towards more robotisation and computer control of operation, and the breaking down of manufacturing operations so that some of the fabrication can be sub-contracted to low cost, third world coastal sites.

5.4 Effects of Opening Up Public Procurement

Most firms believe that opening up public procurement is firstly highly improbable, and secondly unlikely to have any short-term effect. In the longer term, however, it would aid and accelerate the restructuring of the industry which is already underway.

There is no doubt that the boilermakers (and associated process plant and shipbuilding industries) are supported by public purchasing policies, and by subsidies and aid. Assuming that public procurement could be completely opened up, and that suppliers actually respond, the immediate effect would be pressure to reduce home market prices. Some firms thought prices might fall by up to 10 percent. Since the overall profit margins are very slim, this can only happen with the present industry structure if export prices rise to compensate. With intensifying competition for these (generally lower technology) products from cheap labour countries this is very unlikely, so firms will make losses and be forced to merge or close.

This competitive effect may fail to materialise because:

* the cost of bidding for a new contract is very high (more than 1 million Ecus for a complete power station), even in the home market for known product specifications. If there are more competitors, the cost of bidding is increased and the probability of winning is reduced. In a foreign market against indigenous competition the chances of winning are viewed as negligible, so firms will not choose to bid.

* if more firms do bid, the cost of selling increases, which could put costs up by more than the potential price reduction. Margins in the industry are very low; for example for four firms in 1986:

	Net Profit/Turnover
Firm A	6%
Firm B	0.2%
Firm C	8%
Firm D	2%

Selling costs may be around one percent of turnover: doubling selling costs could wipe out profit margins for some firms.

* a large part of the boilermakers' business is repair and refurbishment. This part of the business is not normally open to tender. This has two consequences:

  - this part of the business will not be subject to increased competition, so prices will not be driven down

  - the price of repair and refurbishment work might be put up to compensate for lost profit on new build work.

* suppliers will be afraid of starting a price war which only the Far Eastern producers can win.

In the longer term, opening up the internal market will assist the restructuring that producers are already facing. The ability to move sub-assemblies and products around Europe, the easing of trans-Europe mergers and cooperation agreements, mutual recognition of standards and other aspects of the Internal Market are more important than changes in public purchasing policy. Two aspects of public purchasing policy are important, however:

* at present, national governments each support two or more national suppliers. Any attempt at merger, takeover or closure would bring anti-trust action. If the whole of Europe is seen as the natural market, firms may be able to merge. Several firms viewed the ideal scenario as having one integrated power station supplier in each of the major markets, with 'orderly' marketing agreements.

* the threat of real competition from outside the EC, which would be a necessary consequence of open public tendering, is already causing firms to make cost reducing investment and restructuring plans.

Both UK and Italian firms view a complete freeing of public procurement as a serious threat. Both countries have passed through a long period of low investment in their home power generation industries, which has starved them of funds for new product development (mainly in terms of materials science and electronic combustion-control systems). They have relied on repair work on earlier generations of boilers, and on exporting to low technology markets. Now both Italy and the UK are embarking on a period of new power station building at the rate of around 15,000MW over the next decade. Germany, meanwhile, has maintained a steady, though low, investment in power stations, leaving the German producers in better shape. In France, at the other extreme, the heavy programme of nuclear power is now coming to an end, leaving Framatome hungry for markets. French and German producers should therefore welcome the opportunity to attack the growing Italian and UK markets.

5.5 Scenario

These considerations suggest the following scenario:

* Static Price Effect: negligible.

* Restructuring Effect:

  - Far East penetration of markets: say 20% of major markets (for sub-contract assemblies) and 50% of minor markets
  - mergers of some firms and closure of some facilities
  - doubling of output of the survivors, from existing, modernised facilities
  - price falls 20%
  - some specialisation between the four remaining firms leading to some trade between them (say 20% import penetration)
  - France gains a monopoly in the European Community on PWR station technology.

This scenario is likely anyway. The Internal Market will facilitate and accelerate it. Open public procurement policies are one aspect of the internal market - a necessary but not sufficient condition for the changes described.

The net result on employment is not clear. European producers lose share (a quarter, on the above hyptheses), and increased efficiency increases productivity. The combined effect of these could reduce employment by half in a static market. EC markets may be stronger over the next decade or two, but export markets will decline faster. Employment overall must fall by over half in the next decade or so, but this cannot be ascribed to open public procurement.

Without opening up public procurement, European firms will remain too small, unprofitable and increasingly uncompetitive. They would require increasing protection against low cost producers, until eventually it would be too late to adapt if exposed to competition, and the industry would be destroyed.

6. CASE STUDY 3: TURBINE GENERATORS

6.1 Industry Structure

6.1.1 The product

Turbine generator manufacturers are a subsector of the heavy electrical engineering industry, with the specialist addition of turbine technology, involving thermodynamic design and advanced materials technology.

6.1.2 Markets

The industry faces the same market pressures as the boiler/pressure vessel manufacturers described in the previous case study. It has passed through a decade with no new orders in Italy and UK, and limited orders in Germany (but with the large nuclear programme in France). It is heavily dependant upon exports to the third world, where all the established producers compete aggressively for orders, but are now threatened by Japanese suppliers (not as yet by the really low wage companies of S and SE Asia). Profit margins are very low, and there is overcapacity, although not as much as in boilermaking.

6.1.3 Firms

Many of the producers are linked to the boiler manufacturers, notably in France and Italy. Many of the producers are also parts of large electrical engineering groups. Some of their other product areas are buoyant (eg. telecommunications) so these groups are less threatened than the fabricators, whose other product areas (process plant, steel plant, offshore structures) are also now in decline.

The major suppliers are:

Belgium:

* **ACEC**: jointly owned by Societe Generale de Belgique and France's CGE, producing a wide range of electrical and electronic goods (including railway locomotives and telecommunications equipment).

France:

* **Alsthom-Jeumont**: this is a joint subsidiary of Alsthom and Jeumont Schneider (Alsthom also has a joint venture with Framatome - both are CGE subsidiaries - making hydroelectric turbine generators, called Neyrpic).

  Alsthom is the main operating subsidiary of CGE in the energy and transportation sectors. It is in shipbuilding, boilermaking (Stein Industrie), electrical and mechanical power station and distribution equipment, railway equipment, subsea tecnology, robotics and industrial plant. CGE, the parent, was privatised in May 1987.

  Jeumont-Schneider is the second French electrical/ mechanical engineering conglomerate. It is a subsidiary of Parisienne d'Etudes et de Participations SA. Jeumont-Schneider is principally involved in energy equipment, transport and telecommunications.

Alsthom (CGE) and Jeumont-Schneider between them are major French suppliers to most of the important public sector procurement areas - energy, transport, telecommunication and defence.

Germany:

* **Siemens/Kraftwerk Union AG (KWU)**: KWU is the main, but junior, competitor to Framatome in the European nuclear power equipment industry. Siemens is involved in all aspects of electrical and electronic engineering from power stations to microelectronic components.

* **BBC AG**: German twin to the Swiss Brown Boveri et Cie. BBC is mainly in heavy electrical goods, including railway equipment. In August 1987 Brown Boveri announced merger plans with ASEA of Sweden to form the world's largest heavy electrical engineering firm.

* **MAN**: subsidiary of the heavy engineering firm and contractor GHH.

* **AEG**: specialising in turbine generators for the smaller German power utilities and for industry.

Italy:

* **Ansaldo**: like Franco Tosi below, a turnkey power station supplier, described in the boiler case study. Ansaldo is a public sector company.

* **Franco Tosi**: a power plant specialist, and probably (along with Belgium's ACEC) one the most vulnerable suppliers for that reason.

Sulzer also manufacture hydroelectric turbine generators in Italy.

UK:

* **GEC Turbine Generators**: part of the large GEC electrical group. This company has had no new UK orders for 10 years and works entirely outside Europe.

* **NEI Parsons**: the generator company in the NEI group, which is mainly in process plant and fabrications. NEI offer a complete power station package; GEC only the electrical parts. NEI has also had no new domestic orders since the 1970's and has less export work than GEC, but survives on refurbishment and repairs, and related fabrication and pipework.

Turnover of these companies in turbine generators is not possible to extract from consolidated company accounts, but the ranking of firms in terms of export orders is shown in Table 6.1. Exports of many major firms are around 60 percent of turnover. Note that there are three Japanese firms in the top five.

Table 6.2 shows the ranking of firms by total heavy electrical engineering turnover, assuming the merger of ASEA and BBC goes ahead.

6.2 Competitiveness

None of the firms interviewed thought there was any very significant cost or price difference between European firms, except for higher prices and costs in Belgium. Based on a Delphi analysis (the average of informed guesses) relative prices appear to be something like:

Belgium	120
France	105
Germany	100
Italy	110
UK	100

TABLE 6.1 - RANKING OF FIRMS BY EXPORT ORDERS 1981-1986
FOR POWER GENERATION PLANT

Company	Country	Total Exports 1981-87 (MW)	Share of Exports
1. Mitsubishi	Japan	15300	15.0
2. **GEC**	**UK**	10800	10.6
3. -	USSR	10800	10.6
4. Toshiba	Japan	8900	8.7
5. Hitachi	Japan	8100	7.9
6. General Electric	USA	7400	7.2
7. **KWU/Siemens**	**FRG**	6900	6.7
8. -	Comecon (exc. USSR)	5600	5.5
9. **BBC**	**FRG/Switz**	4900	4.8
10. Westinghouse	USA	4900	4.8
11. **MAN**	**FRG**	4000	4.8
12. **Ansaldo**	**Italy**	3300	3.2
13. **Alsthom**	**France**	3100	3.0
14. **NEI**	**UK**	2500	2.1
15. **Franco Tosi**	**Italy**	2100	3.6
16. Others	-	3700	3.6
		102300	100

Source: GEC Turbine Generators Ltd.
EC producers in bold type

TABLE 6.2 - RANKING OF HEAVY ELECTRICAL ENGINEERING FIRMS

(sales in billion Ecus)

Company	Country	Sales in heavy elec. engg 1986	Total Group Sales	Employees
ASEA/BBC	Sweden/Switz/ FRG	14	14	160,000
Siemens	FRG	9	23	363,000
Hitachi	Japan	9	30	164,000
General Electric	USA	9	30	304,000
Westinghouse	USA	8	10	125,500
CGE/Alsthom	France	7	12	150,000
Mitsubishi	Japan	6	12	71,000
Toshiba	Japan	5	20	120,000
AEG	FRG	3	5	78,000
GEC	UK	3	7	165,000

Source: ASEA, cited in Financial Times Aug 11, 1987

The same comments apply as to boilers, however. Firms only compete in third markets, where prices are distorted by marginal costing and cheap export financing. Bid prices often have a 2:1 range. Home market prices are higher than export prices (where a home market exists), but since there are no identical contracts, comparisons cannot directly be made.

It is generally believed, however, that the Belgian and Italian producers have received subsidies, and their manufacturing costs are higher than relative prices would suggest. The German producers believe their profit margins are slimmer, because their home market is more competitive while their costs are higher than France and UK, which have been able to close down inefficient capacity.

The industry in general appears to be facing up to the threat of competition, and preparing for the expected upturn in new orders for power plant in the 1990's, by investing in cost reducing equipment, particularly computer integrated manufacturing and robotics.

6.3 Economies of Scale

The Italian and UK industries have rationalised production so that two producers of similar sizes remain, and in France only one, but Germany still has four turbine generator producers (even though Siemens is one of the world's largest heavy electrical companies). One of the German companies thought that this gave UK and French producers a cost advantage because of economies of scale, and because they had closed down old plant. There is no evidence however, that German producers are uncompetitive because of small scale. They in fact appear to have higher levels of capacity utilisation which will compensate for smaller scale plants.

It is also true, as in boilers, that Europe has more producers than the USA (although the number of separate plants in not known). There are 11 major producers in the five study countries, plus a few smaller firms including Holec in Holland, and also competition from Sweden, Switzerland and Austria. In the USA there are only 2 producers: Westinghouse and General Electric - but each are smaller in total heavy electrical production than Siemens.

It is worth noting that despite the supposed economies of scale of the US industry, the USA is not very competitive in export markets. As Appendix III notes, however, there are possible reasons for this other than production efficiency. The relative shares of export markets from Table 6.1 are:

Major European Firms	37%
Japanese Firms	32%
Comecon	16%
USA	12%
Others	3%
	100%

There are undoubtedly short run economies of scale as production fills capacity and average costs fall.

Most firms thought that doubling output from 50 percent capacity utilisation to full capacity utilisation would reduce unit costs by 5 to 15 percent. But in this sector most firms are working at 60 to 75 percent capacity at present, so economies are limited and firms saw no great long term savings from increased scale of operation.

Table 6.3 shows the cost structure reported by six firms. Materials are a large proportion of costs - 50 to 60 percent for half of the firms, but 30 to 35 percent for three firms which are more highly integrated. R&D averages 10 percent.

TABLE 6.3 COST BREAKDOWN IN TURBINE GENERATOR MANUFACTURE

(percent of manufacturing costs)

	Firms						
	A	B	C	D	E	F	Average
Labour	20	20	35	50	14	20	26
Materials	50	30	35	35	60	55	44
Overheads	25	40	13	10	14	20	20
R&D	5	10	17	5	12	5	10
	100	100	100	100	100	100	100

Source: WS Atkins' Interviews

This suggests short run economies of scale for turbine generators as shown in Table 6.4.

TABLE 6.4 - SHORT RUN ECONOMIES OF SCALE IN TURBINE GENERATOR MANUFACTURE
(present output = 100)

Output:	100	110	150
Labour	26	27.8	34.5
Materials	44	48.4	66.0
Overheads	20	20.0	20.0
R&D	10	10.6	12.8
Total Cost	100	106.8	133.3
Average Cost	1	0.97	0.89
Incremental Cost	-	0.68	0.67

Source: WS Atkins

Note: Labour = (present labour) x $(volume)^{0.7}$
R&D = (present R&D) x $(volume)^{0.6}$
$1.1^{0.6} = 1.059$ $1.5^{0.6} = 1.273$
$1.1^{0.7} = 1.069$ $1.5^{0.7} = 1.328$

Restructuring to enable firms to operate near to full capacity (assuming present capacity utilisation is around 65 percent) would reduce costs by 10 percent.

In the long run, however, there are not very significant economies of scale beyond the minimum efficient scale set by the size of single orders. Like boiler making, it is essentially a jobbing industry. Increasing the capacity of plants gives some economy in indirect manpower, and savings in ancillary facilities such as materials handling equipment and increased size of firm may give some economy in research and development. This is debatable: R&D includes design work and also has as much to do with troubleshooting and training as with new technology in a mature industry. The main

technological advances relevant in the turbine generator industry come from the field of materials science and are generated outside the industry.

Technological progress is likely to move in the direction of improved materials (reducing the repair and maintenance market and/or reducing manufacturing time), robotisation and computer aided design and computer integrated manufacturing (making it easier to switch between products on the shop floor, minimising the need to have large plants to reduce the down time on machines). These types of technological progress tend to minimise economies of scale.

6.4 Effects of Opening Up Public Procurement

The market in the major producing countries is clearly closed to foreign competition. Only Belgium, of the five countries studied, actually invites foreign bidders, and suppliers believe, rightly or wrongly, that they do so only to compare ACEC's prices. Suppliers do not believe, however, that merely being invited to tender would really change things.

The obstacles to intra-EC trade are seen to be:

* national preference: suppliers believe that even if markets are opened up, other EC customers would prefer to buy US equipment because of bilateral links with USA. It is interesting to note that the Swiss (Brown Boveri) and Swedish (ASEA) are probably seen to be neutral: Brown Boveri has associates in EC countries, particularly Germany and France, so the new BBC-ASEA supergroup will be very well placed to take advantage of more open markets.

* the legacy of standards: customers perceive other EC suppliers as being locked in to their own national standards, whereas US, Japanese and suppliers from the smaller nations (including BBC and ASEA again) are more used to working to foreign standards. Suppliers say this is untrue, and

differences in standards present no design or manufacturing difficulties: it is partly excuse, partly prejudice on the customers' side.

* customers' perception of after sales service capabilities: again seen as false prejudice.

In these circumstances suppliers say they would not waste money bidding. The smaller suppliers are likely to be more aggressive than the majors in this respect.

As in the boiler sector, UK and Italian firms particularly fear that their growing home market, coupled with their own lack of demonstrable new-build experience in Europe over the last decade, will make them vulnerable to attack by the French, German and non-EC producers over the next decade.

During the interview programme, suppliers did not foresee, and had apparently not considered, many mergers in the European industry. The only restructuring suggested was between boilermakers and turbine generator manufacturers - GEC and Babcock is the only obvious candidate. The subsequent news of the BBC-ASEA merger may make the industry think again.

The smaller EC manufacturers would find it hard to survive in a truly competitive market and one or two would quickly drop out. Suppliers believe there would be no immediate price effect, because the industry is already highly competitive.

6.5 Scenario

The following scenario is suggested:

* Static Price Effect: zero.

* Restructuring Effect: capacity will be filled by the resurgence of power station building, which will enable prices to fall by 10 percent - but not directly because of the internal market. The internal market, however, will permit this increase in capacity utilisation across all firms, without wasteful capacity expansion in the growing markets of UK and Italy. This will bring French, German and non-EC firms into the UK and Italian markets and stimulate rationalisation by trans-national mergers (more likely between EC and non-EC companies than between EC companies). This will enable marginal savings to be made in R&D, design and marketing costs, say 1 or 2 percent of costs.

  There would be no serious employment effect unless jobs shift out of the EC to low wage countries, but new manufacturing technology will make this less likely, as direct labour costs are reduced.

7. CASE STUDY 4: ELECTRIC LOCOMOTIVES

7.1 Industry Structure

7.1.1 The product

The railway transport industry is a major sector of public purchasing, and procures capital equipment which falls into 4 areas:

* track and civil engineering
* power supplies
* signalling and controls
* rolling stock, including locomotives, multiple units and trucks and carriages.

It is in rolling stock that increased trade is most likely and economies of scale are most likely to be important. This case study focusses on electric locomotives, which is one product of an industry - "guided land transport equipment" - which supplies four main markets:

* locomotives (for freight and mainline passenger trains)
* diesel/electric multiple units and heavy metros
* light rail vehicles
* "people movers" for short distances e.g. at airports.

In the past couple of decades multiple units and metros for urban/suburban systems have dominated the market. There is now growing investment at the other two extremes - advanced locomotives for high speed trains, and light rail vehicles.

In the supply of locomotives, there are few integrated firms. In any contract there are likely to be two main suppliers, for the mechanical parts and electrical parts respectively. Either may be the main contractor although as the power unit and controls become more sophisticated there seems to be a tendancy for the electrical equipment supplier to take the lead. There may also be other subcontractors for subassemblies, such as bogies, braking systems, pantographs and electronic controls.

7.1.2 The market

The number of locomotive orders in any year is very small. A survey in International Railway Journal reports intentions throughout the 12 EC States to buy 84 locomotives in 1987. The size of the locomotive fleet is generally decreasing as the life and downtime of locomotives is improved. New orders are mainly for replacement of existing stock by new high technology systems, particularly high speed passenger trains such as the TGV in France, the ETR450 in Italy, and the class 91 locomotive in UK.

Product development and technical innovation are of paramount importance. Critical areas are microprocessor control, and the mechanical design for high speed vehicles.

The key characteristic of the railway industry is that the EC countries are locked into a heritage of distinct standards, operating systems and engineering traditions. On electrified lines there are three energy systems - $16\frac{2}{3}$Hz (Germany, Austria, Switzerland and Scandinavia), 50 or 60Hz (most other EC countries' main lines) and DC (UK southern region). Within each of these there are voltage differences. At present, only Belgium has multi-voltage locomotives capable of travelling on neighbouring systems.

With the development of high speed trains, and new light rail systems, standards have recently diverged further.

7.1.3 Firms

The major producers in the five study countries are listed below:

Belgium

* **ACEC** (electrical parts) is 50 percent owned and managed by CGE/Alsthom of France. ACEC is reported to be a high cost producer, but is the sole supplier to Belgian railways and has small markets in the ex-Belgian colonies in Africa. It also makes generators and electrical equipment.

* **BN** (mechanical parts) cooperates with ACEC in the manufacture of mainline electric locomotives, and is itself a world leader in light rail vehicles, metros and trams. It also makes coaches, truck bodies and special transport equipment.

France

* **Alsthom,** a subsidiary of CGE, took over the railway equipment interests of Jeumont-Schneider in January 1987 and is now the sole supplier to French railways. It also recently took over half of ACEC in Belgium, joined forced with German's MAN for diesel locos, is a key member of the "50c/s Group" (see below), and now claims to be the worlds' largest manufacture of locos and railway equipment.

Germany

The Association of the German Locomotive Industry has 12 members, of which there are 3 major manufacturers of the electrical motive parts, and 3 major mechanical part manufacturers. The electrical

firms (AEG, Siemens and BBC) have joined together with Alsthom/ACEC to form the 50 c/s group and apparently each take an agreed share of the Group's export contracts. The major firms are:

* **Krauss Maffei** (mechanical parts), which also makes industrial machinery, electronic equipment, defence equipment and special vehicles.

* **Krupp Mak** (mechanical parts), part of the steel and heavy engineering group, is a licensee of General Electric (USA).

* **Thyssen Henschel** (mechanical parts), also part of a steel and heavy engineering group, is a licensee of General Motors.

* **AEG** (electrical part).

* **Siemens** (electrical part).

* **BBC AG** (electrical part).

None of these German firms have railway equipment as their main line business, and they seem to each have about one third share of their respective part of the German market.

Italy

Italy has a large number of companies (reportedly over 40) making railway rolling stock, most of which are subsidiaries, subcontractors or licensees of the major mechanical contractors:

* **Fiat Ferroviaria** (complete locomotives) appears to be the leader, and is manufacturing the Italian tilt-body trains (ETR 450). Fiat also is the main designer of mechanical parts.

* **Breda** (complete locomotives) a diversified group in iron and steel, diesel engines, turbines, h&v equipment and defence equipment as well as railways.

* **Ansaldo Transporti** (electrical parts) an IRI company. Its sister company Ansaldo Componenti make power station equipment.

Among the large number of other contractors in the rail vehicle sector, there are a number of other important manufacturers of electrical parts, including Magneto Marelli and Brown Boveri

UK

* **GEC Transportation/GEC Traction** (electrical parts) GEC Traction makes locomotives and was formed from a merger of traction interests of GEC, AEl, and English Electric in 1972. GEC frequently works with BREL (see below), for the mechanical parts.

* **BREL** the engineering group of British Rail, mainly involved in non-powered rolling stock, and in repairs of locomotives. It is likely to be privatised soon and GEC Transportation would be a potential purchaser.

* **Brush Electrical Machines**, part of the Hawker Siddeley Group (along with Westinghouse Brake and Signal). Brush is an integrated manufacturer of locomotives.

* **Metro Cammell** is a major manufacturer of multiple units and metro trains, but has also recently been invited to bid for diesel locomotives.

For such a small market, the number of electric locomotive manufacturers in Europe is remarkable. In addition to the new build, there is a large volume of repair and rebuild work and this is what enables so many manufacturers with different designs to survive. There is an export market for diesel locomotives, and for metros and multiple units, but there is little export market for electric locomotives, since no other continent has such an extensive electrified mainline network.

In the USA, as Appendix III shows, there are only two locomotive manufacturers, General Electric and General Motors, making mainly diesel electric locomotives. The dominance of diesel in US railroads has enabled these two producers to gain economies of scale and eliminate smaller competitors.

7.2 Competitiveness

In common with the preceding case studies there is no ready comparison of prices or costs between European manufacturers since they never compete in each others' markets, and to an even greater extent than power generation equipment, the products are built to quite different designs and technical standards. There were quite divergent views among manufacturers about relative prices. Most thought that there is very little difference in prices. The consensus of these interviewees would be the following pattern:

	Price Index
Italy	120
Belgium	110
FRG	110
UK	105
France	100

The UK producers, however, saw a much greater price difference between countries, and one respondent claimed Italian prices were double UK prices. This could be explained perhaps by different technical standards due to geography and track conditions.

Japan and recently South Korea are strong competitors in export markets. The USA dominates the market for diesel locomotives. For these, power supply differences are irrelevant, and the US market is much larger than the European market.

In 1955 the US ordered 500 locomotives compared with reported purchase intentions in 1987 of less than 100 in Europe. This enables the US manufacturers to produce in long series, and achieve significant economies of scale.

7.3 Economies of Scale

Locomotive manufacture in Europe is still very much a jobbing industry because of the importance of maintenance and rebuild activities, with occasional short series production. Maintenance and rebuild (a purely jobbing activity) is carried out by the same facilities as new build. This is because of the large number of different systems and locomotive designs, and the consequent large number of producers.

In these circumstances there are short run economies of scale as long as there is excess capacity. At present the industry is generally operating at around 50 percent of capacity, although some manufacturers claimed over 80 percent capacity utilisation. A reduction in the number of manufacturers by about one third would probably therefore allow survivors to increase production by 50 percent. It is difficult to generalise about cost structures, since the amount of subcontracting and bought-in subassemblies varies. Table 7.1, however, shows the cost breakdown of a number of firms. Table 7.2 then shows that average costs would fall by about 13% if firms operated at full capacity.

In the medium term there are no significant economies of scale to be achieved by expansion of capacity within the present market environment. In the very long term, if there could be harmonisation of the rail system throughout Europe, and reduction of the number of locomotive models from the present number (probably around 50 or more) to a handful, then there would be possibilities of series production. This is not possible in the foreseeable future.

TABLE 7.1 - COST STRUCTURE OF SOME LOCOMOTIVE MANUFACTURERS
(% of Production Costs)

	Firm						
	A	B	C	D	E	F	Average
Labour	20	35	32	8	25	16	23
Materials	40	45	50	40	46	44	44
Overheads	30	20	10	50	25	38	29
R&D	10	-	8	2	4	2	4
Total Cost	100	100	100	100	100	100	100

Source: WS Atkins' interviews

TABLE 7.2 - SHORT RUN ECONOMIES OF SCALE IN LOCOMOTIVE MANUFACTURE
(present cost and output = 100)

	Output Index		
	100	110	150
Labour	23	24.6	30.5
Materials	44	48.4	66
Overheads	29	29	29
R&D	4	4.2	5.1
Total Cost	100	106.2	130.6
Average Cost	1	0.97	0.87
Incremental Cost	-	0.66	0.61

Source: WS Atkins

Note: Labour cost $\propto$(volume) $^{0.7}$, R&D $\propto$(volume) $^{0.6}$.

There would nevertheless be significant savings in development costs if rationalised product ranges could be developed within the constraints of the present railway systems. This would allow a further reduction in the number of manufacturing locations and rationalisation of production between them. This could bring unit costs down by about 20 percent compared with present costs.

7.4 Effects of Opening Up Public Procurement

There are signs that some European railways are becoming more open about procurement. British Rail has a policy of competitive procurement and recently invited both GM and GE, and a consortium of NEI, Krupp and BBC, to bid against GEC, Brush and Metro-Cammell for supply of diesel locomotives. There are, already, privately owned GM locomotives running on British Rail.

This opening up of the market results largely from technological factors. There are a number of innovations in locomotive design, which make potential gains from international procurement evident now.

The extension of high speed networks, coinciding with the construction of the Channel Tunnel, is leading to construction of new track for the first time in decades, giving an export opportunity to the French manufacturers of TGVs, which have a significant technical lead over other manufacturers. The Eurotunnel system is a private sector Anglo-French venture. It will buy shuttle locomotives, and SNCF/BR will buy locomotives for through trains from London to Paris.

There are also important advantages in the control systems for locomotives by the application of microprocessor control. GEC claims to have a significant lead in this area. Belgium and Italian manufacturers claim a lead in multi-voltage locomotives.

These technology changes are forcing international procurement, and are leading to pan-European grouping of manufacturers - for example the 50 Hertz Group, the purchase of Jeumont-Schneider's facilities by Alsthom and reported contacts between Alsthom and other European manufacturers.

Public procurement is therefore responding to technology changes. Conversely, opening up public procurement per se will have little effect on the competitive environment. The main barrier to competitive bidding is that development programmes for new models have in the past been done jointly by the customer and the supplier. There is subsequently little chance of another supplier being able to win orders for existing designs, and none would bother to try. Effective joint development requires geographical proximity and a common language and industrial culture. It is possible, however, that for the next generation of locomotives, development will be at arm's length.

The bonds between railway and supplier are loosening. Railways in Europe historically designed and built their own rolling stock. When steam was replaced in the 1960s, railways lost some of their manufacturing but held on to design. New technology is now coming from the manufacturers: British Rail's unsuccessful attempts to design high speed trains ended its design dominance in UK and BREL is being privatised. In future, railways will be able to set performance specifications and let manufacturers bid for the design and construction package.

If there are continued mergers, takeovers and consortia between European firms in order to obtain technology transfer, there is likely to be increased trade in subassemblies or whole locomotives in future, even if national railways continue to have close technical relationships with their domestic manufacturers. Differences in technical standards are not a barrier to trade per se: manufacturers can easily manufacture to the standards of any other railway.

7.5 Scenario

* Static Price Effect: negligible in the short term. There will be no short term change in intra-EC trade but there could be increased imports of diesel locos (not electric) from US, Japan and S Korea.

  Increased competion will take effect with many years' delay, on the next generation of locomotives. This may reduce prices as follows:

  -20 to 30% - Belgium, FRG and Italy
  zero - France and UK.

* Restructuring Effect: collaboration and mergers, with rationalistion of product lines. In a static market this would lead to closure of around 30% of capacity, but the market may grow to fill capacity. Cost savings due to ST economies of scale would be around 13%.

  In the very long term, European railway systems must be harmonized. This would give scope for economies of series production and savings in development costs.

There will be new trade in subcomponents and assembled locomotives, reaching levels of import penetration in the major countries of perhaps 50 percent in 20 to 30 years. An 'ideal' industry would have say 4 major companies each producing a rationalised range of subassemblies or models. Import penetration in these four producing countries would then be 75 percent, and in all other EC countries 100 percent.

This scenario results from technology changes and from the external market environment, to which public procurement responds. It is not a result of public procurement legislation.

8. CASE STUDY 5: MAINFRAME COMPUTERS

8.1 Industry Structure

8.1.1 The product

Mainframe computer systems are high-performance systems used for large-volume, general purpose applications. The price of mainframe systems, including peripherals, range typically from 0.3 million ecus to 6 million ecus. At the low end of the sector, uniprocessor models operate in the range of 9-12 millions of instructions per second (MIPS). High-end quadratic models can surpass 50 MIPS. The industry is developing rapidly, and the price/performance ratio should continue to fall, while the processing rate is expected to approach 100 MIPS by the early 1990's. A sub-category of the sector is comprised of supercomputers, whose performance far exceeds that of commercial mainframes. The average price of supercomputers is 12 million ecus, and only 150 were in use world-wide in 1985. There are no European manufacturers of such systems.

8.1.2 The market

It is the microcomputer and minicomputer markets which have shown spectacular growth in the past decade, but the market for large mainframe computers still continues to grow at some 10 to 20 percent per year.

8.1.3 The firms

The major suppliers of computer equipment to Europe are listed in Table 8.1. With the exception of Olivetti, all are suppliers of mainframes. The other major mainframe suppliers are NCR and Hewlett-Packard. Market shares in the mainframe sector for the four indigenous manufacturers and IBM are set out in Table 8.2.

TABLE 8.1 - COMPUTER EQUIPMENT SUPPLIERS TO EUROPE: MARKET SHARES AND PRODUCTION 1986

Supplier	Position	Sales ($ billion)	Share (%)
IBM	1	15.7	35.3
Siemens	2	3.9	8.8
DEC	3	2.8	6.3
Olivetti	4	2.7	6.1
Bull	5	2.4	5.4
Unisys	6	2.3	4.3
Nixdorf	7	1.9	4.3
ICL	10	1.4	3.1
Total		44.5	

Source: Financial Times.

TABLE 8.2 - MANUFACTURERS' SHARES OF THE EUROPEAN MAINFRAME MARKET

Supplier/Market	IBM	Siemens	Bull	ICL	Nixdorf
Belgium	60	8	9	2	3
France	50	0	30	2	3
Germany	50	20	3	1	13
Italy	60	3	14	0	2
UK	50	0	1	30	5
All EC	60	7	11	9	5

Source: Roland Berger and Partner/WS Atkins

The five indigenous EC manufacturers are thus:

* **Groupe Bull** (Plants in France, USA, Italy and UK): which is the product of a recent merger of interests between Bull of France; Honeywell of the USA and NEC of Japan. The original Bull (100% French owned) assembled equipment using NEC technology. In 1986, it merged with Honeywell to form Honeywell-Bull, and then bought up Honeywell to take full control. Bull now holds a controlling 42.5% share in Honeywell-Bull (rising to 65.1% by 1989) with Honeywell (42.5%) and NEC (15%) as partners. Production responsibilities are divided between the three companies as follows: Honeywell (industrial automation, high-speed microelectronics), Bull (computer networks), NEC (large computers). Markets have also been allocated, with Honeywell responsible for the UK and Italy, and Bull focusing on France and the rest of western Europe. Production is carried out at six Bull facilities in France, and one in Torino (Honeywell-Bull Italia), one in Scotland (Honeywell Bull UK) and two Honeywell plants in USA.

* **Siemens** (Germany): which sells a full range of mainframes using both Japanese and indigenous technology. Siemens formerly sold IBM plug-compatible computers manufactured by Fujitsu and also manufactures its own small mainframe. Production is carried out at two facilities in Munich and Augsburg.

In January 1987, Siemens and the data processing division of BASF set up **Comparex** (which is 50%/50% owned by Siemens and BASF) to market Hitachi computers.

* **Nixdorf** (Germany): which has two low-end mainframe models. Nixdorf's strength lies in offering novel and cost-effective solutions to commercial data processing problems (in the banking sector, particularly). Its technology is indigenous. Manufacturing is carried out at Paderborn, Berlin and Cologne.

* **ICL** (UK): which is part of the STC group of companies. ICL manufacturers a wide range of computer equipment, and is particularly strong in the UK public sector, notably local government, police and health authorities. Its strengths lie in the provision of system solutions rather than the manufacture of hardware (the technolgoy for which is bought from Fujitsu). The UK government has repeatedly provided emergency financial assistance to ICL, and blocked foreign purchase on several occasions. ICL has two manufacturing facilities in UK, but is planning to set up facilities in other EC countries.

* **IBM** (USA, 6 EC countries and world-wide): is the major supplier of mainframes to Europe and operates as an indigenous manufacturer in six EC countries (including France, UK, Italy and Germany). Large mainframes are assembled in Montpellier (France) and the smaller models at Santa Palomba (Italy). Deliveries from these plants account for 90% of all IBM's mainframe sales to Europe.

8.2 Competitiveness

Comparison of prices in the mainframe computer industry provides little indication of the competitiveness of suppliers. There are three main reasons:

* indigenous manufacturers fix prices in relation to the market leader, IBM. ICL, for example, generally tries to be 7 to 8% cheaper than IBM

* each manufacturer uses discriminatory pricing, although IBM tries to ensure that inter-country price differences are not large enough to encourage re-exports

* manufacturers do not always offer comparable products or solutions to satisfy customer requirements. In these circumstances, bid prices can be misleading.

However, the balance of opinion suggests that the indigenous manufacturers lag behind IBM in three important respects:

* production costs: Through heavy investment in manufacturing technology and distribution, IBM has trimmed costs below the industry average. This is reflected in relative profit levels: IBM (14%) against 7 to 9% for ICL, Siemens and Nixdorf.

* research and development: IBM has access to an enormous R&D base, while ICL, Siemens and Bull are all dependent on Japanese technology to varying degrees. The indigenous R&D base is considered too small to sustain a competitive level of product development. This has clearly been recognised as a problem of both manufacturers and governments, and a number of initiatives have been taken to close the gap, for example:

  - the 'Esprit' programme, which commenced in 1982 and involves 12 companies in 5 countries, and is aimed at encouraging collaboration in R&D
  - the 'Eureka' project, involving European firms, which provides financial assistance for 62 IT projects
  - individual country programmes such as the Alvey Flagship Project in the UK
  - ICL's joint venture with Bull and Siemens to undertake pre-competitive research at the European Computer Industry Centre in Germany

* manufacturing facilities: Export sales to public sector customers are clearly prejudiced by the lack of manufacturing facilities inside the ordering country. Thus, ICL, Siemens, Nixdorf and Bull (until it gained control of Honeywell's facilities in Italy and the UK) are at a disadvantage compared to IBM which manufactures in six countries. In its efforts to increase sales to continental Europe, ICL is currently considering whether to set up manufacturing plants in Germany, France or Spain.

8.3 Economies of Scale

Because all firms are operating at or near full capacity, there are no significant short-run economies of scale (e.g. in closure of inefficient factories). Investment in new factories or factory expansions would be necessary to cope with a significant rise in demand.

Each manufacturer found it difficult to provide a sensible breakdown of costs for mainframes, primarily because costing systems are not set up by product. Most agree, however, that a doubling of production could reduce unit costs by 10 to 15%, but this degree of restructuring is unlikely. The savings would emerge principally in R&D and marketing, rather than production. Mainframe manufacturing does not require a large degree of capital investment in manufacturing plant.

It is worth noting that there are advantages in having a large market share and being market leader, but these are only partly the result of absolute differences in scale.

8.4 Effects of Opening Up Public Procurement

Although national purchasing is not as pronounced in mainframes as in, say, turbine generators, and the market has opened significantly in recent years, preference is given to indigenous manufacturers by public sector clients. It is generally agreed that France is the worst offender. This leads to the sales pattern set out in Table 8.3. Indigneous manufacturers lead their public sector markets, while IBM dominates the private sector market.

If the market were opened up, there is unlikely to be downward pressure in prices. For one thing, the public sector comprises only 30% of the total market, so producers have to be price-competitive to survive in the market. If, however, the performance of EC manufacturers in the private sector is a guide to their true

TABLE 8.3 - MANUFACTURERS' SHARES OF THE EUROPEAN PUBLIC SECTOR MAINFRAME MARKET, 1987

	% of Public Sector Market			% of Total Market		
	Indigenous Manufacturer(s)	IBM	Other Imports	Indigenous Manufacturer(s)	IBM	Other Imports
Belgium	-	60	40	-	60	40
France	65	15	20	30	50	20
Germany	50*	28	22	33*	50	17
Italy	-	50	50	-	60	40
UK	60	20	20	20	50	20

Source: WS Atkins' interviews
Note: * combining Nixdorf and Siemens

competitivenes, then an opening of the market should lead to a decline in the indigenous manufacturers' market shares. On the other hand, indigenous manufacturers' historical dominance of the public sector market should have given them an edge in the provision of solutions to public sector problems, and a degree of resistance to change among purchasers. Thus, in the long term, the redistribution of market shares between companies will not be significant enough to generate price savings through scale economies. Nonetheless, the relative high degree of dependence of indigenous manufacturers on the public sector market poses more problems than opportunities.

The US view is that the European computer industry is not really viable, being dependent on the acquisition of 'off-the-shelf' Japanese technology, preferential access to public sector markets, and in some cases, state financial support. To become truly competitive, there must be rationalisation of product lines, and the development of a strong technological base. Both requirements would best be served through mergers or joint ventures. To some extent, this is already happening (e.g. collaboration in R&D between Siemens, ICL and Bull), and will be encouraged by full

implementation of Open Systems Interconnection standards. However, there is no sign that the four manufacturers are considering any collaboration in production, or product specialisation.

A major threat could be the Japanese, should they decide to bypass their European partners, and sell direct to, or manufacture in, Europe. This is clearly the US view of the situation. Most vulnerable is probably ICL since it:

* is the most heavily dependent on public sector business and Japanese technology

* has persisted in selling a wide product range (competitors consider it too wide)

* has regularly been in financial trouble.

US industry experts believe that the European manufacturers must merge and then specialise in applications and particular product groups.

8.5 Scenario

These considerations suggest the following:

* Static Price Effect: negligible.

* Restructuring Effect:

  - no new entrants to the industry
  - probable Japanese penetration of EC markets through direct sales, up to 5% (US companies will be equally if not more competitive)
  - indigenous manufacturers lose market share in public sector markets, principally to IBM and other US firms. The effect is more dramatic in France which has the most protected market

- accelerated collaboration between EC's four manufacturers, possibly leading to production agreements, a reduction on the range of equipment manufactured, rationalisation of product lines and a buy-out of ICL
- marginal improvement in the export performance of EC manufacturers following restructuring above
- price reduction and/or reduced subsidies equal to say 5 percent of present prices.

The net employment effect will be negligible. Sales lost to EC manufacturers will probably be redistributed to other companies with European manufacturing facilities. In any event, the market is growing at a rate above 10% per annum.

9. CASE STUDY 6: PUBLIC EXCHANGE SWITCHING EQUIPMENT

9.1 Industry Structure

The product under consideration is the central public exchange switching system which interconnects local telephone lines and connects these to long distance trunk lines. The industry has evolved from manual, to electromechanical, and finally to electronic switches. The electronic switch can be both analogue (which uses sound waves for transmission) or digital (which uses pulse code modulation to transmit information). The first digital switch was installed in the USA by AT&T in 1976. Analogue switches are still being produced both to upgrade existing systems and to service low-volume traffic, but the digital switch has become increasingly dominant, having greater transmission speeds. The world's more advanced telecommunications networks should be fully digitalised by the end of the century.

Digital switching is seen as a key technology. For this reason, most European governments have considered it essential to establish an indigenous industry by subsidising the enormous costs of developing a system. This has led to a situation where Europe, with 16% of the world market, has five indigenous systems, whereas the USA, with 40% of the market, has three, of which two are dominant.

The leading European switching systems are as shown in Table 9.1.

Table 9.2 indicates which systems are installed in the five EC countries under review, sets out market shares, and identifies the manufacturers. This shows that the market has been opened in each country to at least one foreign company. However, as Table 9.3 demonstrates, the indigenous manufacturers retain a dominant market share.

TABLE 9.1 - MAIN EUROPEAN DIGITAL SWITCHING SYSTEMS

Country	System	Company
France	E-10, MT20	Alcatel (now also owner of ITT'S System 12 technology)
Germany	EWSD	Siemens
Italy	UT-10	Italtel/Telettra
UK	System X	GEC/Plessey
Sweden	AXE	Ericsson

Source: WS Atkins Interviews

Profiles of the leading manufacturers are set out in the following paragraphs:

Belgium:

* **Bell Telephone Manufacturing (BTM)**: which was an ITT subsidiary, and now part of Alcatel NV. BTM is one of four companies in Europe manufacturing ITT's System 1240 (the others are SEL in Germany, FACE in Italy and SESA in Spain). A recent agreement with the Belgian RTT gives BTM 67% of the market from 1987 to 1992, but it is not entirely dependant on the domestic market. Sales have been made to Denmark, Norway and Switzerland

* **ATEA NV**: which manufactures the GTD-5 switch. ATEA was formerly a subsidiary of GTE, but has since been taken over by NTB which is 80% owned by Siemens and 20% owned by GTE. ATEA is now responsible for marketing Siemens switches to Belgium, and may eventually abandon manufacture of the GTE system.

TABLE 9.2 - DIGITAL SWITCHES INSTALLED IN BELGIUM, FRANCE, GERMANY, ITALY AND THE UK (1987)

Country	Systems In Use:-			
Belgium				
System	System 1240	GTD-5		
Technology	ITT	GTE		
Market Share	67%	33%		
Manufacturers	BTM	ATEA		
Holding Co	Alcatel NV	NTB (1)		
France				
System	E10	MT20	AXE	
Technology	Alcatel	Thomson	Ericsson	
Market Share	84%	16%	0% (2)	
Manufacturers	Alcatel	CGCT, Alcatel	Matra-Ericsson	
Germany				
System	EWSD	System 1240		
Technology	Siemens	ITT		
Market Share	75%	25%		
Manufacturers	Siemens/ Telenorma/ DeTeWe	SEL		
Holding Co		Alcatel NV		
Italy				
System	UT-10	AXE	System 1240	GTD-5
Technology	Italtel/ Telettra	Ericsson	ITT	GTE
Market Share	55%	19%	14%	12%
Manufacturers	Italtel/ Telettra	Fatme	Face	GTE
Holding Co			Alcatel NV	NTB
UK				
System	System X	System Y (AXE)		
Technology	GEC/Plessey	Ericsson		
Market Share (3)	85%	15%		
Manufacturers	GEC/Plessey	Thorn-Ericsson		

Source: WS Atkins

Notes:
1 NTB is a holding company made up of Siemens (80%) and GTE (20%).
2 Ericsson has recent acquired CGCT, and now effectively holds their 16% of the French market.
3 Refers to British Telecom network. Northern Telecom has sold its DMS-100 switch to Mercury Communications.

TABLE 9.3 - PUBLIC SWITCHES TO BE INSTALLED IN 1987

			Suppliers						
Country	Lines Installed Up to 1986 (000's)	Lines To Be Installed 1987 (000's)	Siemens/ Telenorma/ DeTeWe	Ericsson	Alcatel	GEC/ Plessey	Italtel/ Telettra	Others	% Indigenous
Belgium	3,100	200	40	-	160	-	-	-	0
France	24,100	1,620	-	-	1,360	-	-	260[1]	84%
Germany	26,900	1,450	1,090	-	360	-	-	-	75%
Italy	18,450	1,050	120	200	150	-	580	-	55%
UK	21,600	1,870	-	190	-	1,500	-	180[2]	80%
		6,190							

Source: Eurequip Italia

Notes: [1] "Others" = CGCT, but Ericsson now holds this 16% of the market

[2] STC sales of analogue equipment and digital sales to Mercury.

France:

* **Alcatel**: which is the product of a merger of the telecommunications assets of CGE (CIT-Alcatel) and those of Thomson in 1985. Alcatel manufactures the well established E-10 switch and the Thomson MT20 (which may be phased out) at two factories. On January 1st 1987, Alcatel merged with the telecommunication interests of ITT to form Alcatel NV which is registered in Holland and headquartered in Belgium. The CGE (privatised in 1987) has a controlling 55.6% interest in Alcatel, while ITT retains a 37% share (the Societe Generale de Belgique has 5.7% and Credit Lyonais 1.7%). This gives Alcatel control over System 1240 and ITT's subsidiaries in Europe. Its portfolio stands at 39 million lines installed - 24m of E-10 and 15m of System 12 - making it the largest manufacturer of digital switches in the world.

* **Compagnie Generale de Constructions Telephoniques (CGCT)**: which was owned by ITT until its nationalisation in 1982. It retained a 16% share of the market from the French DGT, but has recently been sold off to Matra-Ericsson Communication (a joint venture between Matra Communications of France and LM Ericsson of Sweden), following unsuccessful bids from AT&T, Siemens, Northern Telecom, Italtel and Plessey. Switches manufactured under the Thomson licence will now be replaced by AXE.

Germany:

* **Siemens**: which developed the advanced EWSD switch, and has 45% of the German market. Siemens entered into a joint (50:50) venture with GTE in 1986 to improve market access. Siemens hoped at the outset to persuade GTE to abandon manufacture of its own switch in Europe, but the agreement now is that GTE facilities in Belgium and Italy will market both systems and manufacture the one which proves more successful. Siemens has two manufacturing facilities for digital switches.

* **Telenorma**: which was granted approval to manufacture the EWSD switch in 1986 at its Limburg facility. It has 12.5% of the German market.

* **DeTeWe**: which also manufactures the ESWD switch under licence, and has 12.5% of the German market.

* **Standard Electrik Lorenz (SEL)**: which is an ITT subsidiary, and now part of the Alcatel NV group. It currently manufactures System 1240, and has about 30% of the German market.

Italy:

* **Italtel**: which is owned by IRI. Italtel, formerly a manufacturer of electromechanical switches under licence from Siemens, collaborated with Telettra and GTE to develop the Proteo UT-10 switch, in return for granting GTE access to the Italian market. Italtel, which produces over 90% of the UT switches, merged with Telettra in 1987 to form Telit (which is 48% owned by IRI, 48% by Fiat and 4% by Mediobanca), primarily to rationalise production and development.

* **Telettra**: which is owned by Fiat and now part of the Telit Group.

* **Fatme**: which is a subsidiary of SETEMER, a holding company 70% owned by Ericsson. FATME manufactures Ericsson's AXE switch for the Italian market.

* **Alcatel Face**: which was originally a subsidiary of ITT, manufacturing System 1240 switches (then known as Face Standard).

United Kingdom:

* **Plessey Telecommunications**: which developed System X for British Telecom. Plessey manufactures the switches at Liverpool and takes roughly 50% of System X orders each year. Plessey now owns Stromberg-Carlson in the USA, but sales of System X are largely confined to the UK.

* **GEC Telecommunications**: which manufactures System X at Coventry, and participates in its further development. STC dropped out of the System X project in 1982.

* **Thorn Ericsson**: which is a 41% owned affiliate of LM Ericsson Telephone Company. Ericsson is the second supplier of digital switches to British Telecom and has teamed up with the British company Thorn EMI to assemble its AXE switches in England under the name "System Y".

In October 1987 a proposed merger between the telecommunication interests of GEC and Plessey has been announced. Northern Telecom has also bought an interest in STC plc, which manufactures telecommunications equipment (but not, at present, digital public exchange switching equipment) and is also the owner of ICL, the computer manufacturer. Northern Telecom supplies some switching equipment to the second private sector network, Mercury.

9.2 Competitiveness

It is generally recognised by industry specialists that the world's leading manufacturers of digital switches are currently AT&T, Northern Telecom and Ericsson, considering both price and performance. The industry in the European Community is characterised by the following:

* late development: indigenous switches were not installed in Germany until 1983, and 1985 in the case of the UK (compare 1976 for the USA)

* the relatively large cost of developing systems: the cost to EC States of developing digital switches is calculated at $7 billion against $2.5 billion for US companies. System X cost $1.4 billion to develop against $0.75 billion for AT&T's ESS-5, and $0.5 billion for Ericsson's AXE

* limited export orders in major markets: System X, for example, has failed to win sizeable orders outside the UK

* orientation towards heavily protected domestic markets.

However, EC manufacturers do vary significantly in their competitiveness. The two most competitive are thought to be Alcatel NV and Siemens. Alcatel NV is singled out because:

* the E-10 switch was developed ahead of the competition in Europe, and while relatively unsophisticated, it is reliable and efficient, and has won a large volume of export orders. The development of the switch was much assisted by the massive investment in digitalisation undertaken by the DGT, also ahead of the rest of Europe. The E-10 now commands 20% of the world's installed base of digital switches.

* Alcatel's merger with ITT makes Alcatel NV the world's largest supplier of digital switches, and gives it instant access to ITT markets around the world.

* Alcatel NV now possesses two different but compatible products which have both been successful, the reliable unsophisticated E-10 and the highly advanced System 12.

Siemens is singled out because:

* the EWSD switch, while a late developer, has been successfully installed in a number of markets and is now recognised as a technological leader

* the joint venture with GTE gives Siemens easy access, via GTE subsidiaries, to several European markets and more importantly, the USA.

A comparison of domestic prices would suggest a rather different scenario, however. Current domestic prices appear to be around: $250/line (France), $400/line (Belgium), $300 to $400/line (Italy), $225 (UK) and $500/line (Germany) (see footnote). This would suggest that Siemens is not competitive. However, these differences reflect little more than state subsidisation of development costs which vary between countries in phasing and volume. It is generally believed that the marginal cost of producing switches is roughly the same in each country, and in most cases competitive with the current US domestic price which is reported to have recently fallen to around $100/line.

Thus the key factors in determining competitiveness are technology (performance and reliability) and market access. The latter will become increasingly important as the market for digital switches slows down and over-capacity develops. It is generally believed that there will be room for only three European manufacturers by the turn of the century. For this reason, there has been in recent years intense competition among manufacturers to increase their market shares through acquisitions and mergers. As Table 9.4 shows, the most successful have been Alcatel, Ericsson and Siemens.

9.3 Economies of Scale

Table 9.5 shows the cost structure reported by five firms. This highlights the following important features:

* R&D accounts for a large percentage of total costs, averaging around 20%

* material costs are important, accounting for two thirds of direct manufacturing costs (which constitute 40-60% of total costs).

TABLE 9.4 - RECENT MERGERS, JOINT VENTURES AND ACQUISITIONS IN THE EUROPEAN PUBLIC SWITCHING INDUSTRY

Date	Activity
1985	France merges the telecommunications assets of CGE (Cit-Alcatel) with Thomson to form Alcatel
1985	AT&T and Philips (Netherlands) form APT to adapt the ESS-5 switch to the European market. Philips abandons development of its own PRXD switch
1986	GEC's bid for Plessey is blocked by the UK government; discussions continue on collaboration in the manufacture of System X
1986	Siemens and GTE joint venture
1987	Alcatel acquires ITT's telecommunications interests to form Alcatel NV
1987	Ericsson acquires CGCT
1987	Italtel and Telettra propose a merger to form Telit (since abandoned)
1987	Ericsson joint venture with Telit (or Telettra or Italtel) expected
1987	GEC and Plessey merger proposed
1987	Northern Telecom buys 27.5 percent of STC

Source: WS Atkins

TABLE 9.5 - COST BREAKDOWN IN SWITCH MANUFACTURE
(% of production costs)

	Firms					
	A	B	C	D	E	Average
Labour	25	30	22	20	27	25
Materials	40	35	40	45	35	39
Overheads	15	13	20	18	13	16
R&D	20	22	18	17	25	20
Total	100	100	100	100	100	100

Source: WS Atkins' interviews

These figures suggest the short run economies of scale for public switches shown in Table 9.6.

TABLE 9.6 - SHORT RUN ECONOMIES OF SCALE IN SWITCH MANUFACTURE
(present output = 100)

Output	100	110	150	200
Labour	25	26.7	33.2	40.6
Materials	39	42.5	56.2	72.8
Overheads	16	16	16	16
R&D	20	20.8	23.5	26.4
Total Cost	100	106.0	128.9	155.8
Average Cost	1	0.97	0.86	0.78
Incremental Cost	-	0.60	0.58	0.56

Note: Labour = (present labour) x $(volume)^{0.7}$
R&D = (present R&D) x $(volume)^{0.4}$
Materials = (present materials) x $(volume)^{0.9}$

Economies of scale would arise mainly in R&D, software development costs, and to a lesser extent in labour costs and the purchasing of components. The figures suggest that a doubling of output would generate economies of scale in excess of 20%. However, the maximum savings likely to be realised will be closer to 15 to 20%. The reasoning underlying this conclusion is as follows:

* the weakest suppliers of systems may exit the industry so that say one third of the European market will be available to the surviving producers. Assuming that import penetration remains at current levels, the surviving EC manufacturers should be able to expand output by about 50% each.

* the surviving producers may rationalise their assets to concentrate production in fewer factories. If some 20% of existing factories were closed down, the remaining facilities would be able to expand production by about 25%. Taking exits

and rationalisation into account survivors could increase production by 75%. At current levels of capacity utilisation, this would require some additional investment, but it is likely to be small. This would give manufacturers economies of scale in the order of 20%.

* these potential savings will be offset to some degree by the cost to the surviving producers of adapting systems to new markets. It is estimated that these could amount to 10-20% of the basic development costs, equivalent to a few percent of average costs.

It is of course possible that significant economies could be achieved without restructuring of the industry, through:

* collaboration in R&D (there is already an R&D joint venture between Plessey, Siemens, Alcatel and Italtel, in addition to the RACE, ESPRIT and BRITE projects)

* collaboration in marketing and purchasing (GEC and Plessey were moving in this direction before the announcement of their merger proposals).

Restructuring of the industry, however, will have a major impact on future costs when the next generation of switches comes on-stream. Massive savings will then be realised in development costs (a recent study by London Business School calculated that British Telecom's decision to subsidise the development of System X in preference to, for example, installing Alcatel's E-10 switch, added 10% to consumers' telephone bills mainly due to continued purchasing and maintenance of obsolete equipment because of the delay in installing digital equipment).

Since R&D is around 20% of most firms' costs, and overheads around 15%, restructuring of the industry should lead to savings in these items, which represent long run economies of scale of around 10%.

9.4 Effects of Opening Up Public Procurement

EC markets for public switches are not entirely closed to foreign competition. Each of the countries with indigneous manufacturers has allocated segments of their market to foreign suppliers eg. France (16%), Germany (25%), Italy (45%), UK (15%). Nevertheless, it remains very difficult for suppliers to win business from indigenous manufacturers. Preferential procurement policies are the major barrier, but the non-compatibility of systems and adaptation costs are also important factors.

It is now generally recognised that the decisions taken by governments to develop indigenous technologies has created a surplus of both systems and producers which the industry must rectify to remain viable. The acquisitions, mergers and joint ventures initiated in the past few years reflect this concern among manufacturers. Further opening of public sector markets will accelerate this process, as would full harmonisation of technical standards.

If the markets were opened fully, domestic prices would fall to international levels, perhaps $150 per line taking into account adaptation costs, and the fact that the US price of $100 a line is considered by some to have fallen below average costs as a result of cut-throat competition. Most EC producers appear capable of competing at this price in third markets, but is unknown to what extent this capability is dependent on subsidised domestic prices. Clearly, though, those manufacturers who are heavily or entirely dependent on domestic markets are vulnerable to increased EC competition.

A possible scenario is that the weakest producers will either exit the industry or become manufacturers of other systems. This would enable the surviving producers to seize the market shares necessary to remain competitive in both price and product development. However, it is unlikely that this process will be quick or smooth enough to prevent significant import penetration (mostly from the USA, Canada and Sweden).

9.5 Scenario

The above considerations suggest the following scenario:

* Static Price Effect: domestic prices fall 40% (France), 60% (Belgium), 70% (Germany), 50% (Italy) and 30% (UK).

* Restructuring Effect: the number of EC producers is narrowed. Substantial economies of scale are realised through expanded market shares and rationalisation of manufacturing facilities (15-20%) and savings in R&D and overheads (10%).

* Import penetration: increases from the present 8% to say 20%.

* Exports: improve as producers take advantage of economies of scale.

Footnote on prices per line:

Price comparisons are difficult because of secrecy, differing treatment of R&D costs and the fact that prices are falling rapidly. The following data were used, and were checked with US Dept of Commerce experts.

Belgium: new contract 1987-1990 at BFr16000/line (Source: interview data, plus press reports eg FT 19 Oct 1987)
France: estimate from interview data ("competitive with UK") US$250 approx (1987)
Germany: $500/line (interview data, plus Economist 29 Aug 1987)
Italy: $300-400 (no firm data; interview data suggests prices higher than France, lower than Germany
UK: 1987 System X prices £140 (Source: P. Grindley "System X: the failure of procurement" London Business School 1984)
US: 1986 prices $200-$280 (Source: US Dept of Commerce: A competitive Assessment of the US Digital Office Switch Industry)
1987 price $100 (Source: interviews, plus 'Economist' 29 Aug 87)

10. CASE STUDY 7 : TELEPHONE HANDSETS

10.1 Industry Structure

Within the EC countries under review the principal manufacturers of telephone hand-sets are as follows:

* Belgium : **SA Philips, BTM, ATEA**
* France : **Alcatel, Matra Communication**
* Germany : **Siemens, Telenorma**
* Italy : **Italtel, Marconi Italiana**
* UK : **Plessey, GEC, STC**

These are the same firms which manufacture public switches, with the exception of SA Philips (a subsidiary of Philips N.V. of Holland), Matra Communication (a manufacturer of PABX's and customer premises equipment), Marconi Italiana (a subsidiary of GEC), and STC (part owned by ITT, and a manufacturer of a wide range of telecommunications products).

Indigenous manufacturers have traditionally been protected from competition by the PTTs, which retain control over the testing and approval of products, and their marketing to end-users. PTTs can set specifications, use the approval process, or simply exclude competitors in order to support national producers. This policy has led to the development of unnecessarily high engineering standards, and thus prices within the EC which are far in excess of the competition.

The situation has now changed somewhat. In Belgium, France, Germany and Italy the PTTs have established a two-tier market. The procedure is that consumers must rent their first telephone from the PTT; this is generally manufactured to high engineering standards and acquired from an indigenous manufacturer. Additional terminals may be purchased either from the PTT or retailers. The latter can now sell imported models which have been approved by the PTT. Approval regulations have been relaxed to grant recognition to products manufactured to different standards. The result has been that indigenous manufacturers, while at present still assured of a market through the PTTs, must compete in the private sector market with imports which are generally considerably cheaper.

In the UK, deregulation has gone much further in three respects:

* there is no longer any requirement for consumers to purchase or rent telephones from British Telecom (BT)

* approval and testing of products is now handled by BABT, which is independent of BT

* BT, in collaboration with British manufacturers, has brought its standards more in line with international norms

The results of this have been as follows:

* BT no longer buys all its telephones from British manufacturers (the latter currently command a 70% market share).

* British manufacturers are no longer entirely dependent on BT: the three suppliers sell around 50% of their products directly to the private sector.

* British products are roughly price competitive with equivalent Far East imports.

10.2 Competitiveness

Telephone assembly is a relatively simple procedure requiring little investment in technology and capital equipment. It can, however, be done either with very labour intensive methods, or by using modern automatic component insertion machines. The industry has been largely relocated to SE Asia where producers can minimise labour costs. A combination of the higher engineering standards and higher costs in Europe means that EC products are, in general, two to four times as expensive as Far East imports with equivalent performance specification.

On the other hand, British manufacturers claim to be competitive with imports, having reduced the price of a standard telephone supplied to BT from £38 (54 ecus) to £15 (21 ecus). This has been accomplished both by lowering standards and investing in automated equipment, which is now not very expensive. Some other EC producers are still using manual methods.

The prices of telephones have been investigated in the price analysis described in Section 3. This showed the following relative prices:

France	260
Germany	220
Belgium	190
UK	130
Italy	100

After allowing for transport, trading and procurement costs for a typical contract, the following potential savings from trade were shown (see Appendix II):

France	41%
Germany	37%
Belgium	27%

Note that these savings arise by buying from Italy, where the price is lower because of strong competition from Far East imports. Equal or greater savings would probably be made by buying from Far East suppliers.

10.3 Economies of Scale

All the major producers are reported to be operating at or near full capacity. A sizeable increase in sales would require successful producers to expand on site, invest in automatic equipment, develop new facilities or make acquisitions. It is thought that significant economies of scale can be achieved in labour costs, R&D and purchasing of components.

Table 10.1 show the reported cost structure for four firms. This indicates the short run economies of scale shown in Table 10.2.

TABLE 10.1 - COST STRUCTURE IN TELEPHONE HANDSET MANUFACTURING
(% of production costs)

	Firm : -				
	A	B	C	D	Average
Labour	24	30	18	22	24
Materials	55	45	55	50	51
Overheads	11	14	15	18	15
R&D	10	11	12	10	11
	100	100	100	100	100

Source: WS Atkins' interviews

TABLE 10.2 - SHORT RUN ECONOMIES OF SCALE IN TELEPHONE HANDSETS
(current output = 100)

Output	100	110	150	200
Labour	24	25.4	30.6	36.4
Materials	51	55.6	73.5	95.2
Overheads	15	15.7	18.4	21.2
R & D	11	11	11	11
Total Cost	100	107.7	133.4	163.8
Average Cost	1	0.98	0.89	0.82
Investment Cost	-	0.77	0.67	0.64

Note: Labour = (present labour) x (volume) $^{0.6}$
Materials = (present materials) x (volume) $^{0.9}$
Overheads = (overheads) x (volume) $^{0.5}$

The figures suggest that a doubling of output would reduce unit costs by nearly 20%, with the existing technology, which was the figure most commonly reported by the manufacturers.

If faced with the prospect of a greatly enlarged market, however, firms would invest in automatic assembly. This offers the prospect of greatly increased productivity, and a large fall in average costs. The degree of saving or the scale of production required is not known, but may well be of the order of 50 percent if volumes are large enough.

10.4 Effects of Opening Up Public Procurement

There is at present very little trade in telephones between EC countries with indigenous manufacturers. Suppliers find it almost impossible to win approval for new products from foreign PTTs.

The real barrier to trade is the control over the equipment approval process exercised by the PTTs. A requirement for purchasers to advertise tenders internationally and increase the transparency of the procurement process is not likely to have any effect until the monopoly enjoyed by the PTTs over testing and approval is broken.

Deregulation should bring EC national standards closer both to each other and to international norms. Should the requirement for consumers to acquire their first phone from the PTT be abandoned, this will bring EC products into direct competition with imports. In the UK, this has led to increased import penetration, but the indigenous manufacturers claim to have improved their competitiveness dramatically in the process, and increased sales to third countries. In the USA, however, Far East manufacturers have taken advantage of deregulation to undercut domestic prices and dominate the market. Several US producers have left the field to focus attention on higher value product lines.

Telephones, however, are an excellent example of a product with endless scope for product differentiation. As well as incorporating different telephone facilities (visual displays, redial and storage, timing etc), it has an aesthetic function (colour, shape), can be adapted to different use environments (phone booth, desk top, wall hung, car, fire-safe) and combined with other instruments (work station, clock). There will always, therefore, be scope for many manufacturers, and opportunities for new entrants.

10.5 Scenario

The above considerations suggest the following scenario:

* Static Price Effect: Prices fall as calculated in Appendix II, but only if product approval is removed from the PTT's control:

France	41%
Germany	37%
Belgium	27%

* Restructuring Effect: All producers will suffer declining market shares as imports rise; this will give rise to some restructuring as manufacturers abandon telephones for more profitable product lines where technology and product development are more important factors, and others take action to reduce unit costs (e.g. investment in automation and robotisation, or relocation of production offshore). The number of EC manufacturers will dwindle; the more efficient companies should improve their performance in Europe.

* Import penetration: will rise slightly in the UK and Italy, and by between 40% and 60% in Belgium, France, and Germany.

* Exports : the remaining, efficient, automated EC producers should become more competitive in the growing export markets.

* Employment effect: EC employment would fall in a static market by probably 30-50% because of import penetration and automation, but this fall is likely to be offset by rapidly growing markets at home and for export. The overall rapid growth in customer premises equipment expected over the next decade is likely to mean growing employment for the European industry, as long as it remains competitive.

11. CASE STUDY 8: LASERS

11.1 Industry Structure

11.1.1 Product

A laser is an instrument which emits coherent light.

Lasers are a high technology product, subject to extensive basic and applied research, for which new applications are still being developed. They are products of the optoelectronics industry. Lasers can be classified in several ways into very many different types:

* by the light emitting material: gas lasers, solid-state lasers, semiconductor lasers, chemical lasers - and within each of these classes by the particular combination of materials used

* pulsed/continuous lasers

* by power output.

11.1.2 Markets

The users of lasers are mainly in the public sector, and most research is publicly funded, although they are most frequently procured as components by equipment manufacturers who in turn sell to the public sector. The applications are:

* telecommunications - as emitters in optical fibre networks, and also used in the manufacture, inspection and repair of equipment, and for welding optical fibres

* defence - as a weapon (notably being developed in the USA's SDI programme), and for range finding, target identification, training systems, sensing systems, and special communications applications

* medical - for incision, eye operations, physiotherapy, diagnosis, and cosmetic treatments

* industrial - for cutting and welding, measuring and surveying, holography, and in leisure products.

The first three application areas predominate at present and have public sector customers, but industrial applications are growing. Lasers were invented in the 1960s, and applications are still being found. Many manufacturers began in the 1970s, and the establishment of new manufacturing capacity has exceeded the growth in markets, so there is at present excess capacity, but the market is growing rapidly in many sectors.

In each case, there are three stages of manufacture: making the active components; assembly of the active component into an instrument with the necessary power supply, electronics, optical focussing, and casing/mounting; and then integration of the laser into the application system, such as a machine tool, weapon system, fibre optic cable system, or whatever. These three stages may be done by the same or by different firms.

The dominant applications and the areas where high growth is expected in the near future are telecommmunications for optical fibre networks, and defence.

The total world market for laser instruments is estimated by one firm as US$0.5 billion.

11.1.3 Firms

The industry is very heterogeneous, with many firms producing many products for many applications. There are some large firms, but also many small and medium sized enterprises, unlike any of the preceding case studies where large firms dominate. It is an infant industry with many new entrants. Some firms run into financial difficulties because new application markets do not grow as expected, or because of underfunding. Many new firms are set up to exploit a new type of laser or a new application, by people leaving university or government research programmes.

An exhaustive survey of firms has not been attempted. Firms mentioned by interviewees as being major competitors are listed below. By definition this excludes small firms of which there may be a couple of thousand. There are few firms with laser turnover exceeding 1 million ecus.

* **CBL Optronics NV,** based in Belgium, and forming subsidiaries in France and Germany, with a joint venture in USSR. Makes military products (e.g. rangefinders), metal cutting machine tools and medical lasers.

* **Cilas Alcatel** of France, subsidiary of Alcatel NV, the largest EC telecommunications equipment manufacturer. Cilas make military and telecommunicationss products.

* **Quantel** of France.

* **Siemens** mainly in industrial applications.

* **Messer Griesheim, Trumpf, Baystronics, Rofin Cinon,** all in Germany.

* **Valfibre** and **WIFO** in Italy.

* **Ferranti** of UK, a leader in military applications.

* **Plessey** and **STC** of UK, in the telecommunications field.

* **Coherent General** of USA has manufacturing in Germany.

* **Lumonics** of Canada has an important subsidiary in UK, **JK Laser**, mainly in industrial applications.

* **CIBA-Geigy/Spectraphysics** manufacturing in USA.

* **Lasag** of Switzerland.

* **Philips** in Netherlands.

* In Japan, four firms dominate the market in components and applications: **NEC, Fuji, Hitachi and Toshiba.**

11.2 Competitiveness

The world market for lasers is extremely competitive. It is also highly differentiated, with many firms having a market niche for a particular application. Most firms sell world-wide, and know their customers well. The world of the laser-literate, as one interviewee described it, is small. It is not possible to compare prices of application systems, but for components it is reported that the Japanese are price leaders, and all other manufacturers meet the Japanese price.

11.3 Economies of Scale

Most firms are operating on a jobbing basis, producing prototypes or very small runs, particularly in industrial applications. The point at which significant economies of scale can be reached is a long way off. In the short term in fact there may even be diseconomies of scale, as small entreprenuerial firms pass to become managerial firms.

This is not the case with those applications where demand has reached the take off point for series production, particularly the small telecommunications semiconductor lasers. For these, doubling of production could reduce costs by 20-30%.

11.4 Effects of Opening Up Public Procurement

Suppliers report that they find the markets for lasers very open, with the sole exception of France, where several producers reported that local producers are favoured directly and indirectly. One producer reporting have a contract cancelled in France by the responsible Ministry, because there was a French producer, although the French producer had no equivalent product. The purchaser, however, then rented the equipment from the foreign supplier, instead of purchasing. As a further example of French protectionism, it was claimed that the PTT is developing local area fibre-optic networks before trunk routes in France, because there is not yet a suitable French product for trunk routes.

With this one exception, however, no producers though that public procurement changes would have any effect on trade, prices or the industry structure, because:

* most countries are open to buy the best available product

* suppliers are export oriented and know the customers

* most sales are made to assemblers of telecommunication systems, defence systems, or other equipment manufacturers, who are commercial and unbiased

* markets are very competitive with no margin for price reduction

* there are no gains to be made from mergers at present, since there is little duplication of capabilities. This will change in time as the markets begin to develop and mature, and there could be savings in marketing effort, development costs and production economies. This is probably a few decades away.

11.5 Scenario

* Static Price Effect: no effect.

* Restructuring Effect: no effect.

12. POTENTIAL SAVINGS IN PUBLIC EXPENDITURE

12.1 Introduction

This section sets out the detail of the calculations of the potential savings in public expenditure. The overall methodology was described in the Summary (Section 1) and the details of the estimation of potential savings for individual products were set out in Section 3 (price comparisons) and in Sections 4 to 11 (the case studies). In addition, Appendix II set out the details of the calculation of 'savings thresholds and individual products' savings factors.

The calculations are carried out using a spreadsheet model. As well as the base case described throughout the report, a series of sensitivity analyses have been carried out.

It should be recalled from Section 1 that the savings are estimated in terms of:

* the **static trade effect** - by buying from the cheapest supplying country at present prices

* the **competition effect** - reduction in prices from national producers who are faced with foreign competition for the first time. It is assumed that these price reductions can be met by reduction in real production costs, by investment in new technology or by eliminating 'x-inefficiency'

* the **restructuring effect** - the long run saving arising from economies of scale, including shared R&D and distribution costs, following industry restructuring in certain key sectors dominated by public sector purchasing.

12.2 Formulae Used in the Model

Savings are estimated for each 2 digit product category (according to the ESA R59 classification, which is similar, but not identical, to the 2 digit NACE classification).

The estimates assume that public sector demand is inelastic, so that the total volume of purchases is unchanged after opening up the markets. Initially there is, for each country and each product, a volume of purchases (Q) from both local suppliers and, possibly, importers, but all sold at competitive prices (p). This home price has a statistical distribution for different purchases, different locations, and different moments in time, and differences in product quality are reflected in corresponding differences in product price. The price (p) is interpreted as the mean (expected) home market price, and there is assumed to be no difference between prices of identical products from a manufacturer and an importer.

After opening up the market there are new imports (M) at a lower price (p_m).

Most of the products are manufactured capital goods, which are differentiated products, with monopolistically competitive markets. Local producers need not necessarily meet the new import price. The new import may be a different quality product suitable for some applications and not others. In some cases local manufacturers may produce a substitute for the new import and displace it so that the 'trade effect' ends up with no change in trade. In general, however, local producers may change their price to the home market by an amount dp_c - the competition effect.

Finally, after restructuring, all prices may fall by an amount dp^r - the restructuring effect. It is assumed for simplicity that price differentials are maintained and all producers reduce prices by the same amount.

The formulae used are derived as shown below, for each country and each product.

* Initial public purchasing = pQ

  where Q = total volume of purchases from both local producers and importers
  p = initial mean home price of both local producers and importers.

* After opening up markets, expected public purchasing

$$= (p + dp_c + dp_r)(Q - M) + (p_m + dp_r)M$$

  where M = new imports
  P_m = price (delivered) of new imports from foreign suppliers immediately after opening up
  dp_c = change in price of local suppliers due to new competition
  dp_r = change in price of all products

* Savings = initial purchasing - expected purchasing

$$= (p+dp_c+dp_r)(Q-M)+(p_m+dp_r)M - pQ$$

$$= pM - dp_cQ + dp_cM - dp_rQ - p_mM$$

$$= (p-p_m)M - dp_c(Q-M) - dp_rQ$$

$$= \left(\frac{p-p_m}{p}\right)\left(\frac{M}{Q}\right)pQ \quad \text{..... trade effect}$$

$$+ \left(\frac{-dp_c}{p}\right)\left(1 - \frac{M}{Q}\right)pQ \quad \text{..... competition effect}$$

$$+ \left(\frac{-dp_r}{p}\right)\cdot pQ \quad \text{..... restructuring effect}$$

* define Δ = static price saving = $\frac{p-p_m}{p}$

so $(1-\Delta) = \frac{p_m}{p}$

θ = change in import penetration = $\frac{p_m M}{pQ}$

so $\frac{M}{Q} = \frac{p}{p_m} Q = \frac{Q}{(1-\Delta)}$

$R = \frac{-dp_r}{p}$

also, by hypothesis:

$-dp_c = \Delta$ for previously protected public sector suppliers
$= 0$ for other supply sectors

* Then:

Trade effect $= \frac{\Delta}{1-\Delta} \cdot \theta \cdot pQ$	
Competition effect $= \begin{cases} \Delta\left[1-\frac{\theta}{1-\Delta}\right]pQ \\ 0 \end{cases}$	... for protected sectors ... otherwise
Restructuring effect $= R \cdot pQ$	

12.3 Data Used

With the exception of the change in import penetration, the required data for the calculation of the potential savings have been derived in previous sections of the report.

* the **price savings factors,** are set out in Table 12.1. Details of the calculation are shown in Appendix II. The potential savings for each 2 digit R59 category have been derived by a weighted average of the products for which specific price savings factors were calculated. The weights

TABLE 12.1 - POTENTIAL SAVINGS FACTORS

ESA Category	Category description	BELGIAN FACTOR	FRENCH FACTOR	GERMAN FACTOR	ITALIAN FACTOR	UK FACTOR
010	Agricultural, forestry and fishery products					
031	Coal and coal briquettes	0%	0%	50%	0%	25%
033	Lignite (brown coal) and lignite briquettes					
050	Products of coking					
071	Crude petroleum					
073	Refined petroleum products					
075	Natural gas					
095	Water (collection, purification, distribution)					
097	Electric power					
098	Manufactured gases					
099	Steam, hot water, compressed air					
110	Nuclear fuels					
135	Iron ore and ECSC iron and steel products					
136	Non-ECSC iron and steel products					
137	Non-ferrous metal ores; non-ferrous metals					
151	Cement, lime, plaster	0%	0%	0%	0%	0%
153	Glass					
155	Earthenware and ceramic products					
157	Other minerals and derived products (non-metallic)					
170	Chemical products	9%	0%	52%	0%	40%
190	Metal products	6%	3%	5%	1%	0%
210	Agricultural and industrial machinery	11%	8%	10%	7%	3%
230	Office machines, etc.	1%	12%	3%	27%	5%
250	Electrical goods	17%	14%	15%	14%	6%
270	Motor vehicles and engines	2%	12%	4%	10%	2%
290	Other transport equipment	11%	0%	13%	16%	3%
310	Meat and meat products					
330	Milk and diary products					
350	Other food products					
370	Beverages					
390	Tobacco products					
410	Textiles and clothing	55%	25%	0%	36%	1%
430	Leathers, leather and skin goods, footwear	11%	6%	11%	14%	4%
450	Timber and wooden furniture	10%	4%	20%	0%	0%
471	Pulp, paper, board	0%	8%	18%	0%	0%
473	Paper goods, products of printing					
490	Rubber and plastics products	11%	6%	11%	14%	4%
510	Other manufacturing products	11%	6%	11%	14%	4%
530	Building and civil enginnering works	10%	10%	10%	10%	10%
550	Recovery and repair services					
570	Wholesale and retail trade					
590	Lodging and catering services					
611	Railway transport services					
613	Road transport services					
617	Inland waterways services					
631	Maritime and coastal transport services					
633	Air transport services					
650	Auxiliary transport services					
670	Communications					
690	Credit and insurance					
710	Business services provided to enterprises	10%	10%	10%	10%	10%
730	Renting of immovable goods					
750	Market services of education and research					
770	Market services of health					
790	Market services n.e.c.					
810	General public services					
850	Non-market services of education and research					
890	Non-market services of health					
930	Non-market services n.e.c.					

Source: Table 3.3

used are the consultants' estimates of the relative importance of each product as a paradigm for other similar products in the product group, for example:

- 'other transport equipment' includes aerospace, shipbuilding and railway equipment, which is more like high value high technology electric locomotives (weighting 0.75) than low technology goods wagons (weighting 0.25)
- 'electrical equipment' in public purchasing is approximately 30% power generation, 30% telecommunications equipment, 40% other; hence the weightings shown in Table 12.1

For manufacturing sectors of relatively low importance in the total, the savings factors have been taken as a weighted average of other sectors, as follows:

- agricultural and industrial machinery: taken as 'metal products' (0.5) and 'electrical equipment' (0.5)
- leather goods, rubber and plastics, other manufacturing: taken as an average of all other manufacturing sectors, weighted by their share of total public purchasing
- 'building and civil engineering' (specialist works and border areas), and 'business services'; a potential saving of 10 percent has been assumed for all countries, to give an order of magnitude estimate

* The breakdown of **public purchasing** (pQ) was estimated from 1980 ESA input-output tables and other data sources, applied to the 1984 levels of public purchasing. This was described in Section 5 of the Part I report. The results are shown in Table 12.2

* The change in **import penetration**: is calculated as described in the following subsection.

TABLE 12.2 - BREAKDOWN OF PUBLIC PURCHASING BY PRODUCT CATEGORY

(billion Ecus 1984)

ESA Category	Category description	Belgium	France	Germany	Italy	United Kingdom	Total
010	Agricultural, forestry and fishery products	50.8	739.8	370.2	592.4	351.0	2254.2
021	Coal and coal briquettes	15.7	1525.1	4035.9	738.2	8265.7	14180.9
022	Lignite (brown coal) and lignite briquettes	0.0	59.5	142.1	49.6	0.0	261.2
050	Products of coking	26.7	11.9	55.3	15.2	33.7	142.9
071	Crude petroleum	0.0	0.0	155.7	0.0	3536.1	3691.8
073	Refined petroleum products	2197.8	7066.4	5619.2	8565.6	7128.5	30575.4
075	Natural gas	0.0	549.5	451.4	752.3	0.0	1753.2
095	Water (collection, purification, distribution)	55.3	444.7	585.6	117.8	417.2	1620.5
097	Electric power	192.6	2400.2	2716.4	1223.5	2603.5	8736.6
098	Manufactured gases	45.3	169.6	58.6	432.4	811.9	1517.9
099	Steam, hot water, compressed air	46.7	107.2	86.9	0.2	0.2	241.1
110	Nuclear fuels	0.3	797.8	306.9	49.0	0.0	1154.0
135	Iron ore and ECSC iron and steel products	59.8	249.8	326.0	191.4	361.6	1139.6
136	Non-ECSC iron and steel products	67.5	45.7	131.8	26.1	476.5	747.5
137	Non-ferrous metal ores; non-ferrous metals	24.1	25.1	134.3	29.3	152.0	364.8
151	Cement, lime, plaster	3.5	4.9	45.6	93.2	56.0	193.2
153	Glass	20.9	24.3	57.5	40.1	84.0	227.2
155	Earthenware and ceramic products	19.7	25.8	101.8	77.5	334.3	559.0
157	Other minerals and derived products (non-metallic)	84.7	98.5	249.6	34.7	550.6	1017.3
170	Chemical products	415.3	887.8	5208.4	1432.6	3908.2	12352.3
190	Metal products	842.2	2411.2	2244.0	878.9	2351.7	8729.6
210	Agricultural and industrial machinery	1077.4	1622.5	2104.8	1049.2	4207.3	10061.2
230	Office machines, etc.	197.8	571.5	2304.7	822.8	2865.2	6762.0
250	Electrical goods	1025.7	4272.1	3845.0	2694.9	6189.1	18026.8
270	Motor vehicles and engines	522.3	1829.3	1853.4	904.6	1415.7	6525.3
290	Other transport equipment	2830.3	6148.9	5875.3	5464.3	12761.8	34080.2
310	Meat and meat products	42.3	480.8	585.5	295.9	719.0	2124.5
330	Milk and diary products	6.7	216.9	458.6	137.1	375.1	1194.4
350	Other food products	53.9	421.0	530.8	444.8	1022.3	2472.8
370	Beverages	0.0	114.4	467.6	21.8	204.9	808.9
390	Tobacco products	0.1	0.0	16.8	0.2	20.8	38.0
410	Textiles and clothing	393.0	260.0	591.7	341.0	1047.3	2633.5
430	Leathers, leather and skin goods, footwear	123.1	55.1	64.6	72.4	170.5	485.6
450	Timber and wooden furniture	146.5	1050.4	272.0	256.3	954.0	2630.2
471	Pulp, paper, board	0.0	584.5	743.6	90.9	281.4	1700.3
473	Paper goods, products of printing	303.3	1332.0	2301.5	1557.1	3681.3	9175.7
490	Rubber and plastics products	149.6	458.9	683.5	484.8	967.1	2744.1
510	Other manufacturing products	43.6	551.3	238.7	127.5	810.2	1771.4
530	Building and civil engineering works	5123.7	26948.4	23584.8	23304.9	23392.7	102354.0
550	Recovery and repair services	0.0	746.9	450.8	1361.3	0.0	2559.9
570	Wholesale and retail trade	0.0	583.4	3295.0	1269.9	4421.9	9570.3
590	Lodging and catering services	6.0	133.7	1872.3	463.2	2876.2	5291.6
611	Railway transport services	41.6	1288.5	975.7	711.1	944.3	3461.2
613	Road transport services	0.0	1801.2	355.6	1136.1	964.9	4657.8
617	Inland waterways services	0.0	29.4	12.2	7.4	0.0	48.9
631	Maritime and coastal transport services	0.0	64.9	100.8	98.1	187.6	447.4
633	Air transport services	0.0	666.5	573.1	264.6	427.7	1941.3
650	Auxiliary transport services	0.0	1149.5	268.1	554.1	1978.3	3909.7
670	Communications	0.0	1688.0	1915.0	1032.8	2417.6	7053.4
690	Credit and insurance	0.0	387.8	1023.0	942.1	519.3	2872.3
710	Business services provided to enterprises	0.0	7229.0	7174.2	2932.7	4670.6	22006.5
730	Renting of immovable goods	0.0	708.4	1284.2	637.4	2890.0	5520.1
750	Market services of education and research	0.0	2179.9	634.1	89.9	0.0	2862.9
770	Market services of health	0.0	727.3	342.9	1586.3	0.0	2657.5
790	Market services n.e.c.	641.9	2231.4	2284.2	1622.2	3829.5	10609.2
810	General public services	0.0	0.0	0.0	25.1	0.0	25.1
850	Non-market services of education and research	0.0	0.0	0.0	23.5	0.0	23.5
890	Non-market services of health	0.0	0.0	0.0	113.0	0.0	113.0
930	Non-market services n.e.c.	0.0	0.0	0.0	0.0	0.0	0.0
	Total	15909.4	87911.7	92568.6	68375.3	118356.1	384121.1

Source: WS Atkins calculations from ESA input-output tables and other sources - see Part I report

12.4 Hypothesis on the Change in Import Penetration

A hypothesis has to be made about the change in public sector import penetration for each product group at the 2 digit NACE level. Since no reliable data exists on the current level of public sector import penetration, and since the 1992 public sector import penetration is pure hypothesis, an assumption was made of the maximum likely change in import penetration as follows:

* For coal: as assumed in the case study

* For construction: 10% increase, representing border areas and some specialist construction

* For services: 10% of business services, zero for other services (eg. maintenance, rents, health, travel)

* For manufactured goods: After 1992 the public sector import penetration will be similar to the private sector at present. The latter is not known, but data for total import penetration of each 2 digit sector (public and private purchases) is known.

  Estimates of the present level of import penetration in the public sector have been made on the basis of available evidence from the Contract data base. The implied private sector import penetration is then calculated, using data from the analysis of ESA input-output tables for the ratio of private and public sector purchasing (using intermediate consumption as a proxy)

The calculation of the change in import penetration for manufactured products uses the following equations:

Taking for each 2-digit NACE category

Θ_{AV} = total import penetration, from the DGII data base (1986 or latest year available)

Θ_{PRIV} = present private sector import penetration
Θ_{PUB} = present public sector import penetration

E_{PUB} = public purchases of the sector output
E_{PRIV} = private sector purchases
E_{TOT} = total purchases

$$E_{TOT} \times \Theta_{AV} = E_{PUB} \times \Theta_{PUB} \times E_{PRIV} \times \Theta_{PRIV}$$

whence:

$$\Theta_{PUB} = \frac{\Theta_{AV} - \left(\frac{E_{PUB}}{E_{TOT}}\right) \cdot \Theta_{PUB}}{\left[\frac{E_{PRIV}}{E_{TOT}}\right]}$$

and hence:

Change in import penetration $\Theta = \Theta_{PRIV} - \Theta_{PUB}$

To arrive at the assumed public sector import penetration an hypothesis has been made for each product by comparing the import penetration for the whole economy (from ESA National accounts aggregates) with the evidence from the contract database, as follows:

	Belgium	France	Germany	Italy	UK
1. National import penetration (ESA National Accounts)	43%	20%	22%	19%	22%
2. Apparent public sector import penetration (Atkins database)	21%	16%	12%	1%	4%
3. Ratio (2)/(1)	0.49	0.80	0.55	0.05	0.18

It has been assumed that the ratio (3) above applies to all manufactured product sectors except:

* "other transport equipment" which is mainly public sector purchases already, so the average import penetration is close to the public sector import penetration. It is assumed that in all countries import penetration ultimately reaches 80%, as would be the case if production was shared between the five countries in proportion to their market

* motor vehicles and office equipment for Belgium where import penetration is already high. There is local assembly, but no "national champions". It is assumed that public sector import penetration is similar to the private sector and there is no significant change

* "other manufactures", a spurious residual category. A 10% change is assumed.

Tables 12.3 to 12.7 show, respectively:

* the assumed public sector import penetration

* the average import penetration rates for each country, from the sectoral data base held by DG-II

TABLE 12.3 - ASSUMED PUBLIC SECTOR IMPORT PENETRATION RATES

ESA R-59 Category	Category description	BELGIUM	FRANCE	GERMANY	ITALY	UK
010	Agricultural, forestry and fishery products					
031	Coal and coal briquettes					
033	Lignite (brown coal) and lignite briquettes					
050	Products of coking					
071	Crude petroleum					
073	Refined petroleum products					
075	Natural gas					
095	Water (collection, purification, distribution)					
097	Electric power					
098	Manufactured gases					
099	Steam, hot water, compressed air					
110	Nuclear fuels					
135	Iron ore and ECSC iron and steel products					
136	Non-ECSC iron and steel products					
137	Non-ferrous metal ores; non-ferrous metals					
151	Cement, lime, plaster					
153	Glass					
155	Earthenware and ceramic products					
157	Other minerals and derived products (non-metallic					
170	Chemical products	22.27%	21.15%	10.10%	1.60%	3.95%
190	Metal products	15.45%	6.05%	3.13%	0.49%	1.94%
210	Agricultural and industrial machinery	27.49%	28.76%	7.58%	1.07%	5.31%
230	Office machines, etc.	88.97%	33.25%	16.51%	2.25%	9.39%
250	Electrical goods	26.00%	22.31%	11.14%	1.52%	6.08%
270	Motor vehicles and engines	49.76%	14.26%	6.02%	1.36%	6.56%
290	Other transport equipment	32.60%	10.02%	46.84%	24.80%	21.77%
310	Meat and meat products					
330	Milk and diary products					
350	Other food products					
370	Beverages					
390	Tobacco products					
410	Textiles and clothing	22.43%	17.17%	18.53%	0.52%	5.72%
430	Leathers, leather and skin goods, footwear	38.81%	22.71%	24.53%	0.81%	9.13%
450	Timber and wooden furniture	14.21%	14.13%	7.38%	0.76%	5.93%
471	Pulp, paper, board	16.85%	12.81%	9.39%	0.75%	3.77%
473	Paper goods, products of printing					
490	Rubber and plastics products	18.40%	11.65%	5.67%	0.46%	2.70%
510	Other manufacturing products	32.54%	21.20%	11.10%	0.38%	7.78%
530	Building and civil engineering works					
550	Recovery and repair services					
570	Wholesale and retail trade					
590	Lodging and catering services					
611	Railway transport services					
613	Road transport services					
617	Inland waterways services					
631	Maritime and coastal transport services					
633	Air transport services					
650	Auxiliary transport services					
670	Communications					
690	Credit and insurance					
710	Business services provided to enterprises					
730	Renting of immovable goods					
750	Market services of education and research					
770	Market services of health					
790	Market services n.e.c.					
810	General public services					
850	Non-market services of education and research					
890	Non-market services of health					
930	Non-market services n.e.c.					

Source: WS Atkins estimates - see text

TABLE 12.4 - AVERAGE IMPORT PENETRATION RATES

ESA R-59 Category	Category description	BELGIUM	FRANCE	GERMANY	ITALY	UK
010	Agricultural, forestry and fishery products					
031	Coal and coal briquettes					
033	Lignite (brown coal) and lignite briquettes					
050	Products of coking					
071	Crude petroleum					
073	Refined petroleum products					
075	Natural gas					
095	Water (collection, purification, distribution)					
097	Electric power					
098	Manufactured gases					
099	Steam, hot water, compressed air					
110	Nuclear fuels					
135	Iron ore and ECSC iron and steel products					
136	Non-ECSC iron and steel products					
137	Non-ferrous metal ores; non-ferrous metals					
151	Cement, lime, plaster					
153	Glass					
155	Earthenware and ceramic products					
157	Other minerals and derived products (non-metallic					
170	Chemical products	0.45	0.26	0.19	0.31	0.20
190	Metal products	0.31	0.08	0.06	0.09	0.10
210	Agricultural and industrial machinery	0.56	0.36	0.14	0.20	0.27
230	Office machines, etc.	0.89	0.41	0.32	0.43	0.47
250	Electrical goods	0.53	0.28	0.21	0.25	0.31
270	Motor vehicles and engines	0.50	0.18	0.11	0.26	0.33
290	Other transport equipment	0.33	0.10	0.47	0.25	0.22
310	Meat and meat products					
330	Milk and diary products					
350	Other food products					
370	Beverages					
390	Tobacco products					
410	Textiles and clothing	0.45	0.21	0.35	0.10	0.29
430	Leathers, leather and skin goods, footwear	0.78	0.28	0.47	0.16	0.41
450	Timber and wooden furniture	0.29	0.18	0.14	0.15	0.20
471	Pulp, paper, board	0.34	0.16	0.18	0.14	0.19
473	Paper goods, products of printing					
490	Rubber and plastics products	0.37	0.15	0.11	0.09	0.14
510	Other manufacturing products	0.66	0.26	0.21	0.07	0.27
530	Building and civil engineering works					
550	Recovery and repair services					
570	Wholesale and retail trade					
590	Lodging and catering services					
611	Railway transport services					
613	Road transport services					
617	Inland waterways services					
631	Maritime and coastal transport services					
633	Air transport services					
650	Auxiliary transport services					
670	Communications					
690	Credit and insurance					
710	Business services provided to enterprises					
730	Renting of immovable goods					
750	Market services of education and research					
770	Market services of health					
790	Market services n.e.c.					
810	General public services					
850	Non-market services of education and research					
890	Non-market services of health					
930	Non-market services n.e.c.					

Source: DG II Sectoral Database

TABLE 12.5 - PUBLIC/PRIVATE SECTOR INTERMEDIATE CONSUMPTION

ESA R-59 Category	Category description	Total Public Purchasing	Total Gross Output	Estimated Private Purchasing
010	Agricultural, forestry and fishery products	2254	200384	198130
021	Coal and coal briquettes	14181	24412	10231
022	Lignite (brown coal) and lignite briquettes	261	271	10
050	Products of coking	197	7809	7616
071	Crude petroleum	3692	105502	101810
072	Refined petroleum products	30575	185605	155030
075	Natural gas	1753	16135	14382
095	Water (collection, purification, distribution)	1620	11521	9901
097	Electric power	8737	72578	63841
098	Manufactured gases	1518	13173	11655
099	Steam, hot water, compressed air	241	745	504
110	Nuclear fuels	1154	5737	4583
135	Iron ore and ECSC iron and steel products	1189	87133	85944
136	Non-ECSC iron and steel products	748	31215	30467
137	Non-ferrous metal ores; non-ferrous metals	365	69529	69164
151	Cement, lime, plaster	183	10683	10500
153	Glass	227	16279	16052
155	Earthenware and ceramic products	559	21475	20916
157	Other minerals and derived products (non-metallic)	1018	44649	43631
170	Chemical products	12352	219685	207333
190	Metal products	8728	148444	139716
210	Agricultural and industrial machinery	10061	182752	172691
230	Office machines, etc.	6762	52240	45478
250	Electrical goods	18027	158715	140688
270	Motor vehicles and engines	6535	170891	164356
290	Other transport equipment	34622	55659	21037
310	Meat and meat products	2225	77168	74943
330	Milk and diary products	1194	41183	39989
350	Other food products	2474	151491	149017
370	Beverages	809	43962	43153
390	Tobacco products	38	26309	26271
410	Textiles and clothing	2633	153965	151332
430	Leathers, leather and skin goods, footwear	486	32745	32259
450	Timber and wooden furniture	2680	81067	78387
471	Pulp, paper, board	1700	42469	40769
473	Paper goods, products of printing	9176	77554	68378
490	Rubber and plastics products	2744	68697	65953
510	Other manufacturing products	1771	29053	27282
530	Building and civil engineering works	102354	330255	227901
550	Recovery and repair services	2559	56999	54440
570	Wholesale and retail trade	9570	386971	377401
590	Lodging and catering services	5292	116966	111674
611	Railway transport services	3461	21192	17731
613	Road transport services	4658	75182	70524
617	Inland waterways services	49	636	587
631	Maritime and coastal transport services	447	30258	29811
633	Air transport services	1942	20521	18579
650	Auxiliary transport services	7910	47414	42504
670	Communications	7053	55190	48137
690	Credit and insurance	7562	155627	148065
710	Business services provided to enterprises	17766	169600	151834
730	Renting of removable goods	5520	173285	167765
750	Market services of education and research	2864	9446	6582
770	Market services of health	2957	97599	94642
790	Market services n.e.c.	10909	84309	73400
810	General public services	25	278481	278456
850	Non-market services of education and research	24	92113	92089
890	Non-market services of health	117	25313	25196
910	Non-market services n.e.c.	3	14846	14846
	Total	384121	4982086	4597965

source: WS Atkins' analysis of ESA I-O tables

TABLE 12.6 - IMPLICIT PRIVATE SECTOR IMPORT PENETRATION

ESA R-59 Category	Category description	BELGIUM	FRANCE	GERMANY	ITALY	UK
010	Agricultural, forestry and fishery products					
031	Coal and coal briquettes					
033	Lignite (brown coal) and lignite briquettes					
050	Products of coking					
071	Crude petroleum					
073	Refined petroleum products					
075	Natural gas					
095	Water (collection, purification, distribution)					
097	Electric power					
098	Manufactured gases					
099	Steam, hot water, compressed air					
110	Nuclear fuels					
133	Iron ore and ECSC iron and steel products					
136	Non-ECSC iron and steel products					
137	Non-ferrous metal ores; non-ferrous metals					
151	Cement, lime, plaster					
153	Glass					
155	Earthenware and ceramic products					
157	Other minerals and derived products (non-metallic					
170	Chemical products	46.38%	26.63%	19.84%	32.43%	20.86%
190	Metal products	32.22%	7.62%	6.14%	9.88%	10.27%
210	Agricultural and industrial machinery	57.21%	36.20%	14.87%	21.57%	28.06%
230	Office machines, etc.	88.97%	42.59%	33.76%	49.77%	53.01%
250	Electrical goods	55.96%	28.47%	22.58%	28.40%	33.83%
270	Motor vehicles and engines	49.76%	17.89%	11.71%	27.17%	24.15%
290	Other transport equipment	80.00%	80.00%	80.00%	80.00%	80.00%
310	Meat and meat products					
330	Milk and diary products					
350	Other food products					
370	Beverages					
390	Tobacco products					
410	Textiles and clothing	45.74%	21.44%	35.68%	10.16%	29.22%
430	Leathers, leather and skin goods, footwear	79.05%	28.35%	47.19%	15.72%	41.54%
450	Timber and wooden furniture	29.22%	17.70%	14.33%	15.06%	20.73%
471	Pulp, paper, board	34.79%	16.07%	18.29%	15.00%	19.68%
473	Paper goods, products of printing					
490	Rubber and plastics products	37.97%	14.62%	11.04%	9.22%	14.38%
510	Other manufacturing products	67.94%	26.72%	21.36%	7.72%	39.15%
530	Building and civil engineering works					
550	Recovery and repair services					
570	Wholesale and retail trade					
590	Lodging and catering services					
611	Railway transport services					
613	Road transport services					
617	Inland waterways services					
631	Maritime and coastal transport services					
633	Air transport services					
650	Auxiliary transport services					
670	Communications					
690	Credit and insurance					
710	Business services provided to enterprises					
730	Renting of immovable goods					
750	Market services of education and research					
770	Market services of health					
790	Market services n.e.c.					
810	General public services					
850	Non-market services of education and research					
890	Non-market services of health					
930	Non-market services n.e.c.					

Source: WS Atkins' calculation
· see text

TABLE 12.7 - CHANGE IN PUBLIC SECTOR IMPORT PENETRATION AFTER "1992"

ESA R-59 Category		Category description	BELGIUM	FRANCE	GERMANY	ITALY	UK
010		Agricultural, forestry and fishery products					
031	*	Coal and coal briquettes	0.00%	0.00%	90.00%	0.00%	10.00%
033		Lignite (brown coal) and lignite briquettes					
050		Products of coking					
071		Crude petroleum					
073		Refined petroleum products					
075		Natural gas					
095		Water (collection, purification, distribution)					
097		Electric power					
098		Manufactured gases					
099		Steam, hot water, compressed air					
110		Nuclear fuels					
135		Iron ore and ECSC iron and steel products					
136		Non-ECSC iron and steel products					
137		Non-ferrous metal ores; non-ferrous metals					
151		Cement, lime, plaster					
153		Glass					
155		Earthenware and ceramic products					
157		Other minerals and derived products (non-metallic					
170		Chemical products	24.11%	5.48%	9.74%	30.83%	16.92%
190		Metal products	16.77%	1.57%	3.03%	9.40%	8.33%
210		Agricultural and industrial machinery	29.72%	7.44%	7.29%	20.50%	22.75%
230		Office machines, etc.	0.00%	9.34%	17.25%	47.11%	43.62%
250		Electrical goods	29.96%	6.16%	11.44%	27.08%	27.75%
270		Motor vehicles and engines	0.00%	3.63%	5.69%	25.30%	27.60%
290		Other transport equipment	47.40%	69.98%	33.16%	55.20%	58.23%
310		Meat and meat products					
330		Milk and diary products					
350		Other food products					
370		Beverages					
390		Tobacco products					
410		Textiles and clothing	23.31%	4.27%	17.15%	9.64%	23.59%
430		Leathers, leather and skin goods, footwear	40.24%	5.64%	22.65%	14.91%	33.40%
450		Timber and wooden furniture	15.01%	3.57%	6.95%	14.30%	24.80%
471		Pulp, paper, board	17.94%	3.26%	8.90%	14.25%	15.90%
473		Paper goods, products of printing					
490		Rubber and plastics products	19.58%	2.97%	5.37%	8.76%	11.38%
510		Other manufacturing products	35.40%	5.52%	10.75%	7.34%	31.78%
530	*	Building and civil engineering works	10.00%	10.00%	10.00%	10.00%	10.00%
550		Recovery and repair services					
570		Wholesale and retail trade					
590		Lodging and catering services					
611		Railway transport services					
613		Road transport services					
617		Inland waterways services					
631		Maritime and coastal transport services					
633		Air transport services					
650		Auxiliary transport services					
670		Communications					
690		Credit and insurance					
710	*	Business services provided to enterprises	10.00%	10.00%	10.00%	10.00%	10.00%
730		Renting of immovable goods					
750		Market services of education and research					
770		Market services of health					
790		Market services n.e.c.					
810		General public services					
850		Non-market services of education and research					
870		Non-market services of health					
930		Non-market services n.e.c.					

Source: Tables 12.3/12.6
*See text

* the data on public and private sector intermediate consumption from ESA input-output tables

* the calculated implicit private sector import penetration

* the calculated and assumed changes in import penetration used in the model.

12.5 Base Case Calculations

Tables 12.8, 12.9 and 12.10 show the results of the calculation of the three components of the potential saving in public expenditure. They are summarised in Table 12.11.

TABLE 12.8 - BASE CASE ESTIMATE OF THE STATIC TRADE EFFECT
(billion Ecus)

ESA Category	Category description	Belgium	France	Germany	Italy	United Kingdom	Total
010	Agricultural, forestry and fishery products	0	0	0	0	0	0
031	Coal and coal briquettes	0	0	1816	0	207	2022
033	Lignite (brown coal) and lignite briquettes	0	0	0	0	0	0
050	Products of coking	0	0	0	0	0	0
071	Crude petroleum	0	0	0	0	0	0
073	Refined petroleum products	0	0	0	0	0	0
075	Natural gas	0	0	0	0	0	0
095	Water (collection, purification, distribution)	0	0	0	0	0	0
097	Electric power	0	0	0	0	0	0
098	Manufactured gases	0	0	0	0	0	0
099	Steam, hot water, compressed air	0	0	0	0	0	0
110	Nuclear fuels	0	0	0	0	0	0
135	Iron ore and ECSC iron and steel products	0	0	0	0	0	0
136	Non-ECSC iron and steel products	0	0	0	0	0	0
137	Non-ferrous metal ores; non-ferrous metals	0	0	0	0	0	0
151	Cement, lime, plaster	0	0	0	0	0	0
153	Glass	0	0	0	0	0	0
155	Earthenware and ceramic products	0	0	0	0	0	0
157	Other minerals and derived products (non-metall	0	0	0	0	0	0
170	Chemical products	10	0	550	0	449	1010
190	Metal products	9	1	3	1	1	15
210	Agricultural and industrial machinery	40	11	17	17	30	116
230	Office machines, etc.	0	7	14	142	71	235
250	Electrical goods	61	42	81	114	104	402
270	Motor vehicles and engines	0	10	5	26	38	79
290	Other transport equipment	163	0	296	579	193	1231
310	Meat and meat products	0	0	0	0	0	0
330	Milk and diary products	0	0	0	0	0	0
350	Other food products	0	0	0	0	0	0
370	Beverages	0	0	0	0	0	0
390	Tobacco products	0	0	0	0	0	0
410	Textiles and clothing	110	4	0	18	2	134
430	Leathers, leather and skin goods, footwear	6	0	2	2	2	12
450	Timber and wooden furniture	2	1	5	0	0	9
471	Pulp, paper, board	0	2	14	0	0	16
473	Paper goods, products of printing	0	0	0	0	0	0
490	Rubber and plastics products	4	1	5	7	4	20
510	Other manufacturing products	2	2	3	2	10	18
530	Building and civil enginnering works	51	269	236	233	234	1024
550	Recovery and repair services	0	0	0	0	0	0
570	Wholesale and retail trade	0	0	0	0	0	0
590	Lodging and catering services	0	0	0	0	0	0
611	Railway transport services	0	0	0	0	0	0
613	Road transport services	0	0	0	0	0	0
617	Inland waterways services	0	0	0	0	0	0
631	Maritime and coastal transport services	0	0	0	0	0	0
633	Air transport services	0	0	0	0	0	0
650	Auxiliary transport services	0	0	0	0	0	0
670	Communications	0	0	0	0	0	0
690	Credit and insurance	0	0	0	0	0	0
710	Business services provided to enterprises	0	72	72	34	47	224
730	Renting of immovable goods	0	0	0	0	0	0
750	Market services of education and research	0	0	0	0	0	0
770	Market services of health	0	0	0	0	0	0
790	Market services n.e.c.	0	0	0	0	0	0
810	General public services	0	0	0	0	0	0
850	Non-market services of education and research	0	0	0	0	0	0
890	Non-market services of health	0	0	0	0	0	0
930	Non-market services n.e.c.	0	0	0	0	0	0
	Grand Total	459	423	3119	1175	1391	6566

Source: WS Atkins' calculations

TABLE 12.9 - BASE CASE ESTIMATE OF THE COMPETITION EFFECT

(billion Ecus)

ESA Category	Category description	Belgium	France	Germany	Italy	United Kingdom	Total
010	Agricultural, forestry and fishery products	0	0	0	0	0	0
031	Coal and coal briquettes	0	0	0	0	0	0
033	Lignite (brown coal) and lignite briquettes	0	0	0	0	0	0
050	Products of coking	0	0	0	0	0	0
071	Crude petroleum	0	0	0	0	0	0
073	Refined petroleum products	0	0	0	0	0	0
075	Natural gas	0	0	0	0	0	0
095	Water (collection, purification, distribution)	0	0	0	0	0	0
097	Electric power	0	0	0	0	0	0
098	Manufactured gases	0	0	0	0	0	0
099	Steam, hot water, compressed air	0	0	0	0	0	0
110	Nuclear fuels	0	0	0	0	0	0
135	Iron ore and ECSC iron and steel products	0	0	0	0	0	0
136	Non-ECSC iron and steel products	0	0	0	0	0	0
137	Non-ferrous metal ores; non-ferrous metals	0	0	0	0	0	0
151	Cement, lime, plaster	0	0	0	0	0	0
153	Glass	0	0	0	0	0	0
155	Earthenware and ceramic products	0	0	0	0	0	0
157	Other minerals and derived products (non-metall	0	0	0	0	0	0
170	Chemical products	0	0	0	0	0	0
190	Metal products	0	0	0	0	0	0
210	Agricultural and industrial machinery	0	0	0	0	0	0
230	Office machines, etc.	0	0	0	0	0	0
250	Electrical goods	82	266	301	115	146	890
270	Motor vehicles and engines	0	0	0	0	0	0
290	Other transport equipment	144	0	479	299	130	1051
310	Meat and meat products	0	0	0	0	0	0
330	Milk and diary products	0	0	0	0	0	0
350	Other food products	0	0	0	0	0	0
370	Beverages	0	0	0	0	0	0
390	Tobacco products	0	0	0	0	0	0
410	Textiles and clothing	0	0	0	0	0	0
430	Leathers, leather and skin goods, footwear	0	0	0	0	0	0
450	Timber and wooden furniture	0	0	0	0	0	0
471	Pulp, paper, board	0	0	0	0	0	0
473	Paper goods, products of printing	0	0	0	0	0	0
490	Rubber and plastics products	0	0	0	0	0	0
510	Other manufacturing products	0	0	0	0	0	0
530	Building and civil engineering works	0	0	0	0	0	0
550	Recovery and repair services	0	0	0	0	0	0
570	Wholesale and retail trade	0	0	0	0	0	0
590	Lodging and catering services	0	0	0	0	0	0
611	Railway transport services	0	0	0	0	0	0
613	Road transport services	0	0	0	0	0	0
617	Inland waterways services	0	0	0	0	0	0
631	Maritime and coastal transport services	0	0	0	0	0	0
633	Air transport services	0	0	0	0	0	0
650	Auxiliary transport services	0	0	0	0	0	0
670	Communications	0	0	0	0	0	0
690	Credit and insurance	0	0	0	0	0	0
710	Business services provided to enterprises	0	0	0	0	0	0
730	Renting of immovable goods	0	0	0	0	0	0
750	Market services of education and research	0	0	0	0	0	0
770	Market services of health	0	0	0	0	0	0
790	Market services n.e.c.	0	0	0	0	0	0
810	General public services	0	0	0	0	0	0
850	Non-market services of education and research	0	0	0	0	0	0
890	Non-market services of health	0	0	0	0	0	0
930	Non-market services n.e.c.	0	0	0	0	0	0
	Grand Total	206	266	779	415	275	1941

Source: WS Atkins' calculations

TABLE 12.10 - BASE CASE ESTIMATE OF THE RESTRUCTURING EFFECT
(billion Ecus)

ESA Category	Category description	RESTRUCTURING FACTOR	BELGIUM	FRANCE	GERMANY	ITALY	UK	TOTAL
010	Agricultural, forestry and fishery products		0	0	0	0	0	0
021	Coal and coal briquettes	0%	0	0	0	0	0	0
023	Lignite (brown coal) and lignite briquettes		0	0	0	0	0	0
050	Products of coking		0	0	0	0	0	0
071	Crude petroleum		0	0	0	0	0	0
073	Refined petroleum products		0	0	0	0	0	0
075	Natural gas		0	0	0	0	0	0
095	Water (collection, purification, distribution)		0	0	0	0	0	0
097	Electric power		0	0	0	0	0	0
098	Manufactured gases		0	0	0	0	0	0
099	Steam, hot water, compressed air		0	0	0	0	0	0
110	Nuclear fuels		0	0	0	0	0	0
135	Iron ore and ECSC iron and steel products		0	0	0	0	0	0
136	Non-ECSC iron and steel products		0	0	0	0	0	0
137	Non-ferrous metal ores; non-ferrous metals		0	0	0	0	0	0
151	Cement, lime, plaster	0%	0	0	0	0	0	0
153	Glass		0	0	0	0	0	0
155	Earthenware and ceramic products		0	0	0	0	0	0
157	Other minerals and derived products (non-metall		0	0	0	0	0	0
170	Chemical products	0%	0	0	0	0	0	0
190	Metal products	0%	0	0	0	0	0	0
210	Agricultural and industrial machinery	0%	0	0	0	0	0	0
230	Office machines, etc.	0%	0	0	0	0	0	0
250	Electrical goods	4%	43	179	161	113	260	757
270	Motor vehicles and engines	0%	0	0	0	0	0	0
290	Other transport equipment	15%	425	1222	881	811	1954	5193
310	Meat and meat products		0	0	0	0	0	0
330	Milk and diary products		0	0	0	0	0	0
350	Other food products		0	0	0	0	0	0
370	Beverages		0	0	0	0	0	0
390	Tobacco products		0	0	0	0	0	0
410	Textiles and clothing	0%	0	0	0	0	0	0
430	Leathers, leather and skin goods, footwear	0%	0	0	0	0	0	0
450	Timber and wooden furniture	0%	0	0	0	0	0	0
471	Pulp, paper, board	0%	0	0	0	0	0	0
473	Paper goods, products of printing		0	0	0	0	0	0
490	Rubber and plastics products	0%	0	0	0	0	0	0
510	Other manufacturing products	0%	0	0	0	0	0	0
530	Building and civil enginnering works	0%	0	0	0	0	0	0
550	Recovery and repair services		0	0	0	0	0	0
570	Wholesale and retail trade		0	0	0	0	0	0
590	Lodging and catering services		0	0	0	0	0	0
611	Railway transport services		0	0	0	0	0	0
613	Road transport services		0	0	0	0	0	0
617	Inland waterways services		0	0	0	0	0	0
631	Maritime and coastal transport services		0	0	0	0	0	0
633	Air transport services		0	0	0	0	0	0
650	Auxiliary transport services		0	0	0	0	0	0
670	Communications		0	0	0	0	0	0
690	Credit and insurance		0	0	0	0	0	0
710	Business services provided to enterprises	0%	0	0	0	0	0	0
730	Renting of immovable goods		0	0	0	0	0	0
750	Market services of education and research		0	0	0	0	0	0
770	Market services of health		0	0	0	0	0	0
790	Market services n.e.c.		0	0	0	0	0	0
810	General public services		0	0	0	0	0	0
850	Non-market services of education and research		0	0	0	0	0	0
890	Non-market services of health		0	0	0	0	0	0
930	Non-market services n.e.c.		0	0	0	0	0	0
	Total		468	1402	1043	924	2114	5950

Source: WS Atkins' calculations

TABLE 12.11 - SUMMARY OF BASE CASE ESTIMATES OF TOTAL SAVINGS
(billions of Ecus 1984)

	Belgium	France	Germany	Italy	UK	Total EUR5
Static Trade Effect	0.5	0.4	3.1	1.2	1.4	6.6
Competition Effect	0.2	0.3	0.8	0.4	0.3	1.9
Restructuring Effect	0.5	1.4	1.0	0.9	2.1	6.0
Total Savings	1.1	2.1	4.9	2.5	3.8	14.5
GDP 1984	96.9	623.3	783.8	521.7	540.3	2556
Savings as % of GDP	1.1	0.3	0.6	0.5	0.7	0.6

Source: WS Atkins model

12.6 Sensitivity Analysis

A series of sensitivity analyses have been carried out to test the robustness of the base case hypotheses. The critical alternative cases examined are:

* Case I volume of contracts: savings only apply to contract purchases which are covered by EC legislation. These are estimated to represent 80 percent of total purchasing

* Case II import penetration: supply side constraints restrict the change in import penetration to 50 percent of the Base Case estimates

* Case III trading costs: risk premium and trading costs are negligible in the new internal market conditions

* Case IV price savings: variation of ± 20 percent

* Case V restructuring effects: variation of ± 30 percent

* Case VI competition effect: variation - 50 percent

The results are shown in Table 12.12 and the overall findings summarised in Table 12.13.

TABLE 12.12 - SENSITIVITY ANALYSIS
(billion Ecus)

	Static Trade Effect	Comp.n Effect	Restruct Effect	Total
Base case	6.6	1.9	6.0	14.5
Base case excluding coal	4.6	1.9	6.0	12.5
I: 80% contracts	5.3	2.2	6.0	13.5
II: 50% import penetration	3.3	2.7	6.0	12.0
III: No trading cost	7.3	2.0	6.0	15.3
IV: Price savings ± 20%	5.3-7.9	1.9	6.0	13.2-15.8
V: Restructuring effect ± 33%	6.6	1.9	4.0-8.0	12.5-16.5
VI: Competition effect - 50%	6.6	1.0	6.0	13.6

Notes: The Base Case static trade effect includes savings of:

Coal	2.0	bn ecu
Pharmaceuticals	1.0	bn ecu
Equip goods	2.1	bn ecu
Consumer goods	0.2	bn ecu
Construction	1.0	bn ecu
Services	0.2	bn ecu
	6.6	bn ecu

Competition and restructuring effects are entirely in equipment goods ('electrical equipment' and 'other transport equipment')

TABLE 12.13 - SUMMARY OF POTENTIAL SAVINGS
(Billion Ecus 1984 - 5 countries)

Component	Value (billion ecus)	% GDP	% of total public purchasing
Static trade effect *	3 - 8	0.1 - 0.3	1 - 2
Competition effect	1 - 3	0.04 - 0.1	0.3 - 1
Restructuring effect	4 - 8	0.15 - 0.3	1 - 2
	8 - 19	0.3 - 0.7	2 - 5

12.7 Caveats

It should be recalled that the estimates include the savings in public expenditure (matched by production cost savings) resulting from the complete opening up of the European markets by implementation of the White Paper proposals. It does not, however, include:

* effects on private sector purchases of products whose price is reduced by the restructuring or competition effects. This is relatively small since these effects only apply to sectors where public sector purchasing dominates

* long term effects on the pace of innovation and economic growth as a result of more effective use of R&D. The present estimates measure a potential saving in R&D to achieve the same product strategy. This could be the greatest benefit of all in the long run, and the one thing above all that keeps Europe's major industries competitive.

Within the limited definition of savings in public expenditure, however, it should be noted that:

* the calculations of the static price effect are a theoretical upper limit to the potential expenditure savings for each of the products analysed, because:

  - part of the observed price differences may be due to quality and specification differences
  - any errors in prices quoted will tend to exaggerate price differences
  - initial price differences do not necessarily measure differences in life cycle value for money, so initial price savings may lead to higher maintenance, operating or replacement costs later on

* the calculated savings are the potential result, across all goods and services purchased by the public sector of an open internal market and require all barriers to be removed. Merely opening up public purchasing procedures will not in itself allow these savings to be achieved. The price differences exist in most cases because of other barriers to trade: eg.

  - cartels
  - market share agreements
  - exclusive dealerships
  - trade formalities (eg. on cars and high technology goods)
  - national standards
  - product approval procedures

* changing public purchasing regulations, even if all other barriers are removed, will not induce totally free trade:

  - suppliers, particularly SMEs, often deliberately choose to supply a local, regional or national market and may not respond to international calls for tender

- suppliers dislike open bidding procedures and often consider that the probability of success does not justify the cost of bidding - particularly where there are language problems
- there are good reasons, other than price, for purchasing locally: after sales service, security of supply, language

* conversely, some of the benefits of wider public procurement will be achieved anyway, even if there is no change in the internal market conditions because technology changes are forcing firms in some key industries to adopt Europe-wide, and indeed worldwide, production and marketing strategies.

12.8 Unquantified Effects

There are also other unquantified effects, which include:

* employment effects of plant closures and rationalisation. Of the case studies, this principally effects coal (which is a special case) and possibly boilers and turbine generators. The other products are in growing markets and do not have significant excess capacity, so employment should continue to grow. Moreover, failure to implement the internal market strategy will lead to some industries becoming uncompetitive, with the risk off widescale loss of employment.

* regional disparities. There are likely to be a small number of surviving firms in boilers, turbine generators, locomotives and computers. The stronger firms are those in the four major countries France, Germany, UK and Italy. Labour cost differences may induce the surviving firms to manufacture in the newer Member States, but the history of customs unions suggests this is not usually sufficient to offset the concentration effects

* monopoly effects. The number of firms will reduce, and in the case of power generation equipment, locomotives and mainframe computers there may be only one producer based in each of the main countries. But, if there is a truly open market, there will be real competition between European firms. At present there is no intra-European competition, and domestic competition is severely limited by tacit agreements between firms, and by attempts by governments to share out contracts in order to keep more than one firm in business

* external trade effects. In power generation equipment and locomotives, and possibly also in telecommunications, some firms commented that protected national markets, in which they can cover their overheads from domestic sales, permit firms to compete in export markets by selling below average cost. This is what Japanese firms seem to be able to do, and European firms follow suit. If domestic prices are driven down by open competition, firms fear that Japanese and Far Eastern firms will enter the European market, but European firms will have to try to sell abroad at full cost or close down capacity European firms will become more efficient, but there may be a short-term adverse effect on the external trade balance in these case study products. The consultant believes that the long term viability of key industries like power generation equipment, railway equipment, aerospace, computers and telecommunications depend on the development of a large competitive European market.

A P P E N D I X E S

APPENDIX I

SPECIFICATIONS OF "PRICE EFFECT LIST" SAMPLE PRODUCTS

Product: PHARMACEUTICALS - DIGOXIN

Product Specification: 62.5 mg tablet

Order Quantity: 200 tablets

Delivery Instructions: to main hospital complex

Product: PHARMACEUTICALS - PARACETAMOL

Product Specification: 500 mg tablet

Order Quantity: 10,000 tablets

Delivery Instructions: to main hospital complex

Product: POWER CONDUCTOR

Product Specification:

132 kV Aluminium Cored, steel reinforced overhead line - Lynx conductor

Order Quantity: 10 km

Delivery Instructions: to nearest main road site

Product: STREET LIGHTING

Product Specification:

1. Lighting: 25,000 lumens
2. Power: 200-250W
3. Lantern Size: 610-743 mm long
   400 mm wide
   320 mm deep
4. Weight: 5-6 kilo gross
5. Including lamp, canopy and bow
6. Without control gear and capacitor
7. High pressure sodium lamp

Appendix I (cont'd)

Order Quantity: 200 off

Delivery Instructions: to central depot

Product: FLUORESCENT TUBE

Product Specification:

1. 80 w
2. 5'/164 cm long

Order Quantity: 500 off

Delivery Instructions: to central office supplies depot

Product: SCHOOL DESK

Product Specification:

1. Single
2. Metal frame, laminated top
3. No storage
4. Size - 71 cm high
   - 60 cm wide
   - 60 cm deep

Order Quantity: 100 off

Delivery Instructions: to central depot

Product: OFFICE DESK

Product Specification:

1. Stratified table (laminated plastic)
2. One side, box with 2 drawers; other side, box with 3 drawers, all lockable
3. Steel modesty board
4. Painted square tubular metal legs/feet
5. Size: 0.75 m high
   1.56 x 0.78 m top

Order Quantity: 100 off

Delivery Instructions: to central office supplies depot

Appendix I (cont'd)

Product: FILING CABINET

Product Specification:

1. 4 drawers and file supports
2. Size - 135 cm high
   - 45 cm wide
   - 62 cm deep

Order Quantity: 50 off

Delivery Instructions: to central office supplies depot

Product: UNIFORM (eg. Police/Ambulance/Postman)

Product Specification:

1. Jacket - single breasted with 2 chrome buttons
2. Trousers - 2 pairs with zip fly front, self supporting
3. Cloth - polyester/cotton mix (65% to 35%)
   210 gm/m^2 cloth with miraclean finish
4. Size - to fit man 1.75 - 1.78 m in height
   - jacket : 103 cm chest, 89 cm waist
   - trousers : 89 cm waist, 82.5 cm leg

Order Quantity: 100 suits

Delivery Instructions: to central depot

Product: PHOTOCOPY PAPER

Product Specification:

1. Size - A4
2. Weight - $80g/m^2$
3. Brand - Xerox

Order Quantity: 100 reams

Delivery Instructions: to central office supplies depot

Product: CEMENT

Product Specification: Portland

Order Quantity: 10 tonne bulk

Delivery Instructions: to centre of Capital city

Appendix I (cont'd)

Product: OPEL ASCONA/VAUXHALL CAVALIER 1600

Product Specification:

1. Standard model
2. 1.6 Hatchback; 4 speed manual transmission
3. Engine: 1598 cc petrol/gasoline
   90 PS(DIN) @ 5800 rpm max. power
   93 lb ft (126 Nm) @ 3800-4200 rpm max. torque
   Varajet twin barrel carburettor, manual choke
   9.2:1 compression ratio
4. Sizes: Wheelbase - 2577 mm
   Load capacities - 1.21 m^3 seat down (VDA method)
   Cargo spage - 1.5 m max. length with rear seat down
   1.2 m max. width rear floor
   0.825 m max. cargo height

Order Quantity: 100 off

Delivery Instructions: to central depot

Product: FIAT DUCATO 1.3 TON VAN

Product Specification:

1. Gross Vehicle weight: 2800 kgs
2. Payload: 1385 kgs
3. Engine: 2.0 litre petrol, 78 bhp, 4 cylinder, in line
4. Torque: 113.2 lb.ft. (154.0 Nm) @ 2500 rpm
5. Transmission: 5 speed manual gearbox, clutch 228.6mm diameter
6. Wheel base: 2923 mm
7. Body volume: 6.5 m^3
8. Floor area: 4.46 m^2
9. Not high roof version
10. Brakes: dual circuit, disc on front, drums on rear
11. Steering: rack and pinion

Order Quantity: 30 off

Delivery Instructions: to central depot

Appendix I (cont'd)

Product: VW TRANSPORTER DELIVERY VAN

Product Specification:

1. Gross vehicle weight: 2390 kgs
2. Payload:
3. Engine: 1.9 litre petrol, 78 bhp, 4 cylinder, in line
4. Torque: 103.9 lb.ft. (141 Nm) @ 2600 rpm
5. Transmission: 4 speed manual gearbox, clutch 228 mm diameter
6. Wheel base: 2460 mm
7. Body volume: 5.7 m^3
8. Not high roof version

Order Quantity: 30 off

Delivery Instructions: to central depot

Product: CARDIAC MONITOR

Product Specification:

1. HELLIGE SMS 151 or similar

Order Quantity: 1 off

Delivery Instructions: to main hospital complex

Product: FLUOROSCOPIC SCREENING UNIT (X-RAY MACHINE)

Product Specification:

1. SIEMENS SIRESKOP 4 with undercouched tube and 90"/60" tilting table
2. Without generator, tubes, cables, screen
3. With explorator

Order Quantity: 1 off

Delivery Instructions: to main hospital complex

Product: TRANSFORMER

Product Specification:

1. Output capacity 100 kVA
2. H.V. Line volts 20 kV
3. L.V. Line/Phase volt 400/231 V
4. Oil (no askarel) filled sealed type

Appendix I (cont'd)

5. Weight with oil 3150 kilos
6. Three phase 50 Hz neutral earth
7. Terminals: external H.V. and L.V. bushings
8. Tappings: by external off load switch ± 2½%, 5% on primary volts
9. Losses: load-loss 11.8 kW
10. : no load loss 1.8 kW
11. HV/LV winding connections 41 DY11
12. Delta/Star
13. Norms IEC 76
14. Impulse voltages: 75 kV peak, withstand using 1.2/50 wave, positive and negative polarities

Order Quantity: 20 off

Delivery Instructions: to site

Product: RAILWAY GOODS WAGON

Product Specification:

1. Flat bogie, standard model
2. 4 axles
3. Carrying capacity 54 tonnes
4. Tare weight: 13.4 tonnes
5. Size : 19.9 m long
   2.974 m wide
6. Air and screw brakes

Order Quantity: 10 off

Delivery Instructions: to central railway depot

Product: TELEPHONE SET

Product Specification:

1. Standard digital model
2. Without accessories
3. Table telephone

Order Quantity: a) 100 off (eg. to a government office)
b) 10,000 off (to a PTT)

Delivery Instructions: to central office supplies depot

APPENDIX II
CALCULATION OF TYPICAL SAVINGS THRESHOLDS AND POTENTIAL SAVINGS FACTORS

II.1 Savings Thresholds

The savings threshold is the cost of initiating trade with an overseas supplier, expressed as a percentage of the present price from home suppliers. It represents the saving that has to be offered by a foreign supplier to make trade worthwhile.

The savings threshold is the sum of:

* transport and insurance costs

* trading and procurement costs (advertising, local representation, bid preparation or selling costs by the supplier; and advertising, bid evaluation, quality assurance and inspection or testing costs by the purchaser)

* premium for trading risks (supply interruption, supplier default)

* the cost of foreign exchange cover

* costs resulting from the purchase of products with different quality or specification, such as higher maintenance costs, lower performance, and adaptation costs.

The Tables II.1 (a) to (e) show, for each pair of trading countries, a calculation of these components of the saving threshold based on reasonable assumptions about typical contract sizes, and trading costs. The savings threshold is in many cases a very significant

Appendix II (cont'd)

portion of the total product cost, and is very sensitive to assumptions about contract size, and the location of supplier and purchaser. For large contracts between parties close to each other (ie. in border areas) the threshold would be very low. For small contracts between remote parties (ie. Scotland and the Mezzogiorno) it would be prohibitive. For any product, therefore, there may be potential savings on some contracts, and none on others. The estimates in this report are for a typical contract.

The assumptions made in Table II.1 are described below:

* **Transport costs**

  Figure II.1 shows a simplified model of typical transport costs per tonne-km or per m^3-km for consignments between two European cities. This is representative of journeys between major industrial centres in Europe. The data is from current air freight rates and a recent Atkins study on road freight costs.

  In Table II.1 the typical weight (or volume) of each consignment has been estimated (column 5). The typical transport cost per tonne(m^3)-km is estimated from Figure II.1 (column 6). The transport margin is then calculated as:

  (Transp%) = (wt or vol) * (transp/tn.km) * (distance) / (unit cost)

  Unit cost is the mean price in each country.

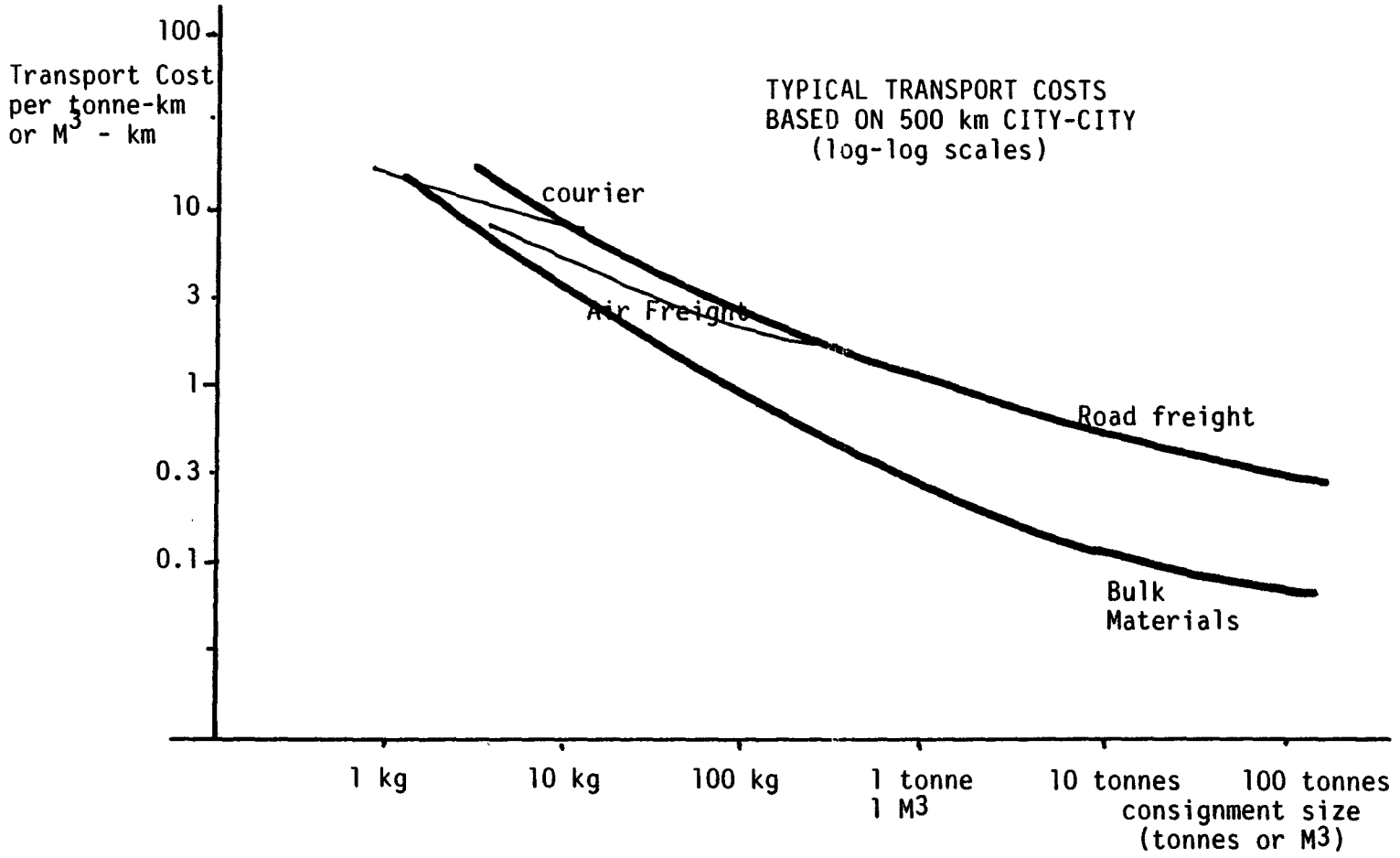

FIGURE II.1 - A SIMPLE TRANSPORT COST MODEL

Appendix II (cont'd)

* **Trading costs**

Four typical cases have been considered:

- products of known quality and specification which only require the purchaser to identify several suppliers, obtain quotations and place an order: Assume 2 man-days @ 500 ecu (man-day cost including support services and overheads) = 1,000 ecus
  eg. pharmaceuticals

- products which require submission and testing of a sample or product literature, formal bidding procedure, and/or more complex shipping arrangements than the first case: assume 4 man-days @ 500 ecus = 2,000 ecus
  eg. street lamps, fluorescent tubes, filing cabinets, cement, paper

- products requiring formal bidding procedure and/or purchasers 'visit to suppliers' premises, product evaluation and/or complex shipping formalities: assume 10 man-days @ 500 ecus = 5,000 ecus
  eg. furniture, vehicles, electronic equipment

- products requiring formal bidding procedures and full technical evaluation and testing of the products, visits to suppliers premises, contract negotiation, design or prototype development, and/or on-going quality assurance: assume 20 man-days @ 500 ecus = 10,000 ecus
  eg. power cables, uniforms, transformers, railway wagons, telephones.

Appendix II (cont'd)

None of the products on the price effect list require very costly design and bidding procedures such as the case study products would require, which might run into hundreds of thousands of Ecus per contract.

The trading cost is expressed as a percent of contract value by choosing a typical contract size:

Contract value = unit cost * order size
(trading %) = (trading cost)/(contract value).

* **Foreign exchange cover**

There is an exchange risk in all foreign contracts. Buyers could insure against the risk by buying currency forward. In practice public purchasers will not normally do so. The cost of doing so is, however, a measure of the risk. This clearly depends on the currencies: in some cases there is a gain. Typical spreads are $\pm$ 5 percent per year. A subjective 2 percent of the supplier's price is assumed (based on a 2 year contract with payments "on average" one year ahead).

* **Trading risk**

An estimated 2 percent for the insurance cost of the risk of interruption of supply is assumed. In practice, the consultant's interviews with purchasing officers suggests that they are generally very risk averse - they are judged mainly on supply performance not cost effectiveness, so the sum of the above two risk premia is probably higher than the 4 percent that has been assumed - they would want to save more than 4 percent before abandoning a secure local supplier.

Appendix II (cont'd)

II.2 Potential Savings Factors

Tables II.2 (a) to (e) show for each purchasing country and each product the calculation of potential savings factors. Each table shows:

* the savings threshold for purchases from each of the four potential trading partners, as calculated above

* the price advantage shown for suppliers in each potential trading partner (the mean of price observations shown in Table 3.4 of the report),

  ie. $\dfrac{\text{(home price) - (foreign price)}}{\text{(home price)}}$ { if greater than 0; 0 otherwise

* the saving for each pair of countries, equal to the price advantage minus the savings threshold

* the potential saving, equal to the greatest saving out of each pair of countries.

These potential savings are summarised in Table II.3.

II.3 Hermes Model Factors

The potential savings factors, and also the changes in import penetration, have been aggregated to macro-sectoral level for use in the Hermes Suite of models by Commission officials. These data are shown in Table II.4.

Appendix II (cont'd)

TABLE II.1(a) - ESTIMATION OF SAVINGS THRESHOLDS (Belgium)

ESTIMATION OF SAVINGS THRESHOLD (Belgium)

		fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder II	calc II
UNIT COST		118	300	317	118	252	892	113	853	1000000
ORDER SIZE		1000	300	400	1000	1000	1000	500	100	500
CONTRACT VALUE		118000	90000	126800	118000	252000	892000	56500	85300	#########
WEIGHT OR VOLUME		0.1	0.3	0.4	0.2	0.4	0.05	0.00025	0.1	0.00025
TRANSPORT (ECU/TN.Km)		0.3	0.3	0.3	0.3	0.3	0.3	1	0.3	1
TRADING		2000	2000	2000	2000	2000	2000	2000	5000	2000
TRADING SUB-TOTAL		2%	2%	2%	2%	1%	0%	4%	6%	0%
From FRANCE	£300	9	72	36	27	36	4.5	0.075	9	0.075
transport premium (%)		8%	24%	11%	23%	14%	1%	0%	1%	0%
Risk Premium		5%	5%	3%	2%	4%	5%	5%	4%	0%
From GERMANY	£300	9	72	36	27	36	4.5	0.075	9	0.075
transport premium (%)		8%	24%	11%	23%	14%	1%	0%	1%	0%
Risk Premium		5%	5%	4%	2%	4%	4%	5%	4%	0%
From ITALY	£900	27	216	108	81	108	13.5	0.225	27	0.225
transport premium (%)		22%	72%	34%	69%	42%	2%	0%	3%	0%
Risk Premium		2%	5%	6%	2%	4%	6%	7%	6%	0%
From UK	£300	9	72	36	27	36	4.5	0.075	9	0.075
transport premium (%)		8%	24%	11%	23%	14%	1%	0%	1%	0%
Risk Premium		5%	4%	3%	2%	3%	6%	4%	0%	0%
TOTAL SAVINGS THRESHOLD										
(FRANCE -> BELGIUM)		14%	31%	18%	27%	19%	5%	9%	11%	0%
(GERMANY -> BELGIUM)		15%	31%	17%	27%	19%	5%	8%	11%	0%
(ITALY -> BELGIUM)		28%	79%	41%	72%	47%	8%	11%	15%	0%
(UK -> BELGIUM)		14%	30%	16%	25%	18%	6%	7%	7%	0%

Source : Eurostat & BEUC Data

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ESTIMATION OF SAVINGS THRESHOLD (Belgium)

		trans. I /graph	electro	telephone	pharm	average of car	van b6	van b7	bus d8	bus d14
UNIT COST		2849	1413	60	795	10026	12188	9174	1000000	10684
ORDER SIZE		100	10	10000	1000	100	100	100	100	100
CONTRACT VALUE		284900	14130	600000	794510	1002565	1218800	917400	#########	1068400
WEIGHT OR VOLUME		0.8	0.1	0.007	0.1	1	3	3	16	3
TRANSPORT (ECU/TN.Km)		0.3	1	1	0.3	0.2	0.1	0.1	0.03	0.1
TRADING		10000	5000	10000	1000	5000	5000	5000	5000	5000
TRADING SUB-TOTAL		4%	35%	2%	0%	0%	0%	1%	0%	0%
From FRANCE	£300	72	30	0.9	9	60	90	90	144	90
transport premium (%)		3%	2%	2%	1%	1%	1%	1%	0%	1%
Risk Premium		5%	4%	6%	3%	4%	4%	5%	1%	6%
From GERMANY	£300	72	30	0.9	9	60	90	90	144	90
transport premium (%)		3%	2%	2%	1%	1%	1%	1%	0%	1%
Risk Premium		5%	4%	7%	3%	4%	5%	4%	1%	4%
From ITALY	£900	216	90	2.7	27	180	270	270	432	270
transport premium (%)		8%	6%	5%	3%	2%	2%	3%	0%	2%
Risk Premium		4%	4%	4%	4%	2%	3%	3%	1%	3%
From UK	£300	72	30	0.9	9	60	90	90	144	90
transport premium (%)		3%	2%	2%	1%	1%	1%	1%	0%	1%
Risk Premium		5%	3%	2%	6%	5%	5%	5%	1%	5%
TOTAL SAVINGS THRESHOLD										
(FRANCE -> BELGIUM)		11%	41%	9%	5%	5%	5%	7%	1%	7%
(GERMANY -> BELGIUM)		11%	41%	10%	3%	5%	6%	6%	1%	6%
(ITALY -> BELGIUM)		15%	46%	10%	7%	7%	8%	9%	1%	9%
(UK -> BELGIUM)		12%	41%	9%	7%	6%	6%	6%	1%	7%

Source : Eurostat & BEUC Data

ESTIMATION OF SAVINGS THRESHOLD (Belgium)

		Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
UNIT COST		4.50	561.20	28875.86	285.97	3.19	48.79	342.60	230.52	205.48	3.35
ORDER SIZE		1000	100	50	100	1000	1000	300	400	1000	10000
CONTRACT VALUE		4505	56120	1443793	28597	3185	48795	102781	92128	205479	33485
WEIGHT OR VOLUME		0.0005	0.01	10	0.01	0.0005	0.1	1	0.5	0.01	0.0024
TRANSPORT (ECU/TN.Km)		10	10	0.2	1	1	0.3	0.3	0.3	0.3	0.3
TRADING		1000	1000	10000	2000	2000	5000	5000	2000	10000	2000
TRADING SUB-TOTAL		22%	2%	1%	7%	63%	10%	5%	2%	5%	6%
From FRANCE	300Km	1.5	30	600	3	0.15	9	90	45	0.9	0.216
transport premium (%)		33%	5%	2%	1%	5%	18%	26%	20%	0%	6%
Risk Premium		7%	5%	3%	4%	2%	4%	4%	4%	2%	5%
From GERMANY	300Km	1.5	30	600	3	0.15	9	90	45	0.9	0.216
transport premium (%)		33%	5%	2%	1%	5%	18%	26%	20%	0%	6%
Risk Premium		6%	2%	3%	3%	2%	6%	5%	6%	2%	5%
From ITALY	900Km	4.5	90	1800	9	0.45	27	270	135	2.7	0.648
transport premium (%)		100%	16%	6%	3%	14%	55%	79%	59%	1%	19%
Risk Premium		9%	6%	3%	2%	5%	3%	2%	5%	3%	3%
From UK	300Km	1.5	30	600	3	0.15	9	90	45	0.9	0.216
transport premium (%)		33%	5%	2%	1%	5%	18%	26%	20%	0%	6%
Risk Premium		2%	0%	3%	1%	4%	2%	4%	2%	2%	4%
TOTAL SAVINGS THRESHOLD											
(FRANCE -> BELGIUM)		63%	12%	6%	12%	69%	32%	35%	26%	9%	17%
(GERMANY -> BELGIUM)		61%	9%	5%	11%	70%	34%	36%	28%	7%	18%
(ITALY -> BELGIUM)		132%	24%	10%	12%	82%	68%	86%	66%	9%	29%
(UK -> BELGIUM)		58%	7%	5%	9%	72%	31%	35%	24%	7%	17%

Source : Atkins Survey Data

NOTES :

The risk premium for both Atkins survey data and Eurostat & BEUC data in all countries has been calculated on the new suppliers price instead of the old home price.

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ESTIMATION OF SAVINGS THRESHOLD (Belgium)

		Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray m/c.	Trans-former	Goods wagon	Telephone
UNIT COST		65.31	6701.09	8344.24	8415.79	2698.10	#########	9154.49	63471.10	39.52
ORDER SIZE		100	100	100	100	5	1	100	100	10000
CONTRACT VALUE		6531	670109	834424	841579	13491	138311	915449	6347110	395241
WEIGHT OR VOLUME		1	1	2	2	0.1	1	3	15	0.01
TRANSPORT (ECU/TN.Km)		0.1	0.2	0.2	0.2	1	1	0.3	0.1	1
TRADING		2000	5000	5000	5000	5000	5000	10000	10000	10000
TRADING SUB-TOTAL		31%	1%	1%	1%	37%	4%	1%	0%	3%
From FRANCE	300Km	30	60	120	120	30	300	270	390	3
transport premium (%)		46%	1%	1%	1%	1%	0%	3%	1%	2%
Risk Premium		4%	5%	5%	5%	4%	5%	4%	3%	5%
From GERMANY	300Km	30	60	120	120	30	300	270	390	3
transport premium (%)		46%	1%	1%	1%	1%	0%	3%	1%	8%
Risk Premium		4%	5%	4%	4%	4%	5%	3%	5%	5%
From ITALY	900Km	90	180	360	360	90	900	810	1170	9
transport premium (%)		138%	3%	4%	4%	3%	1%	9%	2%	23%
Risk Premium		3%	5%	5%	5%	4%	7%	7%	4%	2%
From UK	300Km	30	60	120	120	30	300	270	390	3
transport premium (%)		46%	1%	1%	1%	1%	0%	3%	1%	8%
Risk Premium		4%	5%	4%	4%	4%	2%	6%	4%	5%
TOTAL SAVINGS THRESHOLD										
(FRANCE -> BELGIUM)		81%	6%	7%	7%	42%	9%	9%	4%	16%
(GERMANY -> BELGIUM)		81%	6%	6%	6%	42%	9%	7%	5%	15%
(ITALY -> BELGIUM)		172%	8%	10%	10%	45%	11%	13%	6%	27%
(UK -> BELGIUM)		81%	6%	6%	6%	42%	7%	9%	5%	12%

Source : Atkins Survey Data

BASE CASE

Appendix II (cont'd)

TABLE II.1(b) - ESTIMATION OF SAVINGS THRESHOLDS (France)

27/10/87
ESTIMATION OF SAVINGS THRESHOLD (France)

		fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder II	calc
UNIT COST		132	264	288	96	224	1035	145	295	24
ORDER SIZE		1000	700	400	1000	1000	1000	500	100	500
CONTRACT VALUE		132000	184800	115200	96000	224000	1035000	72500	29500	12000
WEIGHT OR VOLUME		0.1	0.3	0.4	0.1	0.4	0.05	0.00025	0.1	0.00025
TRANSPORT (ECU/TN.Km)		0.3	0.3	0.3	0.3	0.3	0.3	1	0.3	1
TRADING		2000	2000	2000	2000	2000	2000	2000	5000	2000
TRADING SUB-TOTAL		2%	2%	1%	2%	1%	0%	3%	5%	17%
From BELGIUM	£300	9	72	36	27	36	4.5	0.075	9	0.075
transport premium (%)		7%	20%	9%	31%	16%	0%	0%	1%	0%
Risk Premium		4%	3%	3%	5%	5%	3%	3%	4%	0%
From GERMANY	£500	15	120	60	45	60	7.5	0.125	15	0.125
transport premium (%)		11%	33%	15%	52%	27%	1%	0%	2%	1%
Risk Premium		5%	4%	3%	4%	5%	3%	4%	4%	3%
From ITALY	£800	24	192	96	72	96	12	0.2	24	0.2
transport premium (%)		18%	53%	25%	84%	43%	1%	0%	2%	1%
Risk Premium		9%	4%	5%	3%	4%	5%	5%	7%	5%
From UK	£400	12	96	48	36	48	6	0.1	12	0.1
transport premium (%)		9%	26%	12%	42%	21%	1%	0%	1%	0%
Risk Premium		4%	3%	3%	2%	3%	5%	3%	0%	2%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> FRANCE)		12%	25%	14%	39%	21%	4%	6%	12%	17%
(GERMANY -> FRANCE)		18%	39%	20%	59%	33%	4%	6%	12%	20%
(ITALY -> FRANCE)		32%	58%	31%	89%	48%	6%	9%	16%	22%
(UK -> FRANCE)		15%	32%	16%	47%	25%	6%	6%	8%	19%

Source : Eurostat & BEUC Data

27/10/87
ESTIMATION OF SAVINGS THRESHOLD (France)

		trans. I	electro /graph	telephone	pharm	average of car	van b6	van b7	bus d8	bus d14
UNIT COST		3028	1364	87	683	10946	12409	12269	199884	161333
ORDER SIZE		100	10	10000	1000	100	100	100	100	100
CONTRACT VALUE		302800	13640	870000	682560	1094612	1240900	1226900	19988400	16133300
WEIGHT OR VOLUME		0.8	0.1	0.003	0.1	1	3	3	16	3
TRANSPORT (ECU/TN.Km)		0.3	1	1	0.3	0.2	0.1	0.1	0.03	0.1
TRADING		10000	5000	10000	1000	5000	5000	5000	5000	5000
TRADING SUB-TOTAL		2%	37%	1%	0%	0%	0%	0%	0%	0%
From BELGIUM	£300	72	30	0.9	9	60	90	90	144	90
transport premium (%)		2%	2%	1%	1%	1%	1%	1%	0%	1%
Risk Premium		3%	4%	3%	5%	4%	4%	3%	0%	3%
From GERMANY	£500	120	50	1.5	15	100	150	150	240	150
transport premium (%)		4%	4%	2%	2%	1%	1%	1%	0%	1%
Risk Premium		4%	4%	5%	3%	4%	5%	3%	4%	3%
From ITALY	£800	192	80	2.4	24	160	240	240	384	240
transport premium (%)		6%	6%	3%	4%	1%	2%	2%	0%	1%
Risk Premium		4%	4%	2%	4%	4%	5%	4%	5%	0%
From UK	£400	96	40	1.2	12	80	120	120	192	120
transport premium (%)		3%	3%	1%	2%	1%	1%	1%	0%	1%
Risk Premium		5%	4%	1%	7%	4%	5%	4%	4%	4%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> FRANCE)		9%	43%	5%	6%	5%	5%	4%	0%	4%
(GERMANY -> FRANCE)		11%	44%	8%	11%	5%	6%	5%	4%	4%
(ITALY -> FRANCE)		12%	47%	6%	8%	6%	7%	6%	5%	5%
(UK -> FRANCE)		11%	43%	4%	9%	5%	6%	5%	4%	5%

Source : Eurostat & BEUC Data

BASE CASE

26/10/87
ESTIMATION OF SAVINGS THRESHOLD (France)

		Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
UNIT COST		8.01	635.34	20198.99	260.28	1.50	45.44	367.32	233.85	125.35	4.12
ORDER SIZE		1000	100	50	100	1000	1000	300	400	1000	10000
CONTRACT VALUE		8008	63534	1009950	26028	1499	45441	110196	93542	125350	41211
WEIGHT OR VOLUME		0.0005	0.01	10	0.01	0.0005	0.1	1	0.5	0.01	0.0024
TRANSPORT (ECU/TN.Km)		10	10	0.2	1	1	0.3	0.3	0.3	0.3	0.3
TRADING		1000	1000	10000	2000	2000	5000	5000	2000	10000	2000
TRADING SUB-TOTAL		12%	2%	1%	8%	133%	11%	5%	2%	8%	5%
From BELGIUM	300Km	1.5	30	600	3	0.15	9	90	45	0.9	0.216
transport premium (%)		19%	5%	3%	1%	10%	20%	25%	19%	1%	5%
Risk Premium		2%	4%	6%	4%	8%	4%	4%	4%	7%	3%
From GERMANY	500Km	2.5	50	1000	5	0.25	15	150	75	1.5	0.36
transport premium (%)		31%	8%	5%	2%	17%	33%	41%	32%	1%	9%
Risk Premium		3%	2%	4%	3%	5%	6%	5%	6%	3%	4%
From ITALY	800Km	4	80	1600	8	0.4	24	240	120	2.4	0.576
transport premium (%)		50%	13%	8%	3%	27%	53%	65%	51%	2%	14%
Risk Premium		5%	5%	4%	2%	12%	7%	2%	5%	5%	3%
From UK	400Km	2	40	800	4	0.2	12	120	60	1.2	0.288
transport premium (%)		25%	6%	4%	2%	13%	26%	33%	26%	1%	7%
Risk Premium		1%	0%	4%	1%	9%	2%	3%	2%	3%	3%
TOTAL SAVINGS THRESHOLD											
(BELGIUM -> FRANCE)		33%	10%	10%	13%	152%	25%	33%	25%	15%	13%
(GERMANY -> FRANCE)		47%	11%	10%	13%	155%	50%	50%	40%	12%	18%
(ITALY -> FRANCE)		68%	19%	13%	17%	172%	67%	72%	59%	15%	22%
(UK -> FRANCE)		39%	8%	9%	10%	155%	40%	41%	30%	12%	15%

Source : Atkins Survey
Data

26/10/87
ESTIMATION OF SAVINGS THRESHOLD (France)

		Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray m/c.	Trans-former	Goods wagon	Telephone
UNIT COST		68.88	7978.35	10078.62	10491.42	2846.52	#########	9442.38	52417.49	53.65
ORDER SIZE		100	100	100	100	5	1	100	100	10000
CONTRACT VALUE		6888	797835	1007862	1049142	14233	161764	944238	5241749	536466
WEIGHT OR VOLUME		1	1	2	2	0.1	1	3	13	0.01
TRANSPORT (ECU/TN.Km)		0.1	0.2	0.2	0.2	1	1	0.3	0.1	1
TRADING		2000	5000	5000	5000	5000	5000	10000	10000	10000
TRADING SUB-TOTAL		29%	1%	0%	0%	35%	3%	1%	0%	2%
From BELGIUM	300Km	30	60	120	120	30	300	270	390	3
transport premium (%)		44%	1%	1%	1%	1%	3%	3%	1%	6%
Risk Premium		4%	3%	3%	3%	4%	3%	4%	5%	3%
From GERMANY	500Km	50	100	200	200	50	500	450	650	5
transport premium (%)		73%	1%	2%	2%	2%	0%	5%	1%	9%
Risk Premium		4%	4%	4%	4%	4%	4%	3%	5%	3%
From ITALY	800Km	80	160	320	320	80	800	720	1040	8
transport premium (%)		116%	2%	3%	3%	3%	0%	8%	2%	15%
Risk Premium		3%	4%	4%	4%	4%	6%	3%	4%	2%
From UK	400Km	40	80	160	160	40	400	360	520	4
transport premium (%)		58%	1%	2%	2%	1%	0%	4%	1%	7%
Risk Premium		4%	4%	3%	3%	3%	3%	4%	5%	2%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> FRANCE)		76%	5%	5%	5%	40%	7%	8%	6%	10%
(GERMANY -> FRANCE)		106%	6%	6%	6%	41%	7%	9%	7%	15%
(ITALY -> FRANCE)		148%	7%	7%	8%	42%	9%	12%	7%	18%
(UK -> FRANCE)		91%	5%	6%	5%	40%	6%	9%	6%	11%

Source : Atkins Survey
Data

BASE CASE

Appendix II (cont'd)

TABLE II.1(c) - ESTIMATION OF SAVINGS THRESHOLDS (Germany)

27/10/87
ESTIMATION OF SAVINGS THRESHOLD (German)

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		fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder	calc II
UNIT COST		162	354	332	35	272	287	131	640	17
ORDER SIZE		1000	300	400	1000	1000	1000	500	100	500
CONTRACT VALUE		162000	106200	132800	35000	272000	287000	65500	64000	8500
WEIGHT OR VOLUME		0.1	0.6	0.4	0.2	0.4	0.05	0.00025	0.1	0.00025
TRANSPORT (ECU/TN.Ka)		0.3	0.3	0.3	0.3	0.3	0.3	1	0.3	1
TRADING		2000	2000	2000	2000	2000	2000	2000	5000	2000
TRADING SUB-TOTAL		1%	2%	2%	2%	1%	0%	3%	6%	24%
From BELGIUM	£300	9	72	36	27	36	4.5	0.075	9	0.075
transport premium (%)		6%	20%	11%	72%	13%	1%	0%	1%	0%
Risk Premium		3%	3%	4%	6%	4%	4%	3%	4%	3%
From FRANCE	£500	15	120	60	45	60	7.5	0.125	15	0.125
transport premium (%)		9%	34%	19%	52%	22%	1%	0%	2%	1%
Risk Premium		3%	4%	5%	4%	3%	5%	4%	4%	5%
From ITALY	£600	18	144	72	54	72	9	0.15	18	0.15
transport premium (%)		11%	41%	22%	64%	26%	1%	0%	2%	1%
Risk Premium		2%	4%	5%	3%	3%	6%	6%	6%	4%
From UK	£700	21	168	84	63	84	10.5	0.175	21	0.175
transport premium (%)		13%	47%	25%	74%	31%	1%	0%	2%	1%
Risk Premium		3%	4%	3%	2%	2%	6%	3%	3%	3%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> GERMANY)		10%	26%	16%	40%	18%	5%	7%	11%	24%
(FRANCE -> GERMANY)		14%	40%	24%	59%	26%	6%	8%	12%	30%
(ITALY -> GERMANY)		15%	46%	29%	69%	31%	7%	9%	14%	31%
(UK -> GERMANY)		18%	53%	30%	79%	34%	7%	6%	3%	28%

Source : Eurostat & BEUC Data

27/10/87
ESTIMATION OF SAVINGS THRESHOLD (Germany)

		trans. I	electro /graph	telephone	pharm	average of car	van b6	van b7	bus d6	bus d14	
UNIT COST		3331	1590	103	1514	10367	14467	10158	178227	11762	
ORDER SIZE		100	10	10000	1000	100	100	100	100	100	
CONTRACT VALUE		333100	15900	1030000	1513600	1036735	1446300	1015800	17822700	1176200	
WEIGHT OR VOLUME		0.8	0.1	0.003	0.1	1	7	7	15	7	
TRANSPORT (ECU/TN.Ka)		0.3	1	1	0.3	0.2	0.1	0.1	0.02	0.1	
TRADING		10000	5000	10000	1000	5000	5000	5000	5000	5000	
TRADING SUB-TOTAL		3%	38%	1%	0%	0%	0%	0%	0%	0%	
From BELGIUM	£300	72	30	0.9	9	60	90	90	114	90	
transport premium (%)		2%	2%	1%	1%	1%	1%	1%	0%	1%	
Risk Premium		2%	4%	2%	2%	4%	3%	4%	0%	4%	
From FRANCE	£500	120	50	1.5	15	100	150	150	240	150	
transport premium (%)		4%	4%	1%	1%	1%	1%	1%	0%	1%	
Risk Premium		4%	4%	2%	2%	4%	3%	5%	4%	5%	
From ITALY	£600	144	60	1.8	18	120	180	180	288	180	
transport premium (%)		4%	5%	2%	1%	1%	1%	2%	0%	2%	
Risk Premium		4%	4%	2%	2%	4%	4%	4%	5%	6%	
From UK	£700	168	70	2.1	21	140	210	210	336	210	
transport premium (%)		5%	5%	2%	1%	1%	1%	2%	0%	2%	
Risk Premium		5%	4%	1%	2%	5%	4%	4%	4%	5%	
TOTAL SAVINGS THRESHOLD											
(BELGIUM -> GERMANY)		3%	45%	4%	2%	5%	4%	5%	1%	5%	
(FRANCE -> GERMANY)		11%	47%	5%	4%	5%	5%	7%	1%	6%	
(ITALY -> GERMANY)		11%	47%	5%	4%	5%	5%	6%	1%	6%	
(UK -> GERMANY)		12%	48%	4%	5%	5%	5%	4%	1%	4%	

Source : Eurostat & BEUC Data

BASE C

26/10/87
ESTIMATION OF SAVINGS THRESHOLD (Germany)

212

		Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
UNIT COST		6.41	301.69	19449.51	192.97	1.71	68.54	444.58	340.71	79.36	4.44
ORDER SIZE		1000	100	50	100	1000	1000	300	400	1000	10000
CONTRACT VALUE		6409	30169	972476	19297	1713	68540	133374	136284	79358	44439
WEIGHT OR VOLUME		0.0005	0.01	10	0.01	0.0005	0.1	1	0.5	0.01	0.0024
TRANSPORT (ECU/TN.Km)		10	10	0.2	1	1	0.3	0.3	0.3	0.3	0.3
TRADING		1000	1000	10000	2000	2000	5000	5000	2000	10000	2000
TRADING SUB-TOTAL		16%	3%	1%	10%	117%	7%	4%	1%	13%	5%
From BELGIUM	300Km	1.5	30	600	3	0.15	9	90	45	0.9	0.216
transport premium (%)		22%	10%	3%	2%	9%	13%	20%	13%	1%	5%
Risk Premium		3%	7%	6%	6%	7%	3%	3%	3%	10%	3%
From FRANCE	500Km	2.5	50	1000	5	0.25	15	150	75	1.5	0.36
transport premium (%)		39%	17%	5%	3%	15%	22%	34%	22%	2%	9%
Risk Premium		5%	8%	4%	5%	4%	3%	3%	3%	6%	4%
From ITALY	600Km	3	60	1200	6	0.3	18	180	90	1.8	0.432
transport premium (%)		47%	20%	6%	3%	18%	26%	40%	26%	2%	10%
Risk Premium		7%	11%	4%	3%	10%	2%	2%	4%	7%	3%
From UK	700Km	3.5	70	1400	7	0.35	21	210	105	2.1	0.504
transport premium (%)		55%	23%	7%	4%	20%	31%	47%	31%	3%	11%
Risk Premium		2%	1%	4%	1%	8%	1%	3%	2%	5%	2%
TOTAL SAVINGS THRESHOLD											
(BELGIUM -> GERMANY)		42%	21%	10%	18%	133%	23%	27%	17%	24%	12%
(FRANCE -> GERMANY)		60%	28%	10%	18%	135%	32%	41%	26%	21%	16%
(ITALY -> GERMANY)		69%	34%	11%	16%	144%	35%	46%	32%	22%	17%
(UK -> GERMANY)		72%	27%	12%	15%	145%	39%	54%	34%	20%	19%

Source : Atkins Survey
Data

26/10/87
ESTIMATION OF SAVINGS THRESHOLD (Germany)

		Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray m/c.	Trans-former	Goods wagon	Telephone
UNIT COST		72.18	7809.61	9199.40	9309.27	2957.00	*********	7628.28	71513.85	46.52
ORDER SIZE		100	100	100	100	5	1	100	100	10000
CONTRACT VALUE		7218	780961	919940	930927	14785	159898	762928	7151385	465174
WEIGHT OR VOLUME		1	1	2	2	0.1	1	3	13	0.01
TRANSPORT (ECU/TN.Km)		0.1	0.2	0.2	0.2	1	1	0.3	0.1	1
TRADING		2000	5000	5000	5000	5000	5000	10000	10000	10000
TRADING SUB-TOTAL		29%	1%	1%	1%	34%	3%	1%	0%	2%
From BELGIUM	300Km	30	60	120	120	30	300	270	360	3
transport premium (%)		42%	1%	1%	1%	1%	0%	4%	1%	6%
Risk Premium		4%	3%	4%	4%	4%	3%	3%	4%	3%
From FRANCE	500Km	50	100	200	200	50	500	450	650	5
transport premium (%)		69%	1%	2%	2%	2%	0%	6%	1%	11%
Risk Premium		4%	4%	4%	5%	4%	4%	5%	3%	5%
From ITALY	600Km	60	120	240	240	60	600	540	780	6
transport premium (%)		92%	2%	2%	2%	2%	0%	7%	1%	13%
Risk Premium		3%	4%	4%	5%	4%	6%	4%	3%	3%
From UK	700Km	70	140	260	280	70	700	630	910	7
transport premium (%)		97%	2%	3%	3%	2%	0%	9%	1%	15%
Risk Premium		4%	4%	4%	4%	3%	3%	5%	3%	3%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> GERMANY)		73%	5%	5%	5%	38%	7%	10%	4%	12%
(FRANCE -> GERMANY)		101%	6%	7%	7%	39%	7%	12%	4%	18%
(ITALY -> GERMANY)		114%	6%	7%	8%	40%	9%	12%	5%	17%
(UK -> GERMANY)		128%	6%	7%	7%	40%	6%	15%	5%	19%

Source : Atkins Survey
Data

BASE CASE

Appendix II (cont'd)

TABLE II.1(d) - ESTIMATION OF SAVINGS THRESHOLDS (Italy)

27/10/37
ESTIMATION OF SAVINGS THRESHOLD (Italy)

		fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder	calc II
UNIT COST		100	748	462	57	224	1292	191	1312	28
ORDER SIZE		1000	200	400	1000	1000	1000	500	100	500
CONTRACT VALUE		100000	104400	184800	57000	224000	1292000	95500	131200	14000
WEIGHT OR VOLUME		0.1	0.8	0.4	0.3	0.4	0.05	0.00025	0.1	0.00025
TRANSPORT (ECU/TN.km)		0.3	0.3	0.3	0.3	0.3	0.3	1	0.3	1
TRADING		2000	2000	2000	2000	2000	2000	2000	5000	2000
TRADING SUB-TOTAL		2%	2%	1%	4%	1%	0%	2%	4%	14%
From BELGIUM	£900	27	216	108	81	108	13.5	0.225	27	0.225
transport premium (%)		27%	62%	31%	142%	48%	1%	0%	2%	1%
Risk Premium		5%	3%	3%	8%	5%	3%	2%	3%	0%
From FRANCE	£800	24	192	96	72	96	12	0.2	24	0.2
transport premium (%)		24%	55%	21%	126%	43%	1%	0%	2%	1%
Risk Premium		5%	4%	3%	6%	4%	3%	2%	2%	3%
From GERMANY	£600	18	144	72	54	72	9	0.15	18	0.15
transport premium (%)		18%	41%	16%	95%	32%	1%	0%	1%	1%
Risk Premium		6%	4%	3%	6%	5%	3%	3%	3%	2%
From UK	£1,200	36	288	144	108	144	18	0.3	36	0.3
transport premium (%)		36%	83%	31%	189%	64%	1%	0%	3%	1%
Risk Premium		6%	4%	2%	4%	3%	4%	2%	0%	2%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> ITALY)		34%	67%	27%	154%	54%	4%	5%	3%	15%
(FRANCE -> ITALY)		31%	61%	25%	136%	48%	4%	5%	8%	18%
(GERMANY -> ITALY)		26%	47%	20%	104%	38%	4%	3%	8%	17%
(UK -> ITALY)		44%	88%	34%	197%	68%	5%	4%	7%	17%

Source : Eurostat & BEUC Data

27/10/37
ESTIMATION OF SAVINGS THRESHOLD (Italy)

		trans. I	electro /graph	telephone	ohara	average of car	van b6	van b7	bus d8	bus d14
UNIT COST		2918	1435	53	716	11620	14909	11156	228174	1000000
ORDER SIZE		100	10	10000	1000	100	100	100	100	100
CONTRACT VALUE		291800	14350	530000	716350	1161994	1490900	1115600	22817400	**********
WEIGHT OR VOLUME		0.8	0.1	0.003	0.1	1	3	3	16	3
TRANSPORT (ECU/TN.km)		0.3	1	1	0.3	0.2	0.1	0.1	0.03	0.1
TRADING		10000	5000	10000	1000	5000	5000	5000	5000	5000
TRADING SUB-TOTAL		3%	35%	2%	0%	0%	0%	0%	0%	0%
From BELGIUM	£900	216	90	2.7	27	180	270	270	432	270
transport premium (%)		7%	6%	5%	4%	2%	2%	2%	0%	0%
Risk Premium		4%	4%	5%	4%	3%	3%	3%	0%	0%
From FRANCE	£800	192	80	2.4	24	160	240	240	384	240
transport premium (%)		7%	6%	5%	3%	1%	2%	2%	0%	0%
Risk Premium		5%	4%	7%	4%	4%	3%	4%	4%	0%
From GERMANY	£600	144	60	1.8	18	120	180	180	288	180
transport premium (%)		5%	4%	3%	3%	1%	1%	2%	1%	0%
Risk Premium		5%	4%	8%	8%	4%	4%	4%	3%	1%
From UK	£1,200	288	120	3.6	36	240	360	360	576	360
transport premium (%)		10%	8%	7%	5%	2%	2%	3%	1%	0%
Risk Premium		6%	3%	2%	7%	4%	4%	4%	3%	0%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> ITALY)		15%	45%	12%	9%	5%	5%	6%	0%	0%
(FRANCE -> ITALY)		15%	44%	12%	7%	6%	5%	7%	4%	0%
(GERMANY -> ITALY)		12%	32%	11%	11%	5%	5%	9%	2%	0%
(UK -> ITALY)		19%	47%	11%	12%	7%	7%	9%	1%	0%

Source : Eurostat & BEUC Data

BASE C

6/10/87
STIMATION OF SAVINGS THRESHOLD (Italy)

215

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
NIT COST	10.61	833.27	20157.17	123.20	4.35	30.56	173.89	316.36	146.51	2.91
RDER SIZE	1000	100	50	100	1000	1000	300	400	1000	10000
ONTRACT VALUE	10614	83327	1007858	12320	4351	30556	52166	126545	146509	29089
EIGHT OR VOLUME	0.0005	0.01	10	0.01	0.0005	0.1	1	0.3	0.01	0.0024
RANSFORT (ECU/TN.Km)	10	10	0.2	1	1	0.3	0.3	0.3	0.3	0.2
RADING	1000	1000	10000	2000	2000	5000	5000	2000	10000	2000
RADING SUB-TOTAL	9%	1%	1%	16%	46%	16%	10%	2%	7%	7%
rom BELGIUM 900Km	4.5	90	1800	9	0.45	27	270	135	2.7	0.648
ransport premium (%)	42%	11%	9%	7%	10%	88%	155%	42%	2%	22%
isk Premium	2%	3%	6%	9%	3%	6%	8%	3%	6%	5%
rom FRANCE 800Km	4	80	1600	8	0.4	24	240	120	2.4	0.576
ransport premium (%)	38%	10%	8%	6%	9%	79%	138%	38%	2%	20%
isk Premium	3%	3%	4%	8%	1%	6%	9%	3%	3%	6%
rom GERMANY 600Km	3	60	1200	6	0.3	18	180	90	1.8	0.432
ransport premium (%)	28%	7%	6%	5%	7%	59%	104%	28%	1%	15%
isk Premium	2%	1%	4%	6%	2%	9%	10%	4%	2%	6%
rom UK 1,200Km	6	120	2400	12	0.6	36	360	180	3.6	0.864
ransport premium (%)	57%	14%	12%	10%	14%	119%	207%	57%	2%	30%
isk Premium	1%	0%	4%	2%	3%	3%	7%	2%	3%	5%
OTAL SAVINGS THRESHOLD										
(BELGIUM -> ITALY)	54%	15%	16%	33%	59%	111%	173%	47%	14%	34%
(FRANCE -> ITALY)	50%	14%	13%	31%	57%	101%	156%	42%	12%	32%
(GERMANY -> ITALY)	40%	10%	11%	27%	54%	84%	123%	34%	10%	28%
(UK -> ITALY)	67%	16%	17%	28%	63%	137%	224%	60%	12%	41%

ource : Atkins Survey
Data

6/10/87
STIMATION OF SAVINGS THRESHOLD (Italy)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray m/c.	Trans-former	Goods wagon	Telephone
NIT COST	51.55	7933.36	9607.87	10973.55	2925.75	*********	6874.45	58603.77	20.60
RDER SIZE	100	100	100	100	5	1	100	100	10000
ONTRACT VALUE	5155	793336	960787	1097355	14629	226424	687445	5860377	205979
EIGHT OR VOLUME	1	1	2	2	0.1	1	2	13	0.01
RANSPORT (ECU/TN.Km)	0.1	0.2	0.2	0.2	1	1	0.3	0.1	1
RADING	2000	5000	5000	5000	5000	5000	10000	10000	10000
RADING SUB-TOTAL	39%	1%	1%	0%	34%	2%	1%	0%	5%
rom BELGIUM 900Km	90	180	360	360	90	900	810	1170	9
ransport premium (%)	175%	2%	4%	3%	3%	0%	12%	2%	44%
isk Premium	5%	2%	3%	3%	4%	2%	5%	4%	8%
rom FRANCE 800Km	80	160	320	320	80	800	720	1040	8
ransport premium (%)	155%	2%	3%	3%	3%	0%	10%	2%	39%
isk Premium	5%	4%	4%	4%	4%	3%	5%	4%	10%
rom GERMANY 600Km	60	120	240	240	60	600	540	780	6
ransport premium (%)	116%	2%	2%	2%	2%	0%	8%	1%	29%
isk Premium	6%	4%	4%	3%	4%	3%	4%	3%	8%
rom UK 1,200Km	120	240	480	480	120	1200	1080	1560	12
ransport premium (%)	233%	3%	5%	4%	4%	1%	16%	3%	58%
isk Premium	5%	4%	4%	3%	3%	2%	6%	4%	5%
OTAL SAVINGS THRESHOLD									
(BELGIUM -> ITALY)	218%	6%	8%	7%	41%	5%	19%	6%	56%
(FRANCE -> ITALY)	199%	7%	8%	7%	41%	5%	17%	6%	54%
(GERMANY -> ITALY)	161%	6%	7%	6%	40%	5%	14%	6%	47%
(UK -> ITALY)	277%	8%	9%	8%	42%	9%	22%	7%	68%

Source : Atkins Survey
Data

BASE CASE

Appendix II (cont'd)

TABLE II.1(e) - ESTIMATION OF SAVINGS THRESHOLDS (UK)

217

		fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder	calc II
UNIT COST		141	214	252	52	167	1279	100	1000000	14
ORDER SIZE		1000	500	400	1000	1000	1000	500	100	500
CONTRACT VALUE		141000	94200	100800	52000	167000	1279000	50000	*********	7000
WEIGHT OR VOLUME		0.1	0.3	0.4	0.3	0.4	0.05	0.00025	0.1	0.00025
TRANSPORT (ECU/TN.Km)		0.3	0.3	0.3	0.3	0.3	0.3	1	0.3	1
TRADING		2000	2000	2000	2000	2000	2000	2000	5000	2000
TRADING SUB-TOTAL		1%	2%	2%	4%	1%	0%	4%	0%	29%
From BELGIUM	£300	9	72	36	27	36	4.5	0.075	9	0.075
transport premium (%)		6%	23%	14%	52%	22%	3%	0%	0%	1%
Risk Premium		3%	4%	5%	9%	6%	3%	5%	0%	0%
From FRANCE	£400	12	96	48	36	48	6	0.1	12	0.1
transport premium (%)		9%	31%	19%	69%	29%	0%	0%	0%	1%
Risk Premium		4%	5%	6%	7%	5%	3%	6%	0%	7%
From GERMANY	£700	21	168	84	63	84	10.5	0.175	21	0.175
transport premium (%)		15%	54%	33%	121%	50%	1%	0%	0%	1%
Risk Premium		5%	5%	5%	7%	7%	3%	5%	0%	5%
From ITALY	£1,200	36	288	144	108	144	18	0.3	36	0.3
transport premium (%)		26%	92%	57%	208%	86%	1%	0%	0%	2%
Risk Premium		3%	4%	7%	4%	5%	4%	6%	0%	8%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> UK)		11%	29%	21%	65%	29%	3%	9%	0%	29%
(FRANCE -> UK)		14%	37%	27%	80%	35%	4%	10%	0%	36%
(GERMANY -> UK)		21%	60%	41%	192%	58%	4%	7%	0%	35%
(ITALY -> UK)		30%	99%	66%	216%	93%	6%	12%	0%	39%

Source : Eurostat & BEUC Data

27/10/87
ESTIMATION OF SAVINGS THRESHOLD (UK)

		trans. I electro /graph	telephone	pharm	average of car	van b6	van b7	bus d8	bus d14
UNIT COST		4395	1218	29	1214	11973	14840	11120	176749	14261
ORDER SIZE		100	10	10000	1000	100	100	100	100	100
CONTRACT VALUE		439500	12180	290000	1213840	1197325	1484000	1112000	17674900	1426100
WEIGHT OR VOLUME		0.8	0.1	0.003	0.1	1	2	2	16	2
TRANSPORT (ECU/TN.Km)		0.3	1	1	0.3	0.2	0.1	0.1	0.03	0.1
TRADING		10000	5000	10000	1000	5000	5000	5000	5000	5000
TRADING SUB-TOTAL		2%	41%	3%	0%	0%	0%	0%	0%	0%
From BELGIUM	£300	72	30	0.9	9	60	90	90	144	90
transport premium (%)		2%	2%	3%	1%	1%	1%	1%	0%	1%
Risk Premium		3%	5%	9%	3%	3%	3%	4%	0%	3%
From FRANCE	£400	96	40	1.2	12	80	120	120	192	120
transport premium (%)		2%	3%	4%	1%	1%	1%	1%	0%	1%
Risk Premium		3%	4%	12%	2%	4%	3%	4%	5%	5%
From GERMANY	£700	168	70	2.1	21	140	210	210	336	210
transport premium (%)		4%	6%	7%	2%	1%	1%	2%	0%	1%
Risk Premium		3%	4%	14%	5%	3%	4%	4%	4%	3%
From ITALY	£1,200	288	120	3.6	36	240	360	360	576	360
transport premium (%)		7%	10%	12%	3%	2%	2%	3%	0%	3%
Risk Premium		3%	5%	7%	2%	4%	4%	4%	5%	4%
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> UK)		7%	48%	15%	3%	4%	4%	5%	0%	4%
(FRANCE -> UK)		7%	49%	20%	3%	5%	4%	6%	5%	6%
(GERMANY -> UK)		9%	51%	26%	4%	5%	5%	6%	4%	5%
(ITALY -> UK)		11%	56%	33%	5%	6%	7%	8%	5%	7%

Source : Eurostat & BEUC Data

BASE CASE

'10/87

TIMATION OF SAVINGS THRESHOLD (UK)

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Cooker oven
IT COST	2.59	78.01	19225.56	71.44	3.27	24.26	302.33	128.66	95.44	3.42
DER SIZE	1000	100	50	100	1000	1000	500	400	1000	10000
NTRACT VALUE	2576	7801	961278	7144	3271	24256	90750	51462	95441	34166
ISHT OR VOLUME	0.0005	0.01	10	0.01	0.0005	0.1	1	0.5	0.01	0.0024
NSPORT (ECU/TN.Km)	10	10	0.2	1	1	0.3	0.3	0.3	0.3	0.3
ADING	1000	1000	10000	2000	2000	5000	5000	2000	10000	2000
ADING SUB-TOTAL	39%	26%	1%	29%	61%	21%	6%	4%	10%	6%
m BELGIUM £200	1.5	30	600	3	0.15	9	90	45	0.9	0.216
ansport premium (%)	58%	79%	2%	4%	5%	37%	30%	35%	1%	6%
sk Premium	7%	59%	5%	16%	4%	8%	5%	7%	9%	4%
m FRANCE £400	2	40	800	4	0.2	12	120	60	1.2	0.288
ansport premium (%)	78%	105%	4%	6%	6%	49%	40%	47%	1%	8%
sk Premium	12%	67%	4%	15%	2%	7%	5%	7%	5%	5%
m GERMANY £700	3.5	70	1400	7	0.35	21	210	105	2.1	0.504
ansport premium (%)	136%	184%	7%	10%	11%	87%	69%	82%	2%	15%
sk Premium	10%	72%	4%	11%	2%	11%	6%	11%	5%	5%
m ITALY £1,200	6	120	2400	12	0.6	36	360	180	3.6	0.864
ansport premium (%)	233%	316%	12%	17%	18%	148%	119%	140%	4%	25%
sk Premium	16%	88%	4%	7%	5%	5%	2%	10%	6%	3%
TAL SAVINGS THRESHOLD										
BELGIUM -> UK)	104%	164%	10%	48%	70%	66%	40%	46%	20%	16%
FRANCE -> UK)	129%	198%	9%	48%	69%	79%	50%	53%	17%	19%
GERMANY -> UK)	185%	242%	12%	49%	74%	118%	81%	96%	16%	26%
ITALY -> UK)	288%	430%	13%	52%	85%	174%	127%	154%	20%	35%

urce : Atkins Survey
Data

/10/87
TIMATION OF SAVINGS THRESHOLD (UK)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray a/c.	Trans-former	Goods wagon	Telephone
IT COST	66.73	7632.31	8685.91	8479.42	2489.96	#########	10316.82	61650.58	26.75
DER SIZE	100	100	100	100	5	1	100	100	10000
NTRACT VALUE	6673	763231	868591	847942	12450	104203	1031682	6165058	267508
ISHT OR VOLUME	1	1	1	1	0.1	1	1	1	0.01
NSPORT (ECU/TN.Km)	0.1	0.2	0.2	0.2	1	1	0.2	0.1	1
ADING	2000	5000	5000	5000	5000	5000	10000	10000	10000
ADING SUB-TOTAL	30%	1%	1%	1%	40%	5%	1%	0%	4%
m BELGIUM £200	30	60	120	120	30	300	270	390	7
ansport premium (%)	45%	1%	1%	1%	1%	0%	3%	1%	11%
sk Premium	4%	4%	4%	4%	4%	5%	4%	4%	5%
m FRANCE £400	40	80	160	160	40	400	360	520	4
ansport premium (%)	60%	1%	2%	2%	2%	0%	3%	1%	15%
sk Premium	4%	4%	5%	5%	5%	6%	4%	5%	5%
m GERMANY £700	70	140	280	280	70	700	630	910	7
ansport premium (%)	105%	2%	3%	3%	3%	1%	5%	1%	26%
sk Premium	4%	4%	4%	4%	5%	5%	3%	5%	7%
m ITALY £1,200	120	240	480	480	120	1200	1080	1560	12
ansport premium (%)	180%	3%	6%	6%	5%	1%	10%	2%	45%
sk Premium	7%	4%	4%	5%	5%	9%	5%	4%	7%
TAL SAVINGS THRESHOLD									
BELGIUM -> UK)	79%	5%	6%	6%	46%	12%	7%	5%	21%
FRANCE -> UK)	94%	4%	7%	7%	45%	11%	8%	4%	27%
GERMANY -> UK)	119%	7%	9%	9%	48%	14%	11%	5%	41%
ITALY -> UK)	213%	9%	11%	11%	56%	15%	14%	7%	52%

urce : Atkins Survey
Data

BASE CASE

ıdix II (cont'd)

TABLE II.2(a) - CALCULATION OF POTENTIAL SAVINGS FACTORS (Belgium)

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (Belgium)

220

	fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder	calc II	
TOTAL SAVINGS THRESHOLD										
(FRANCE -> BELGIUM)	14%	31%	18%	27%	19%	5%	9%	11%	0%	
(GERMANY -> BELGIUM)	15%	31%	17%	27%	19%	5%	9%	11%	0%	
(ITALY -> BELGIUM)	28%	79%	41%	72%	47%	3%	11%	15%	2%	
(UK -> BELGIUM)	14%	30%	16%	26%	19%	5%	7%	7%	0%	
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
FRANCE	0%	0%	0%	27%	11%	0%	0%	5%	100%	
GERMANY	0%	0%	0%	23%	0%	1%	0%	3%	100%	
ITALY	15%	0%	0%	52%	11%	0%	0%	2%	100%	
UK	0%	0%	21%	56%	34%	0%	12%	0%	100%	
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
FRANCE	0%	0%	0%	0%	0%	0%	0%	0%	100%	
GERMANY	0%	0%	0%	1%	0%	0%	0%	0%	100%	
ITALY	0%	0%	0%	0%	0%	0%	0%	0%	100%	
UK	0%	0%	4%	30%	15%	0%	4%	0%	100%	
MAX SAVINGS	0%	0%	4%	30%	15%	0%	4%	0%	0%	

Source : Eurostat & BEUC Data

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (Belgium)

	trans. I	electro /graph	telephone	pharm	average of car	van b6	van b7	bus d8	bus d14	
TOTAL SAVINGS THRESHOLD										
(FRANCE -> BELGIUM)	11%	41%	9%	5%	5%	5%	7%	1%	7%	
(GERMANY -> BELGIUM)	11%	41%	10%	9%	5%	6%	6%	1%	5%	
(ITALY -> BELGIUM)	15%	46%	10%	7%	7%	8%	8%	1%	2%	
(UK -> BELGIUM)	12%	41%	9%	7%	6%	5%	6%	1%	7%	
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
FRANCE	0%	3%	0%	14%	0%	0%	0%	30%	0%	
GERMANY	0%	3%	0%	0%	0%	0%	0%	33%	0%	
ITALY	0%	0%	12%	19%	0%	0%	0%	44%	0%	
UK	0%	14%	52%	0%	0%	0%	0%	32%	0%	
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
FRANCE	0%	0%	0%	0%	0%	0%	0%	69%	0%	
GERMANY	0%	0%	0%	0%	0%	0%	0%	31%	0%	
ITALY	0%	0%	0%	0%	0%	0%	0%	71%	0%	
UK	0%	0%	47%	0%	0%	0%	0%	32%	0%	
MAX SAVINGS	0%	0%	47%	0%	0%	0%	0%	0%	0%	

Source : Eurostat & BEUC Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS FACTOR (Belgium)

221

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
TOTAL SAVINGS THRESHOLD										
(FRANCE -> BELGIUM)	63%	12%	6%	12%	69%	32%	35%	26%	8%	17%
(GERMANY -> BELGIUM)	61%	9%	5%	11%	70%	34%	36%	28%	7%	18%
(ITALY -> BELGIUM)	122%	24%	10%	12%	82%	68%	86%	66%	9%	29%
(UK -> BELGIUM)	58%	7%	5%	9%	72%	31%	35%	24%	7%	17%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
FRANCE	0%	0%	30%	9%	53%	7%	0%	0%	39%	0%
GERMANY	0%	46%	33%	33%	46%	0%	0%	0%	61%	0%
ITALY	0%	0%	30%	57%	0%	37%	49%	0%	29%	13%
UK	43%	93%	33%	75%	0%	50%	12%	44%	54%	0%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
FRANCE	0%	0%	24%	0%	0%	0%	0%	0%	31%	0%
GERMANY	0%	37%	27%	22%	0%	0%	0%	0%	55%	0%
ITALY	0%	0%	20%	45%	0%	0%	0%	0%	20%	0%
UK	0%	86%	28%	66%	0%	20%	0%	20%	46%	0%
MAX SAVINGS	0%	86%	28%	66%	0%	20%	0%	20%	55%	0%

Source : Atkins Survey Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS FACTOR (Belgium)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray a/c.	Trans-former	Goods wagon	Telephone
TOTAL SAVINGS THRESHOLD									
(FRANCE -> BELGIUM)	81%	6%	7%	7%	42%	9%	8%	4%	16%
(GERMANY -> BELGIUM)	81%	6%	6%	6%	43%	8%	7%	5%	15%
(ITALY -> BELGIUM)	172%	8%	10%	10%	45%	11%	13%	6%	27%
(UK -> BELGIUM)	81%	6%	6%	6%	42%	7%	9%	5%	13%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
FRANCE	0%	0%	0%	0%	0%	0%	0%	17%	0%
GERMANY	0%	0%	0%	0%	0%	0%	17%	0%	0%
ITALY	21%	0%	0%	0%	0%	0%	25%	8%	48%
UK	0%	0%	0%	0%	8%	25%	0%	3%	32%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
FRANCE	0%	0%	0%	0%	0%	0%	0%	13%	0%
GERMANY	0%	0%	0%	0%	0%	0%	9%	0%	0%
ITALY	0%	0%	0%	0%	0%	0%	12%	2%	20%
UK	0%	0%	0%	0%	0%	18%	0%	0%	19%
MAX SAVINGS	0%	0%	0%	0%	0%	18%	12%	13%	20%

Source : Atkins Survey Data

Appendix II (cont'd)

TABLE II.2(b) - CALCULATION OF POTENTIAL SAVINGS FACTORS (France)

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (France)

223

	fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	typw I	calc I	paper shredder II	calc
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> FRANCE)	12%	25%	14%	79%	21%	4%	6%	12%	17%
(GERMANY -> FRANCE)	19%	39%	20%	59%	33%	4%	5%	12%	21%
(ITALY -> FRANCE)	27%	58%	31%	85%	48%	6%	8%	16%	22%
(UK -> FRANCE)	15%	32%	16%	47%	25%	5%	4%	8%	19%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	11%	19%	19%	0%	0%	14%	22%	0%	0%
GERMANY	0%	7%	14%	1%	0%	14%	10%	0%	29%
ITALY	25%	4%	0%	24%	0%	9%	0%	0%	0%
UK	0%	14%	35%	40%	25%	0%	31%	0%	42%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	0%	4%	0%	0%	10%	16%	0%	0%
GERMANY	0%	0%	0%	0%	0%	10%	5%	0%	9%
ITALY	2%	0%	0%	0%	0%	0%	0%	0%	0%
UK	0%	0%	19%	0%	0%	0%	25%	0%	22%
MAX SAVINGS	2%	0%	19%	0%	0%	10%	25%	0%	22%

Source : Eurostat & BEUC Data

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (France)

	trans. /graph	I electro	telephone	phara	average of car	van g6	van b7	bus d8	bus d14
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> FRANCE)	9%	42%	5%	6%	5%	5%	4%	0%	4%
(GERMANY -> FRANCE)	11%	44%	6%	11%	5%	6%	5%	4%	4%
(ITALY -> FRANCE)	12%	47%	6%	8%	6%	7%	6%	5%	5%
(UK -> FRANCE)	11%	43%	4%	9%	5%	5%	5%	4%	5%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	14%	0%	31%	0%	3%	2%	26%	0%	34%
GERMANY	0%	5%	0%	0%	5%	0%	17%	11%	27%
ITALY	12%	0%	29%	0%	0%	0%	3%	0%	0%
UK	0%	11%	57%	0%	0%	0%	9%	12%	13%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	6%	0%	26%	0%	4%	0%	21%	0%	30%
GERMANY	0%	0%	0%	0%	0%	0%	12%	7%	23%
ITALY	0%	0%	22%	0%	0%	0%	3%	0%	0%
UK	0%	0%	63%	0%	0%	0%	4%	8%	7%
MAX SAVINGS	6%	0%	63%	0%	4%	0%	21%	8%	30%

Source : Eurostat & BEUC Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (France)

224

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Cooler paper
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> FRANCE)	33%	10%	10%	13%	152%	35%	33%	25%	15%	13%
(GERMANY -> FRANCE)	47%	11%	10%	13%	155%	50%	50%	40%	12%	18%
(ITALY -> FRANCE)	68%	19%	13%	13%	172%	67%	72%	59%	15%	22%
(UK -> FRANCE)	39%	8%	9%	10%	155%	40%	41%	30%	12%	15%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
BELGIUM	44%	12%	0%	0%	0%	0%	7%	2%	0%	19%
GERMANY	20%	53%	4%	26%	0%	0%	0%	0%	37%	0%
ITALY	0%	0%	0%	53%	0%	33%	53%	0%	0%	29%
UK	68%	94%	5%	73%	0%	47%	18%	45%	24%	17%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
BELGIUM	10%	2%	0%	0%	0%	0%	0%	0%	0%	5%
GERMANY	0%	41%	0%	13%	0%	0%	0%	0%	25%	0%
ITALY	0%	0%	0%	40%	0%	0%	0%	0%	0%	8%
UK	29%	86%	0%	62%	0%	7%	0%	15%	12%	2%
MAX SAVINGS	29%	86%	0%	62%	0%	7%	0%	15%	25%	8%

Source : Atkins Survey Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (France)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray s/c.	Trans-former	Goods wagon	Telephone
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> FRANCE)	76%	5%	5%	5%	40%	7%	8%	6%	10%
(GERMANY -> FRANCE)	106%	6%	6%	6%	41%	7%	9%	7%	15%
(ITALY -> FRANCE)	148%	7%	7%	8%	42%	9%	12%	7%	18%
(UK -> FRANCE)	91%	5%	6%	5%	40%	6%	9%	6%	11%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	5%	16%	17%	20%	5%	14%	3%	0%	26%
GERMANY	0%	2%	9%	11%	0%	1%	19%	0%	13%
ITALY	25%	1%	5%	0%	0%	0%	27%	0%	62%
UK	3%	4%	14%	19%	13%	36%	0%	0%	50%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	11%	12%	15%	0%	8%	0%	0%	16%
GERMANY	0%	0%	3%	5%	0%	0%	10%	0%	0%
ITALY	0%	0%	0%	0%	0%	0%	16%	0%	43%
UK	0%	0%	8%	14%	0%	30%	9%	0%	39%
MAX SAVINGS	0%	11%	12%	15%	0%	30%	16%	0%	43%

Source : Atkins Survey Data

Appendix II (cont'd)

TABLE II.2(c) - CALCULATION OF POTENTIAL SAVINGS FACTORS (Germany)

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (Germany)

226

	fixed secretair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper spreader II	calc II
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> GERMANY)	10%	26%	16%	40%	18%	5%	7%	11%	24%
(FRANCE -> GERMANY)	14%	40%	24%	57%	26%	8%	9%	12%	30%
(ITALY -> GERMANY)	15%	46%	29%	69%	31%	7%	9%	14%	31%
(UK -> GERMANY)	19%	52%	30%	79%	34%	7%	6%	9%	28%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	27%	15%	5%	0%	7%	0%	14%	0%	0%
FRANCE	18%	0%	0%	0%	18%	0%	0%	4%	0%
ITALY	38%	2%	0%	32%	18%	0%	0%	0%	2%
UK	13%	11%	24%	39%	39%	0%	24%	0%	18%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	17%	0%	0%	0%	0%	0%	7%	0%	0%
FRANCE	4%	0%	0%	0%	0%	0%	0%	0%	0%
ITALY	22%	0%	0%	0%	0%	0%	0%	0%	0%
UK	0%	0%	0%	0%	5%	0%	17%	0%	0%
MAX SAVINGS	23%	0%	0%	0%	5%	0%	17%	0%	0%

Source : Eurostat & BEUC Data

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (Germany)

	trans. I /grason	electro	telephone	pharm	average of car	van b6	van b7	bus b8	bus d11
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> GERMANY)	9%	45%	4%	3%	5%	4%	5%	0%	5%
(FRANCE -> GERMANY)	11%	47%	6%	7%	6%	5%	7%	6%	7%
(ITALY -> GERMANY)	11%	47%	5%	3%	6%	5%	7%	5%	6%
(UK -> GERMANY)	13%	48%	4%	5%	6%	5%	7%	1%	7%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	14%	0%	42%	48%	2%	16%	10%	2%	6%
FRANCE	2%	0%	16%	55%	0%	14%	0%	0%	0%
ITALY	12%	0%	49%	53%	0%	0%	0%	2%	2%
UK	0%	6%	72%	29%	0%	0%	0%	1%	0%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	6%	0%	38%	45%	0%	11%	5%	0%	1%
FRANCE	0%	0%	10%	52%	0%	9%	0%	0%	0%
ITALY	2%	0%	44%	50%	0%	0%	0%	2%	0%
UK	0%	0%	68%	15%	0%	2%	0%	0%	0%
MAX SAVINGS	6%	0%	63%	52%	0%	11%	5%	0%	1%

Source : Eurostat & BEUC Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (Germany)

227

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> GERMANY)	42%	21%	10%	18%	135%	27%	27%	17%	24%	12%
(FRANCE -> GERMANY)	60%	28%	10%	18%	135%	32%	41%	26%	21%	16%
(ITALY -> GERMANY)	69%	34%	11%	16%	144%	35%	46%	32%	22%	17%
(UK -> GERMANY)	72%	27%	12%	15%	145%	39%	54%	34%	20%	19%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
BELGIUM	30%	0%	0%	0%	0%	29%	23%	32%	0%	25%
FRANCE	0%	0%	0%	0%	12%	24%	17%	31%	0%	7%
ITALY	0%	0%	0%	36%	0%	56%	61%	7%	0%	35%
UK	60%	87%	1%	63%	0%	65%	32%	62%	0%	23%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
BELGIUM	0%	0%	0%	0%	0%	6%	0%	15%	0%	12%
FRANCE	0%	0%	0%	0%	0%	2%	0%	5%	0%	0%
ITALY	0%	0%	0%	20%	0%	20%	15%	0%	0%	18%
UK	0%	60%	0%	48%	0%	25%	0%	28%	0%	4%
MAX SAVINGS	0%	60%	0%	48%	0%	25%	15%	28%	0%	18%

Source : Atkins Survey Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (Germany)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray a/c.	Trans-former	Goods wagon	Telephone
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> GERMANY)	73%	5%	5%	5%	38%	7%	10%	4%	12%
(FRANCE -> GERMANY)	101%	6%	7%	7%	39%	7%	12%	4%	18%
(ITALY -> GERMANY)	114%	6%	7%	8%	40%	9%	12%	5%	17%
(UK -> GERMANY)	128%	6%	7%	7%	40%	6%	15%	5%	19%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	10%	14%	9%	10%	9%	14%	0%	11%	15%
FRANCE	5%	0%	0%	0%	4%	0%	0%	27%	0%
ITALY	29%	0%	0%	0%	1%	0%	10%	18%	56%
UK	8%	2%	6%	9%	15%	35%	0%	14%	42%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	9%	4%	4%	0%	7%	0%	7%	7%
FRANCE	0%	0%	0%	0%	0%	0%	0%	23%	0%
ITALY	0%	0%	0%	0%	0%	0%	0%	14%	39%
UK	0%	0%	0%	2%	0%	29%	0%	9%	23%
MAX SAVINGS	0%	9%	4%	4%	0%	29%	0%	23%	39%

Source : Atkins Survey Data

Appendix II (cont'd)

TABLE II.2(d) - CALCULATION OF POTENTIAL SAVINGS FACTORS (Italy)

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (Italy)

	fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder II	calc II
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> ITALY)	34%	67%	27%	154%	54%	4%	5%	9%	15%
(FRANCE -> ITALY)	31%	61%	25%	136%	48%	4%	5%	8%	19%
(GERMANY -> ITALY)	25%	47%	20%	104%	38%	4%	5%	8%	17%
(UK -> ITALY)	44%	88%	34%	197%	68%	6%	4%	7%	17%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	0%	14%	31%	0%	0%	31%	41%	35%	0%
FRANCE	0%	0%	16%	0%	0%	20%	24%	29%	14%
GERMANY	0%	0%	28%	0%	0%	31%	31%	36%	38%
UK	0%	10%	45%	9%	25%	1%	48%	0%	50%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	0%	4%	0%	0%	27%	36%	27%	0%
FRANCE	0%	0%	0%	0%	0%	16%	19%	31%	0%
GERMANY	0%	0%	9%	0%	0%	29%	26%	28%	22%
UK	0%	0%	11%	0%	0%	0%	43%	0%	33%
MAX SAVINGS	0%	0%	11%	0%	0%	28%	43%	31%	33%

Source : Eurostat & BEUC Data

27/10/87
CALCULATION OF POTENTIAL SAVINGS FACTORS (Italy)

	trans. I	electro /graph	telephone	chairs	average car	van b6	van b7	bus d8	bus d14
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> ITALY)	15%	45%	12%	3%	5%	7%	5%	0%	0%
(FRANCE -> ITALY)	15%	44%	13%	7%	5%	5%	7%	4%	0%
(GERMANY -> ITALY)	12%	43%	13%	11%	5%	5%	6%	3%	0%
(UK -> ITALY)	19%	47%	11%	12%	7%	7%	8%	7%	0%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	2%	2%	0%	0%	14%	18%	18%	0%	99%
FRANCE	0%	5%	0%	5%	5%	17%	0%	12%	98%
GERMANY	0%	3%	0%	0%	11%	3%	9%	46%	98%
UK	0%	15%	45%	0%	0%	0%	0%	20%	98%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	0%	0%	0%	3%	13%	12%	0%	99%
FRANCE	0%	0%	0%	0%	0%	11%	0%	9%	99%
GERMANY	0%	0%	0%	0%	6%	0%	7%	19%	99%
UK	0%	0%	34%	0%	0%	0%	0%	19%	98%
MAX SAVINGS	0%	0%	34%	0%	9%	13%	12%	13%	0%

Source : Eurostat & BEUC Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (Italy)

230

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Cooker paper
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> ITALY)	54%	15%	16%	33%	59%	111%	173%	47%	14%	34%
(FRANCE -> ITALY)	50%	14%	13%	31%	57%	101%	156%	42%	12%	32%
(GERMANY -> ITALY)	40%	10%	11%	27%	54%	84%	122%	34%	10%	28%
(UK -> ITALY)	67%	16%	17%	28%	63%	137%	224%	60%	12%	41%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
BELGIUM	58%	33%	0%	0%	27%	0%	0%	27%	0%	0%
FRANCE	25%	24%	0%	0%	66%	0%	0%	26%	14%	0%
GERMANY	40%	64%	4%	0%	61%	0%	0%	0%	46%	0%
UK	76%	95%	5%	42%	25%	21%	0%	59%	35%	0%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
BELGIUM	4%	18%	0%	0%	0%	0%	0%	0%	0%	0%
FRANCE	0%	10%	0%	0%	9%	0%	0%	0%	3%	0%
GERMANY	0%	54%	0%	0%	6%	0%	0%	0%	36%	0%
UK	9%	80%	0%	14%	0%	0%	0%	0%	23%	0%
MAX SAVINGS	9%	80%	0%	14%	9%	0%	0%	0%	36%	0%

Source : Atkins Survey Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (Italy)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray a/c.	Trans-former	Goods wagon	Telephone
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> ITALY)	218%	6%	8%	7%	41%	5%	19%	6%	56%
(FRANCE -> ITALY)	199%	7%	8%	7%	41%	5%	17%	6%	54%
(GERMANY -> ITALY)	161%	6%	7%	6%	40%	5%	14%	6%	42%
(UK -> ITALY)	277%	8%	9%	8%	42%	5%	23%	7%	68%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	0%	16%	13%	23%	8%	39%	0%	0%	0%
FRANCE	0%	0%	0%	4%	3%	29%	0%	11%	0%
GERMANY	0%	2%	4%	15%	0%	29%	0%	0%	0%
UK	0%	4%	10%	23%	15%	54%	0%	0%	0%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	9%	5%	17%	0%	34%	0%	0%	0%
FRANCE	0%	0%	0%	0%	0%	23%	0%	5%	0%
GERMANY	0%	0%	0%	9%	0%	24%	0%	0%	0%
UK	0%	0%	0%	15%	0%	49%	0%	0%	0%
MAX SAVINGS	0%	9%	5%	17%	0%	49%	0%	5%	0%

Source : Atkins Survey Data

Appendix II (cont'd)

TABLE II.2(e) - CALCULATION OF POTENTIAL SAVINGS FACTORS (UK)

CALCULATION OF POTENTIAL SAVINGS FACTORS (UK)

	fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder	calc II
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> UK)	11%	29%	21%	65%	29%	3%	9%	3%	29%
(FRANCE -> UK)	14%	37%	27%	80%	36%	4%	10%	3%	36%
(GERMANY -> UK)	21%	60%	41%	122%	55%	4%	9%	3%	55%
(ITALY -> UK)	30%	98%	66%	216%	92%	6%	12%	0%	89%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	16%	4%	0%	0%	0%	30%	0%	100%	0%
FRANCE	1%	0%	0%	0%	0%	19%	0%	100%	0%
GERMANY	0%	0%	0%	0%	0%	21%	0%	100%	0%
ITALY	29%	0%	0%	0%	0%	0%	0%	100%	0%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	5%	0%	0%	0%	0%	27%	0%	100%	0%
FRANCE	0%	0%	0%	0%	0%	15%	0%	100%	0%
GERMANY	0%	0%	0%	0%	0%	27%	0%	100%	0%
ITALY	0%	0%	0%	0%	0%	0%	0%	100%	0%
MAX SAVINGS	5%	0%	0%	0%	0%	27%	0%	0%	0%

Source : Eurostat & BEUC Data

27/10/97
CALCULATION OF POTENTIAL SAVINGS FACTORS (UK)

	trans. I /graph	electro	telephone	pharm	average of car	van b6	van b7	bus d8	bus d14
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> UK)	7%	48%	15%	3%	4%	4%	5%	3%	4%
(FRANCE -> UK)	7%	49%	20%	3%	5%	4%	6%	5%	6%
(GERMANY -> UK)	9%	51%	25%	7%	5%	5%	6%	4%	5%
(ITALY -> UK)	11%	56%	23%	5%	5%	7%	8%	5%	5%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	25%	3%	0%	35%	16%	18%	18%	0%	25%
FRANCE	24%	0%	0%	44%	9%	15%	0%	0%	0%
GERMANY	24%	3%	0%	0%	12%	3%	3%	3%	18%
ITALY	24%	0%	0%	41%	3%	0%	0%	0%	0%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	29%	0%	0%	31%	12%	14%	13%	3%	21%
FRANCE	17%	0%	0%	40%	4%	12%	0%	0%	0%
GERMANY	15%	3%	3%	0%	8%	0%	3%	3%	12%
ITALY	22%	0%	0%	36%	0%	0%	0%	0%	0%
MAX SAVINGS	29%	0%	0%	40%	12%	14%	13%	0%	21%

Source : Eurostat & BEUC Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (UK)

233

	Digoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Copier paper
TOTAL SAVINGS THRESHOLD										
(BELGIUM -> UK)	104%	164%	10%	48%	70%	86%	40%	46%	20%	16%
(FRANCE -> UK)	129%	198%	9%	49%	69%	79%	50%	58%	17%	19%
(GERMANY -> UK)	185%	242%	12%	49%	74%	118%	81%	90%	16%	24%
(ITALY -> UK)	288%	430%	18%	52%	85%	174%	127%	154%	23%	28%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:										
BELGIUM	0%	0%	0%	0%	3%	0%	0%	0%	0%	2%
FRANCE	0%	0%	0%	0%	54%	0%	0%	0%	0%	0%
GERMANY	0%	0%	0%	0%	48%	0%	0%	0%	17%	0%
ITALY	0%	0%	0%	0%	0%	0%	43%	0%	0%	15%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :										
BELGIUM	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
FRANCE	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
GERMANY	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%
ITALY	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
MAX SAVINGS	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%

Source : Atkins Survey
Data

26/10/87
CALCULATION OF POTENTIAL SAVINGS (UK)

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray m/c.	Trans-former	Goods wagon	Telephone
TOTAL SAVINGS THRESHOLD									
(BELGIUM -> UK)	79%	5%	6%	6%	46%	10%	7%	5%	21%
(FRANCE -> UK)	94%	6%	7%	7%	46%	11%	8%	4%	27%
(GERMANY -> UK)	139%	7%	8%	8%	48%	12%	10%	8%	37%
(ITALY -> UK)	213%	8%	11%	11%	50%	15%	14%	7%	52%
RELATIVE PRICE ADVANTAGE FOR SUPPLIERS:									
BELGIUM	2%	12%	4%	1%	0%	0%	11%	0%	1%
FRANCE	0%	0%	0%	0%	0%	0%	8%	15%	0%
GERMANY	0%	0%	0%	0%	0%	0%	23%	0%	0%
ITALY	23%	0%	0%	0%	0%	0%	39%	8%	22%
POTENTIAL SAVING AFTER SAVINGS THRESHOLD WHEN BUYING FROM :									
BELGIUM	0%	7%	0%	0%	0%	0%	4%	0%	0%
FRANCE	0%	0%	0%	0%	0%	0%	0%	15%	0%
GERMANY	0%	0%	0%	0%	0%	0%	15%	0%	0%
ITALY	0%	0%	0%	0%	0%	0%	19%	0%	0%
MAX SAVINGS	0%	7%	0%	0%	0%	0%	19%	15%	0%

Source : Atkins Survey
Data

TABLE II.3 - CALCULATION OF POTENTIAL SAVINGS - SUMMARY

	fixed armchair	storage cabinet	file cabinet	shelf	swivel chair	type I	calc I	paper shredder	calc II
BELGIUM *	2%	2%	4%	72%	14%	0%	4%	0%	2%
FRANCE	4%	0%	16%	1%	2%	10%	25%	0%	22%
GERMANY	23%	0%	0%	2%	5%	0%	17%	0%	3%
ITALY	0%	0%	11%	0%	3%	28%	17%	31%	30%
UK	5%	0%	2%	3%	0%	27%	2%	0%	2%

Source : Eurostat & BEUC Data

	trans. I electro /graph	telephone	chairs	average of car	van b6	van b7	bus d8	bus d14
BELGIUM	0%	0%	47%	9%	0%	0%	0%	0%	0%
FRANCE	6%	0%	63%	0%	4%	0%	21%	9%	20%
GERMANY	6%	0%	68%	52%	0%	11%	5%	0%	4%
ITALY	0%	0%	34%	0%	8%	13%	12%	19%	0%
UK	29%	0%	0%	40%	12%	14%	13%	0%	21%

Source : Eurostat & BEUC Data

	Oxoxin .25mg	Paracet.	Power cable	Street lamp	Fluor. tube	School desk	Office desk	Filing cabinet	Uniform	Cooler paper
BELGIUM	0%	86%	28%	56%	0%	20%	0%	20%	55%	0%
FRANCE	29%	36%	0%	62%	0%	7%	0%	15%	25%	9%
GERMANY	0%	60%	0%	46%	0%	25%	15%	26%	0%	13%
ITALY	9%	80%	0%	14%	9%	0%	0%	0%	36%	0%
UK	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%

Source : Atkins Survey
Data

	Cement	Opel Ascona	Fiat Ducato	VW Transp.	Cardiac Monitor	X-ray a/c.	Trans- former	Goods wagon	Telephone
BELGIUM	0%	0%	0%	0%	0%	18%	12%	13%	20%
FRANCE	0%	11%	12%	16%	0%	30%	16%	0%	43%
GERMANY	0%	9%	4%	4%	0%	29%	0%	23%	39%
ITALY	0%	9%	5%	17%	0%	49%	0%	5%	0%
UK	0%	7%	0%	0%	0%	0%	19%	10%	0%

Source : Atkins Survey
Data

Appendix II (cont'd)

TABLE II.4 - HERMES MODEL FACTORS

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CHANGE IN PRICE DUE TO STATIC PRICE EFFECT

	BELGIUM	FRANCE	GERMANY	ITALY	U.K.
A : AGRICULTURE	0.0%	0.0%	0.0%	0.0%	0.0%
E : FUEL AND POWER	0.0%	0.0%	13.1%	0.0%	0.9%
G : INTERMEDIATE GOODS	1.5%	0.0%	8.8%	0.0%	7.6%
K : EQUIPMENT GOODS	4.2%	0.4%	2.3%	7.5%	1.5%
C : CONSUMPTION GOODS	9.8%	0.2%	0.4%	0.7%	0.2%
B : BUILDING AND CONSTRUCTION	1.0%	1.0%	1.0%	1.0%	1.0%
Z : TRANSPORT AND COMMUNICATION	0.0%	0.0%	0.0%	0.0%	0.0%
L : OTHER MARKET SERVICES	0.0%	0.5%	0.6%	0.4%	0.4%

Formula : SUM(Static Price Effect)/SUM(Public Purchases)
-FOR EACH MACROSECTORAL BRANCH

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CHANGE IN PRICE DUE TO COMPETITION EFFECT

	BELGIUM	FRANCE	GERMANY	ITALY	U.K.
A : AGRICULTURE	0.0%	0.0%	0.0%	0.0%	0.0%
E : FUEL AND POWER	0.0%	0.0%	0.0%	0.0%	0.0%
G : INTERMEDIATE GOODS	0.0%	0.0%	0.0%	0.0%	0.0%
K : EQUIPMENT GOODS	3.2%	1.4%	4.3%	3.5%	0.9%
C : CONSUMPTION GOODS	0.0%	0.0%	0.0%	0.0%	0.0%
B : BUILDING AND CONSTRUCTION	0.0%	0.0%	0.0%	0.0%	0.0%
Z : TRANSPORT AND COMMUNICATION	0.0%	0.0%	0.0%	0.0%	0.0%
L : OTHER MARKET SERVICES	0.0%	0.0%	0.0%	0.0%	0.0%

Formula : SUM(Competition Effect)/SUM(Public Purchases)
-FOR EACH MACROSECTORAL BRANCH

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CHANGE IN PRICE DUE TO RESTRUCTURING EFFECT

	BELGIUM	FRANCE	GERMANY	ITALY	U.K.
A : AGRICULTURE	0.0%	0.0%	0.0%	0.0%	0.0%
E : FUEL AND POWER	0.0%	0.0%	0.0%	0.0%	0.0%
G : INTERMEDIATE GOODS	0.0%	0.0%	0.0%	0.0%	0.0%
K : EQUIPMENT GOODS	7.2%	7.4%	5.7%	7.9%	7.2%
C : CONSUMPTION GOODS	0.0%	0.0%	0.0%	0.0%	0.0%
B : BUILDING AND CONSTRUCTION	0.0%	0.0%	0.0%	0.0%	0.0%
Z : TRANSPORT AND COMMUNICATION	0.0%	0.0%	0.0%	0.0%	0.0%
L : OTHER MARKET SERVICES	0.0%	0.0%	0.0%	0.0%	0.0%

Formula : SUM(Restructuring Effect)/SUM(Public Purchases)
-FOR EACH MACROSECTORAL BRANCH

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TOTAL CHANGE IN PRICE

	BELGIUM	FRANCE	GERMANY	ITALY	U.K.
A : AGRICULTURE	0.0%	0.0%	0.0%	0.0%	0.0%
E : FUEL AND POWER	0.0%	0.0%	13.1%	0.0%	0.9%
Q : INTERMEDIATE GOODS	1.5%	0.0%	8.8%	0.0%	7.6%
K : EQUIPMENT GOODS	14.5%	9.2%	12.3%	18.9%	9.6%
C : CONSUMPTION GOODS	9.8%	0.2%	0.4%	0.7%	0.2%
B : BUILDING AND CONSTRUCTION	1.0%	1.0%	1.0%	1.0%	1.0%
Z : TRANSPORT AND COMMUNICATION	0.0%	0.0%	0.0%	0.0%	0.0%
L : OTHER MARKET SERVICES	0.0%	0.5%	0.6%	0.4%	0.4%

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CHANGE IN IMPORT PENETRATION

	BELGIUM	FRANCE	GERMANY	ITALY	U.K.
A : AGRICULTURE	0.0%	0.0%	0.0%	0.0%	0.0%
E : FUEL AND POWER	0.0%	0.0%	26.3%	0.0%	3.6%
Q : INTERMEDIATE GOODS	14.4%	3.6%	9.1%	24.8%	11.2%
K : EQUIPMENT GOODS	32.4%	33.1%	17.1%	39.4%	39.8%
C : CONSUMPTION GOODS	16.5%	2.1%	3.9%	3.7%	9.3%
B : BUILDING AND CONSTRUCTION	10.0%	10.0%	10.0%	10.0%	10.0%
Z : TRANSPORT AND COMMUNICATION	0.0%	0.0%	0.0%	0.0%	0.0%
L : OTHER MARKET SERVICES	0.0%	5.3%	5.6%	4.0%	3.9%

Formula : SUM(Public Purchases * Import Penetration)/SUM(Public Purchases)
-FOR EACH MACROSECTORAL BRANCH

17/11/87

APPENDIX III
THE CASE STUDY
INDUSTRIES IN THE USA

Appendix III (cont'd)

III.0 Introduction

For each of the case study industries a comparison has been made between the industry structures and competitiveness in USA and Europe, to indicate:

* whether the large, relatively open, US market gives US firms a competitive advantage

* whether the US industry is a pattern for the future development of EC industries in an open internal market.

This appendix describes the US industries. It is based on fieldwork and deskwork in the USA during August 1987. The conclusions are drawn from interviews with US government officials, particularly in the Department of Commerce, and the publications listed in the bibliography.

III.1 Coal

III.1.1 Industry structure

The USA is world leader in the production of steam coal, accounting for 25% of the market. Output has increased at an average annual rate of 3.1% since 1972, and presently stands at 1010m tonnes. Production is carried out by more than 3000 companies, operating over 4,700 mines. Despite this, the industry displays a marked level of concentration. Only 159 mines are capable of producing over 7m tonnes per annum, and the largest 10 companies account for 33% of total output. Although coal is mined in 27 States, three account for 50% of the production.

Electric utilities consume 85% of all coal mined in the US. About 8% (mostly metallurgical coal at present) is exported, mainly to Western Europe. Import penetration stands at 0.2% of consumption.

Appendix III (cont'd)

III.1.2 Competitiveness

The US coal mining industry is highly competitive, for the following reasons:

* Geological conditions (some 60% of production is surface mined) allow high levels of mechanisation.

* Vast reserves enable producers to avoid mining difficult seams.

* Productivity is high by international standards, and has increased steadily over the past decade. Capacity utilisation stands at 90%.

* Transportation facilities are modern and efficient; labour relations are stable.

* Profitability has been maintained despite falling real prices (the average f.o.b. price was $27/tonne between 1980 and 1986).

* US producers can expect the domestic demandto grow at 2% per annum to the year 2000.

* Exposure to international competition, and aggressive competition among US producers for utilities' contracts.

Projections up to 1995 indicate that US mine prices will be generally superior to South African, Australian and Colombian coal by at least $6/tonne in the domestic market. The US is vulnerable to competition only to sales from Colombia to coastal utilities in the South East and Gulf. For this reason, legislation has been proposed to set a $8/tonne tariff on Colombian coal imports.

Appendix III (cont'd)

In export markets, the US is not price competitive and has lost market share steadily. However, it retains a high volume of sales because of concerns among purchasers about the reliability of supply, their desire for supply diversification, and the high quality of US coals.

III.1.3 Impact of internal market factors

The fact that the US market is large and not fragmented gives no significant economies of scale to the coal industry, where markets are restricted by transport costs, and scale is determined by geological factors. The US industry has many small firms, and is highly competitive.

III.2 Boilers

III.2.1 Industry structure

Since the mid 1970's, orders for conventional and nuclear boilers have declined markedly in the US. Sales have fallen from an average of 28,000mw p.a in the early 1970s to 13,000mw p.a in the 1980's. There were few orders placed in 1985 and 1986, and demand is expected to grow at only 1.5% per annum to 1995 for conventional boilers and 3% per annum for nuclear systems.

As a result, all manufacturers are operating at minimum levels (below 20% capacity) and subsisting largely on maintenance and repair work. There are four manufacturers of conventional boilers:

* **Combustion Engineering**

Combustion Engineering Power Systems Group (CE) supplies equipment and services for both conventional and nuclear steam generating systems for electric utilities and industry. It has a network of 46 licensees and associated companies in 30

Appendix III (cont'd)

countries, as well as 20 manufacturing plants and 6 R&D facilities in the USA and Canada. Although CE leads the US market (with a 40% share), a levelling out of turnover figures persuaded CE to embark on a major restructuring programme in 1983, involving consolidation of manufacturing facilities and acquisition of companies in related but higher-value markets. Investment in R&D has also been increased to exploit new technologies.

* **Babcock and Wilcox**

Babcock and Wilcox is a subsidiary of McDermott International Power Generation Systems and Equipment Division. It manufactures complete fossil fuel boilers, nuclear steam supply systems, and nuclear fuel assemblies for the electric utility industry. Most plants are owned by Babcock and Wilcox and are located in the US with the exception of one in Ontario. The company is moving increasingly into higher value components (e.g. computerised boiler management systems) and new technologies to improve sales in the retrofit market. Babcock has a 35% share of the US market.

* **Foster Wheeler**

Foster Wheeler Energy Equipment primarily designs and fabricates steam generators and condensers. Manufacturing plants are located in New York and Ontario. The company has a 20% share of the domestic market.

* **Riley Stoker**

Manufactures conventional boilers, taking a 5% share of the domestic market.

Appendix III (cont'd)

Nuclear steam supply systems are produced by Babcock and Wilcox, CE, and also **General Electric** and **Westinghouse.** CE initially participated in the nuclear power market as a supplier of major components to both General Electric and Westinghouse, but later entered the market with a complete system of their own design primarily for the US market.

III.2.2 Competitiveness

The competitiveness of US boilermakers vis-a-vis EC suppliers is difficult to determine for the following reasons:

* there is no import penetration of the US boiler market since all three licensors of boiler technology manufacture in the US

* although the market for new boilers in the US has been depressed for many years, and manufacturers are operating at around 10% capacity for complete units, the three main suppliers are recording improving profit rates in excess of 10% largely due to expansion of higher-value business lines and the buoyancy of the domestic maintenance, retrofit and upgrading market

* US boilermakers export a much smaller percentage of their output than their EC competitors (averaging 15% over the last decade and declining), but the strong domestic market for maintenance and refurbishment together with uncompetitive export credit packages have weakened the incentive to pursue export markets as aggressively as the competition.

US industry specialists, however, suggest the following:

* the large market enjoyed by US boilermakers (see Table III.2.1) has provided the resources for them to maintain a world lead in both boiler and production technology. Although

Appendix III (cont'd)

the three main US suppliers typically allocate 1 to 2% of revenues to R&D and 1% to capital investment (less than most EC manufacturers) these are enough in absolute terms to retain a lead over Europe where there is much duplication of effort. Particular attention has been directed towards, for example, fluidised bed combustion and measures to improve labour productivity (given the relatively high labour rates obtaining in the US)

TABLE III.2.1 - COMPARISON OF US AND EC BOILER PRODUCTION

	USA	EEC
Utility boiler sales (MW : 1984)	13,000	12,000
No. of major manufacturers (including nuclear pressure vessels)	6	15

Source: US Department of Commerce

* although there are some economies of scale in production, the US advantage in this respect has eroded as domestic orders declined. Over-capacity is now worse in the US than in EC, and this is a major drain on resources. The current programme of consolidation of manufacturing facilities should restore the US edge

* US equipment is believed to be both more reliable and efficient than the competition, primarily because of new technology.

Appendix III (cont'd)

III.2.3 Impact of internal market factors

The size of the internal market gives some economies of scale in boilermaking, particularly in R&D, but this is not the key factor in US firms' performance. Greater competition between boilermakers, compared to the protected and fragmented EC industry, has led to greater efficiency and technical progress.

III.3 Turbine Generators

III.3.1 Industry structure

Most US power is generated by private investor-owned companies that account for 77% of the nation's generating capacity. Federal installations (mostly linked to irrigation projects) operate only 10% of US capacity. A further 8% is generated by municipality-owned companies; most municipality utilities now perform only the distribution function. The remaining 5% is generated by co-operatives, many established and financed by the Rural Electric Administration. Despite the large number of utilities (648 in 1986), the market for large turbine-generator sets is quite concentrated. Of 10,475 generating units, only 407 (4%) are above 500 mw. Utilities generally procure equipment to identical specifications, and do not place restrictions on non-US suppliers, so the market is both open and uniform.

The US has the largest electricity generating system in the world. The size of this network has given US equipment manufacturers the opportunity to lead the world in the design, development and production of electric power generating equipment, including turbine-generator sets. A comparison of markets, generating capacity, production capacity and sales for turbine-generators between the USA and the EC is given in Table III.3.1.

Appendix III (cont'd)

TABLE III.3.1 - USA AND EC PRODUCTION OF TURBINE GENERATOR SETS

	USA	EC	World (est)
Generating capacity (GW : 1984)	666	360	2,000
Additions to capacity (GW : 1985-1990)	23	12	100
Production capacity: all power generating equipment (GW : 1984)	38	60	150
Sales turbine-generators (GW : annual average 1980-85)	14	9	30
No. manufacturers	2	10	na

Source: US Department of Commerce

In common with Europe, the US domestic market for turbine generators has deteriorated since the mid-1970's. US generation of electricity grew 10% per annum between 1960 and 1975, but only 1.5% per annum between 1980 and 1986. Projected growth between 1986 and 1995 is 2% per annum. As a result, shipments of turbine generator sets fell from 51,872 MW in 1972 to 12,920 MW in 1983 and 7,500 in 1985. This has had the following implications:

* restructuring and consolidation by US manufacturers

* increased dependence on exports where margins are lower. Exports rose from 2% of sales in 1972 to 17% in 1983, although this is still low compared to European firms.

There have been only two US suppliers of turbine-generator sets since the departure of Allis Chalmers from this sector of the industry in the 1960s, namely:

Appendix III (cont'd)

* **General Electric (GE)**

  GE has 45% of the US turbine-generator market. It is well over twice the size of each of its major EC competitors. GE has recently invested heavily in measures to improve productivity and efficiency, in the rationalisation of manufacturing sites, and in the development of new power generating technologies. In addition, GE has sold its power transformer business to Westinghouse.

* **Westinghouse**

  Westinghouse has 40% of the US turbine-generator market. Like GE, Westinghouse has consolidated its turbine-generator business (recently closing a facility at Pittsburgh) and diversified into a variety of sectors, strengthening its R&D capability.

III.3.2 Competitiveness

A comparison of US and EC suppliers of turbine-generators sets leads to the following conclusions:

* profit margins for US suppliers average 9% against 3 to 4% for EC manufacturers

* fixed costs per unit of production are thought to be lower for US suppliers given the size of their manufacturing facilities. GE, for example, carries out all its steam turbine generator production on one site following recent rationalisation

* US suppliers' R&D expenditure represents 5 to 6% of total revenue; the average for EC suppliers is 2 to 3%, which is much smaller in absolute amount.

Appendix III (cont'd)

* the US market is fairly open to foreign suppliers, subject to a 7.5% tariff, but import penetration is low (around 5%). Only one large import order has been placed (with Brown-Boveri) in recent years. The US maintains a 3:1 trade surplus, albeit a declining share of the world market

* a US Department of Energy study compared US and imported turbine generators, and found US equipment more reliable and cheaper to run.

The competitiveness of US suppliers is thought to arise from certain scale economies. Their dominance of the large US market has enabled GE and Westinghouse to maintain profitability, initially through installation of power units and latterly through maintenance and refurbishment, and to invest in the R&D necessary to maintain a technological lead, and the capital investment to remain low-cost producers. Both companies' membership of larger engineering groups has accorded further benefits in, for example, the sharing of R&D facilities and the use of corporate resources in implementing restructuring programmes.

This assessment is, at first sight, contradicted by the poor performance of US manufacturers in markets outside Japan and Western Europe. However, this can be explained, inter alia, by:

* non-competitive Eximbank financing compared to lower foreign interest rates and mixed credits. The availability of concessionary finance to Japanese manufacturers has persuaded Westinghouse to sign a production sharing agreement with Mitsubishi for the manufacture of turbine generators below 250 MW for non-US markets

Appendix III (cont'd)

* the high value of the US dollar

* the existence of the International Electrical Association. It is thought that this cartel of European and Japanese manufacturers enables its members to keep bid costs low by allocating markets

* government subsidies to European manufacturers

* anti-trust legislation prohibiting collusion between GE and Westinghouse in export markets (their domestic market-fixing arrangement was broken in the 1960s).

III.3.3 Impact of internal market factors

There are quite clear economies of scale for the US turbine generator manufacturers, with only two firms and a larger market and higher capacity utilisation than EC firms.

III.4 Locomotives

III.4.1 Industry structure

The US railroad industry provides four distinct and separate services:

* **Freight haulage**, freight haulage is carried out by over 400 companies, of which 32 are currently classified Class I (revenues in excess of $50 billion), 26 Class II, and 375 Class III railroads (including train operators, switching and terminal companies). Class I carriers account for 95% of the freight tonnage handled by the industry. All operators are privately owned; the federal government's interest in Conrail was sold off in 1985. The industry is still supervised by the Interstate Commerce Commission, but since 1980 most freight

Appendix III (cont'd)

rates have been deregulated. This has created much more competitive conditions, and accelerated the rate of consolidation through mergers. The seven largest railroads now account for 80% of total rail revenues.

* **Inter-city Passenger Services** are provided by AMTRAK which was set up in 1970 by the federal government and is 50% state-financed.

* **Commuter services** have been consolidated into regional operating authorities funded by local government and the communities served. Federal involvement in commuter services through Conrail ended in 1982.

* **Urban mass transit services** are provided by local authorities with federal financial assistance. Historically, 80% of all transit capital improvements has been made with federal funds.

The market for equipment manufacturers in the US is thus very different from Europe; the level of public sector involvement is much lower and the number of entities providing services much higher.

There are only two suppliers of electric locomotives:

* **General Motors**

GM is a manufacturer of both diesel-electric and electric locomotives. It has licencing agreements in Australia, Spain, Sweden, Yugoslavia, Germany (Thyssen-Henschel), Brazil and Korea. The company is world leader in the production of diesel locomotives, controlling 60% of the market.

Appendix III (cont'd)

* **General Electric**

GE also manufactures diesel-electric and electric locomotives. It has licencing agreements in Australia, Brazil, South Africa and Germany (Krupp).

III.4.2 Competitivess

GE and GM are world leaders in the manufacture of diesel-electric locomotives, particularly for freight-haulage applications. They completely dominate the market in the US, where the use of common specifications and systems between railroads and deregulation has created a large and growing rail-haulage industry. GE and GM have therefore enjoyed the economies of series production, despite gradual deterioration in the level of capacity utilisation (which is around 50% currently). Their advantage in this respect over the European competition is evident from Table III.4.1.

TABLE III.4.1.-COMPARISON OF THE US AND EC LOCOMOTIVE INDUSTRY

	US	EC
No. of locomotives in service (1986)	24,881	20,174
Domestic orders of locomotives (1986)	540	84
No. of major manufacturers	2	10

Source: Association of American Railroads.

GM and GE machines are thought to be leaders in terms of cost, reliability and fuel efficiency.

Appendix III (cont'd)

The picture is very different for electric locomotives. The major market for such machines lies in passenger rail (both inter-city and commuter), and here the US suppliers have major disadvantages vis-a-vis their EC competitors:

* demand has declined steadily for decades, and is not thought likely to improve except for urban mass transit services. The European passager rail industry is much larger. AmTrak is not expected to place any orders for several years

* public sector financial assistance is aimed at maintaining essential services, and is not sufficient, as in Europe, to support the development of new locomotives.

As a result, GM and GE are not especially competitive in this segment of the market. They lag significantly, particularly in relation to Alsthom, in electronic componentry. However, their machines are cheap and reliable, so both companies sustain sales to less sophisticated export markets. For the same reason, import penetration is zero; currently there is no market in the US for the high speed, high performance electric locomotives manufactured in Europe.

III.4.3 Impact of internal market factors

Like turbine generators, the US locomotive manufacturers seem to benefit from considerable economies of scale from the large, uniform and competitive US market. Although there are only two manufacturers there is probably more effective competition than between manufacturers in most EC countries, and this competitive environment may be more important than the economies of scale.

Appendix III (cont'd)

III.5 Mainframe Computers

III.5.1 Industry structure

US sales of mainframe computers were worth $24.8 billion in 1986. The leading suppliers and their market shares are shown in Table III.5.1.

TABLE III.5.1 - US MAINFRAME COMPUTER MANUFACTURERS

Company	% of US Market
IBM	62.1
DEC	9.7
Sperry) Unisys	7.3
Burroughs)	6.4
CDC	5.5
NCR	5.0
Honeywell	2.0
Cray	1.0
Amdahl	1.0

Source: US Department of Commerce

The industry has undergone some measure of rationalisation in recent years, following a slowdown in market growth. Mainframe sales have grown at 5% per annum since 1980 against 20% per annum for the industry as a whole. The Sperry-Burroughs (Unisys) merger was one product of this (Sperry became a majority owned subsidiary of Burroughs in 1986). Specialisation in product lines is another; Burroughs focuses on the banking market, Sperry on airlines and NCR on retail applications. Only IBM and CDC are continuing to produce the full range of mainframes.

Cray Research and CDC are the only two companies producing supercomputers in the USA. Cray has 70% of that market, and almost total dominance of the public sector segment. Supercomputers

Appendix III (cont'd)

account for only 3% of total mainframe production, but sales have been rising rapidly. Cray, for example, has grown very rapidly each year since commencing operations in 1972. Sales increased 57% between 1985 and 1986.

Public sector sales account for 5% of production in the computer industry as a whole, but around 30% for mainframes. Sperry, for example, sells 29% by value of its output to NASA and the military, and a further 10% to other government agencies. Supercomputer manufacturers are even more dependent on public sector business. Some 50% of Cray's revenues has been provided by government and university customers.

III.5.2 Competitiveness

The huge US lead over EC manufacturers in the production of mainframes is evident from Table III.5.2.

Thus, while the EC comprises nearly 25% of the world market, indigenous manufacturers supply only 8% of sales. The US lead is even more pronounced in supercomputers, where its manufacturers control 90% of the world market, and face competition only from the Japanese. Most important of all, US manufacturers have virtually no competition from the EC in terms of hardware technology. Of the four 'indigenous' manufacturers in the EC, only Nixdorf (and very recently, Siemens) use homegrown technology.

The only real competition to US mainframe manufacturers comes from the Japanese, principally Fujitsu and NEC. The Japanese have a small share of the US mainframe market through Honeywell-Bull (which uses NEC technology) and Amdahl (Fujitsu). The technology flow from the USA to Japan has effectively been reversed, even in supercomputers (where Fujitsu and Hitachi now claim a technological lead over Cray and CDC). Import penetration in mainframes stands well below the industry average for the US (20%), but the situation is expected to deteriorate.

Appendix III (cont'd)

TABLE III.5.2 - COMPARISON OF THE US AND EC MAINFRAME COMPUTER INDUSTRY

	US	EC	WORLD
Market size (US$ billion)	15.6	8.2	34.0
share of world market	46%	24%	100%
Production (US$ billion)	24.8	2.8	34.0
share of world market	73%	8%	100%
No. manufacturers	9	4 (exc IBM)	

Source: US Department of Commerce

Note: The world market for all computer equipment is estimated at $108.3 billion in 1985 and $150 billion in 1987. Mainframes account for about 22% of this total.

Vis-a-vis the European competition, however, the US has substantial advantages in:

* the possession of indigenous technology

* access to a larger domestic market

* the size of individual companies, giving most a lead in the development of manufacturing systems and computer technology. IBM's ability to devote over $3.5 billion annually to R&D (more than all other manufacturers combined) is unrivalled. Companies such as Cray and Sperry devote 15% and 18% of revenues respectively to R&D. European manufacturers cannot match such expenditures, and survive only by importing technology 'off-the-shelf' from the Japanese

Appendix III (cont'd)

* private sector funding of R&D; few European customers are large enough to subsidise the development of computer systems by their suppliers, whereas in the USA this is relatively common. Sperry, for example, sources 52% of its R&D budget from private sector clients.

* very large Department of Defence funding of research projects which have commercial spin-off.

On the other hand, US manufacturers face some disadvantages compared with EC companies:

* preferential public sector procurement practices in Europe and Japan. The US has recently negotiated an agreement with the Japanese allowing their manufacturers a reasonable chance of winning business in supercomputers, but access to public sector markets remains limited. Offshore manufacturing in major export markets (IBM's strategy) has been quite successful in breaking down these barriers, and IBM has a strong market share in all countries, but still believes preference is given to indigenous firms.

* anti-trust legislation. Only recently has interpretation of anti-trust legislation been relaxed to allow the formation of R&D consortia, such as the Microelectronic and Computer Technology Corporation set up in 1983. Led by CDC, this group of 21 computer and semiconductor companies attempts to exploit the economies of scale and risk minimisation that collective efforts in R&D may provide. Collaborative research ventures in Europe are more common.

Appendix III (cont'd)

III.5.3 Impact of internal market factors

US firms benefit from large R&D expenditure which is focused on particular markets because of specialisation of firms. European firms' research is duplicated, with little cross-fertilisation. This, rather than economies of scale in manufacture and marketing, seems to be the key, although IBM's absolute size gives it enormous market power.

III.6 Public Exchange Switching Equipment

III.6.1 Industry structure

The US market for central public exchange switches was worth approximately $3.4 billion in 1985. The major suppliers are identified in Table III.6.1.

TABLE III.6.1 - SUPPLIERS OF SWITCHES TO THE USA, 1984

	Total Lines Shipped (millions)	Digital Lines Shipments (millions)	Analogue Line Shipments (millions)
AT&T	4.6	2.5	2.1
Northern Telecom	3.2	3.1	-
GTE	1.6	1.6	0.04
Others	0.43	0.48	0.01
	9.83	7.68	2.15

Source: US Department of Commerce

AT&T clearly dominates the market overall (with a 47% market share), but Northern Telecom leads in the digital area. The fourth largest supplier is currently Stromberg-Carlson (now owned by Plessey),

Appendix III (cont'd)

which supplies only digital equipment, and accounts for about 3% of the market. The digital switching market is expected to grow at 5 to 9% per annum.

The major suppliers' activities may be summarised as follows:

* **AT&T Technologies**

AT&T Technologies (formerly Western Electric) produces seven varieties of switches (the ESS family). The most advanced product is 5-ESS, which incorporates the latest hardware features and software capabilities, and now accounts for 50% of sales.

AT&T retains privileged access to its own long distance network market. However, since 1984 it has lost market share, notably to Northern Telecom, because the Regional Bell Operating Companies (RBOCs) were free to seek alternative suppliers. However, recent reports indicate that the 5-ESS switch has enabled AT&T to recapture the lead.

To offset the loss of its near monopoly status in the USA, AT&T launched itself into European export markets. In 1983, it set up a joint venture with Philips (to form APT), and in 1984 purchased a 25% stake in Olivetti.

Switches are manufactured in Dallas, Columbus and Oklahoma City, and integrated circuits at another two facilities.

* **Northern Telecom**

Northern Telecom Inc. (NTI) is the US subsidiary of Northern Telecom Limited (NT), Canada. Although NT manufactures all types of telecommunications equipment, its strongest product lines in the US market are of PBXs and public exchange

Appendix III (cont'd)

switching. Following the acceptance of its first digital switch, the DMS-10, in 1982 and its DMS-100 family in 1983, NT has pushed sales of its digital technology.

Switches are manufactured at three facilities in North Carolina. Production is at capacity levels. Some 80% of sales are to US buyers.

* **GTE Communications Inc.**

GTE manufactures one digital switch - the GTD-5EAX - at North Lake, Illinois. The switch was brought on line in 1982, and sold initially to the GTE telephone companies. Sales to RBOCs began in 1986 following evaluation by Bellcore in 1985. The switch is also manufactured by GTE subsidiaries in Belgium and Italy. In 1986, GTE forged a 50:50 joint venture with Siemens. This, together with growing acceptance of the GTD-5EAX switch, is expected to turn around GTE's falling share of the digital switching market.

* **Stromberg-Carlson**

Stromberg-Carlson is well established in the independent TELCOs. In 1982, Plessey purchased the company to gain instant US market share. Plessey originally planned to market Stromberg's DCO digital switch and upgrade it with System X technology and features, but in 1985 announced the phase-out of DCO production at its facility in Florida.

However, attempts to sell System X to the RBOCs and common carriers were unsuccessful. Plessey has therefore decided to continue with an upgraded DCO switch, and has become the third supplier to the RBOC network (after AT&T and Northern Telecom).

Appendix III (cont'd)

Other suppliers are:

* **ITT Corporation**

  ITT has a small market share with its old System 1210 switch. It was forced in 1985 to cancel its plans to develop a US version of System 1240 (which it markets in Europe) because of technological difficulties.

* **DSC Communications Corporation**

  DSC has recently developed its DEX 5 digital switch, making its first sale in 1985. Production is carried out at one facility in Texas.

* **Itec Inc** and **Rockwell International** are both recent US entrants to the market. Of the European suppliers the most successful has been **Ericsson** which has made an impression on the common carrier market. It has set up a joint venture with a US company for marketing purposes, and imports its AXE-10 switches directly from Sweden. **Siemens** has sold its EWSD switch to the RBOC market, and sales should be assisted by the GTE link-up. **Alcatel** has also targeted the RBOC market for its E-10 switch. It is unclear at this stage how the alliance with ITT will affect its US strategy.

III.6.2 Competitiveness

The relative position of the world's suppliers of digital switches can be gauged from Table III.6.2. Production by region is set out in Table III.6.3.

Appendix III (cont'd)

TABLE III.6.2 - MANUFACTURERS' SALES OF DIGITAL SWITCHES

Manufacturer	Lines Installed by end 1985 (millions)	Position	Lines Installed by end 1986 (millions)	Position
Alcatel	13.0	1	18.0 (1)	1
Northern Telecom	11.1	2	15.5	2
AT&T	6.5	3	10.1	3
Ericsson	4.7	4	7.9	4
GTE	3.8	5	5.0	6
NEC	2.9	6	5.9	5
ITT	1.5	7	-	-
Siemens	1.4	8	1.6	9
Plessey	1.1	9	3.2 (2)	7
GEC	0.7	10		
Fujitsu	0.4	11	1.8	8
Other (3)	0.5	-	3.0	-

Sources: US Department of Commerce; The Economist, 29/8/87

Notes: 1 including ITT.

2 figure for 1985 includes Stromberg-Carlson; figure for 1986 refers to combined Plessey/GEC manufacture of System X.

3 notably Philips, Italtel, Hitachi and Oki.

Although the picture is obscured by link-ups between countries (notably, AT&T and Philips, Siemens and GTE, Alcatel and ITT), table III.6.2 suggests that EC manufacturers are not significantly smaller than their main competitors.

A different picture is obtained by comparing prices (see Table III.6.4). This shows that none of the European manufacturers' domestic prices would be competitive in the US market. European prices clearly reflect varying margins to cover development costs, and the lack of competition. Increasing competition in the US market has pushed prices down from between $200 and $250 per line in 1984 to $100 in 1987.

Appendix III (cont'd)

US manufacturers' relatively poor sales performance cannot therefore be explained with reference to prices. They also appear to be competitive in technology. Industry experts in the USA argue that AT&T's 5-ESS switch is the world's most advanced, followed by Ericsson and Siemens. Certainly, 5-ESS is more advanced than both System X (which failed to sell in the US) and Alcatel's E-10.

TABLE III.6.3 - PRODUCTION OF DIGITAL SWITCHES BY REGION

Manufacturer	Lines Installed By End 1986 (millions)	% of Production	% of Consumption
EC	23.2	32	16
US	16.7	23	40
Japanese	8.7	12	9
Other	23.4	33	35
	72.0	100	100

Sources: US Department of Commerce; The Economist, 29/8/87

Note: Counting Northern Telecom as Canadian

TABLE III.6.4 - COMPARISON OF PRICES FOR DIGITAL SWITCHES

	$ per line installed (1987) (approx)
US	100
France	250
Belgium	400
UK	225
Italy	300
Germany	500

Sources: US Department of Commerce; WS Atkins' interviews, plus other sources (see footnote on page 152)

Appendix III (cont'd)

According to US Department of Commerce reports, US manufacturers have failed to lead the digital switching market because of:

* preferential procurement practices in Europe, Japan and even (to some extent) Canada which have effectively excluded US manufacturers from those markets, while all manufacturers have had free access to the US market. Consequently:

  - the US 'enjoys' the smallest trade surplus in telecommunication equipment (as a percentage of production) of any major OECD country
  - the US suffers a net deficit with those same trading partners
  - over 50% of US exports are to developing countries, and 75% to those plus the UK and Canada (the most liberal telecommunications markets)

  Both AT&T and GTE have clearly recognised that access to the European market can only be obtained through alliances with indigenous manufacturers.

* technological difficulties experienced by the ITT System 1240 switch, and the failure to adapt it to the US market.

* higher levels of investment in the conversion to digital switches in Europe than in the USA. European manufacturers are presented with a smaller, but guaranteed, more predictable and faster growing market than their US competitors.

* public sector funding of R&D in telecommunications. Manufacturers in Europe have benefited greatly from subsidisation of the development of indigenous technology. British Telecom, for example, underwrote the development cost of System X by about $700 million (out of a total cost of $1.4 billion). It is true, however, that the duplication of effort

Appendix III (cont'd)

in Europe has meant that the EC has spent nearly three times as much on the development of digital exchanges as US companies (i.e. $7 billion against $2.5 billion).

Interestingly, Table III.6.5 shows that those countries with highly protected telecommunications markets have the strongest trade balances.

TABLE III.6.5 - TRADE BALANCES IN TELECOMMUNICATIONS EQUIPMENT (1984)

	$ billion
Japan	+ 1.64
Germany	+ 0.53
France	+ 0.35
Italy	- 0.03
UK	- 0.04
USA	- 1.04

Source: US Department of Commerce

In an open market, US manufacturers would lead, at least initially, on the basis of price and performance. It appears that EC manufacturers cannot meet US market prices unless exports are sold at marginal cost, or subsidised by domestic sales. Currently, they account for less than 8% of the US market. However, the competitiveness of US manufacturers will be steadily eroded unless they maintain a technological lead.

Competition in technology will focus on software. In a digital switch, software controls the signalling, processing, and routing functions, and monitors maintenance problems. Increased emphasis is being placed on software development as networks are converted to ISDN systems. Software determines the type of enhanced features

Appendix III (cont'd)

available in a network, a factor which will be increasingly important to operators. Public sector subsidisation of R&D in Europe could give EC manufacturers an edge in this respect.

Market share will be important because in the public switching equipment industry, the size of a firm's actual or potential market and its ability to sustain world-class competitive standing are closely related. Economies of scale arise in production costs, in marketing and maintenance services, and R&D. Conversion to digital exchanges is set to slow down by the 1990s, by which time the industry will face over-capacity problems. It is generally expected that the industry will then undergo a 'shake-out'. The alliances and take-overs which have characterised the telecommunications industry in recent years demonstrate that the acquisition of market share is recognised as essential for survival. The future of the US digital switches industry, just as much as the EC industry, seems to depend, therefore, on whether the major export markets in Europe and Japan are opened to competition.

III.6.3 Impact of internal market factors

After their initial lead, it is not evident that US firms now have any great advantage over European manufacturers of digital switching equipment. Starting later, with protected home markets, has given European firms an advantage (the same applies to Japanese firms). Although protected by public purchasing policies EC firms have been exposed to some degree to the cold shower of competition, since all countries have brought in second suppliers.

The size of the US market and the fact that it started first, means that development costs there have been amortised by volume production and prices are now very low. Europe has not yet amortised development costs, but prices will fall.

Appendix III (cont'd)

III.7 Telephones

III.7.1 Industry Structure

The US telecommunications market breaks down as shown in Table III.7.1.

TABLE III.7.1 - BREAKDOWN OF US TELECOMMUNICATIONS MARKET BY TYPE OF EQUIPMENT

	Consumption (US $ billion) 1984	%
Public switching	2.75	11
Other switching	1.28	5
Customer premises equipment	12.80	51
Transmission	7.02	28
Other	1.15	5
	25.00	100

Source: US Department of Commerce

In 1986, the US market for customer premises equipment was worth $16 billion, of which telephone handsets accounted for $2.2 billion (about 7% of the total equipment market).

Since deregulation in 1968, more than 2,000 companies have entered the customer premises market to supply telephone handsets, key systems, PBXs, modems, facsimile, intercom, dictation, answering machines and mobile radiotelephones. The major suppliers of telephones are AT&T, ITT and General Electric; many others have left this sector of the market because of competition from Far East manufacturers. In total, 17 US companies are active in the market.

Appendix III (cont'd)

III.7.2 The US telecommunications network

The US telecommunications network is radically different to those operating in Europe. It is important therefore to sketch briefly the present structure of the system and its history.

Prior to 1984, the public telecommunications network in the US was a near AT&T monopoly. This was broken by the Justice Department in 1982; a Consent Decree obliged AT&T to divest itself of 22 wholly owned Bell operating companies. These companies were grouped into 7 Regional Bell Operating Companies (RBOCs), with responsibility for providing services within 164 'Local Access and Transport Areas' (LATAs) covering the country. The RBOCs were prohibited from offering long-distance toll services between LATAs. Local telephone services are also provided by independent telephone companies (TELCOs), and those part owned by AT&T (Cincinatti Bell and Southern New England Telephone Company), and GTE.

AT&T was also obliged to support the RBOCs through provision of equipment and services (through Western Electric, now AT&T Technologies), and technology (through Bell Laboratories). However, the intention was that the RBOCs would be free to make their own procurement decisions, set their own specifications, and compete with AT&T and others in the provision of long distance services, in consultancy and equipment contracts, and ultimately in manufacturing.

Long distance services are currently provided by:

* AT&T (which absorbed all the long distance services run by the operating companies and controls 80% of the market)

* 'the specialised common carriers': these have developed national (tandem-switched) networks to offer both public and private long distance services. MCI and GTE/Sprint are by far

Appendix III (cont'd)

the largest, with 9% of the total long distance market (followed by US Telecom and Western Union), but more than 50 companies are active in the field. Many of these are resellers, leasing large quantities of discounted services from other long distance providers to resell to small end-users

* 'value-added carriers': these companies lease transmission links from common carriers to offer 'packet-switching' facilities which process information to improve transmission efficiency. The largest companies offering this service are Tymnet, GTE Telenet, Uninet and Graphnet.

In addition to the public network (PSTN) there is a significant number of private networks which may be independent or connected to the PSTN. They are common in federal government, the military and large corporations.

A breakdown of revenues by carrier is provided in Table III.7.2.

TABLE III.7.2 - TELEPHONE OPERATING REVENUES BY TYPE OF CARRIER (USA)
(1986 : US $ billion)

RBOC's	50.0
TELCO's	21.4
AT&T	35.0
Specialised Common Carriers	5.9
Value-added Carriers	0.7
Total	113

Source: US Department of Commerce, various publications

Appendix III (cont'd)

The major differences between this network and those operating in Europe are:

* private ownership: public sector participation in the US is confined to some of the small TELCOs

* competition in the provision of services: in 1986, the RBOCs completed developments on their systems to allow equal access to all long-distance carriers. AT&T's privileged access to RBOC networks has therefore disappeared. The degree of choice available to the consumer is thus much greater in the US than in Europe

* regulatory framework: the US telecommunications equipment market was largely deregulated in 1968. Customer premises equipment must still be approved by the Federal Communications Commission, but the testing may be carried out by independent laboratories and the standards are performace orientated, and set up to promote competition. Switching equipment is normally submitted to Bellcore (formerly an arm of AT&T, but now financed by the RBOCs) for testing. Thus, unlike Europe there is no central PTT organisation responsible for procuring, testing and approving equipment. This has generated a much more competitive equipment market

* competition in procurement: following the break-up of AT&T's monopoly, RBOCs, as well as TELCOs and other carriers, are free to procure equipment from any supplier. Prior to 1984, Western Electric supplied 90% of the equipment used or re-sold by (what became) the RBOCs. The proportion is now under 30%

* the size of the market: although the RBOC's may soon develop different equipment requirements, as their systems develop independently of each other, thus fragmenting the market to some degree, deregulation and de-monopolisation have together

Appendix III (cont'd)

established a single and open US market. The installed base consists of 23,000 switching offices and 118 million access lines, which is 38% of the world market.

III.7.3 Competitiveness

Some 90% of telephones sold in the USA are manufactured in Japan and other Far East countries. This compares with an average import penetration of the US telecommunications equipment market of 10%. Almost none of the RBOCs retail AT&T telephones.

The main reason for this is that the price of telephone handsets is determined to a large extent by labour costs which are considerably lower in the Far East. AT&T has reacted to this by moving its telephone assembly plant from Louisiana to Singapore. GE, on the other hand, has invested in labour-saving techologies. Many other firms have abandoned production, and concentrated on more sophisticated products where they retain a technological advantage, and where customers are concerned as much about performance as price (for example, PBX's).

The better performance of EC manufacturers is due, in large measure, to the control exercised by the PTTs over specifications, testing, approval and procurement decisions.

III.7.4 Impact of internal market factors

Economies of scale in telephone manufacture have not in the past been sufficiently important to overcome labour cost differences, so the large US market has been no advantage to US manufacturers. Free competition has, however, given US consumers access to cheap imports. The fragmented and regulated EC market has protected high cost local manufacturers. With new technology and deregulation, however, EC manufacturers may be competitive (even with smaller national markets than the USA).

Appendix III (cont'd)

III.8 Lasers

III.8.1 Industry structure

Lasers are manufactured by well over 1,000 companies in the US, ranging from the very big to the very small. Aside from the large corporations such as Rockwell, manufacturers tend to specialise in particular applications. It is thus convenient to discuss the industry with reference to three end-use categories:

* **Military applications**

DOD funding of laser related R&D is thought to have been increasing at nearly 100% per annum in recent years. The major beneficiaries of this are well established prime contractors to the military such as Rockwell and Hewlett-Packard, but sub-contracting to universities and smaller companies is common.

* **Industrial, scientific, medical and commercial applications**

This segment of the market has experienced growth in excess of 15% per annum, and the rapid development of new applications. These conditions have encouraged a high rate of entry to the industry, notably by very small companies set up to exploit a new technology or application. The level of industrial concentration is thus very low, although a number of firms can be identified as market leaders, e.g. Lumonics and Spectre-Physics in industrial, medical and commercial applications, and Hewlett-Packard in scientific applications.

Appendix III (cont'd)

* **Telecommunications applications**

The market for semi-conductor laser diodes (used as transmitters and repeaters in fibre optic cable) is increasing at a rate of 30% per annum in the US. Some 400 firms manufacture these devices or components, but the market is dominated by the major telecommunications equipment suppliers: AT&T Technologies (50% market share), Northern Telecom (25%), GTE, ITT, and Plessey. Hewlett-Packard also has a significant market share.

III.8.2 Competitiveness

US industry competitiveness varies across the industry, as follows:

* **Military applications**

US industry enjoys protected access to DOD R&D funding and high technology procurements (foreign participation is less than 1%). This near monopoly of the western world's largest military market has sustained a clear US lead. This lead arises in technology rather than production economies - some of the most important breakthroughs have been made by small firms. In this respect, the US has an advantage both in the amount of capital directed towards R&D, and in the fact that centralised procurement avoids wasteful duplication in basic research and in the development of competing systems.

* **Industrial, scientific, medical and commercial applications**

The large size and sophistication of the US market has enabled US manufacturers to develop a lead in applications where the market elsewhere is as yet limited. However, there is no evidence that US manufacturers of the more common systems are either more efficient or technologically advanced than their

Appendix III (cont'd)

major competitors. In such a diverse and fragmented industry, it is difficult to be precise in making comparisons. However, the balance of opinion suggests that of EC manufacturers, the British and Germans are the most competitive with the USA.

* **Telecommunications applications**

Unlike other types of laser, volume is a critical factor in determining the unit cost of manufacturing semi-conductor laser diodes. Economies of scale arise in spreading R&D and marketing costs across greater output. Labour, plant and machinery costs are relatively unimportant. Since the US accounts for 60% of the world market (albeit declining), US manufacturers have historically been able to develop a price and technological advantage over the competition. However, the gap is narrowing for the following reasons:

- 80% of sales are to telephone companies (or telecommunications equipment suppliers), hence exports to Japan and Europe have been limited. Preferential procurement policies by EC PTTs have provided an umbrella under which indigenous firms which manufacture lasers as well as cabling systems have sheltered and gradually improved efficiency

- the market is now growing faster in the EC than in the US (at about 40% per annum) and will soon provide EC manufacturers with a domestic market equal in size to the US

- EC governments, especially the UK, France and Germany, have targeted the industry for R&D support

- EC manufacturers, notably Plessey, are gaining experience in the US market.

Appendix III (cont'd)

US industry specialists identify Plessey and Siemens (and to a lesser extent Cable and Wireless, Alcatel, STC, and AEG-Telefunken) as major potential threats, particularly if they come to dominate an open European market.

III.8.3 Impact of internal market factors

The US industry has benefited from the fact that applications markets grew earlier than in Europe and hence markets were bigger. There is no evidence that public purchasing restrictions within the EC put EC producers at a disadvantage - producers claim that the market is open, except in France. In this field there is no strong evidence that, up to now, EC firms are uncompetitive or technically less advanced than US firms, but this may change as a result of the massive SDI research programme.

III.9 Tariff Rates

A comparison of EC and US tariff rates for selected products in 1987 is shown in Table III.9.1.

Appendix III (cont'd)

TABLE III.9.1 - EC AND US TARIFF RATES ON SELECTED PRODUCTS 1987

Product	European Tariff (1)(3)	US Tariff (2)(3)	Difference (US-EC)
Steam coal	Free	Free	0.0%
Boiler (power station)	5.5%	6.5%	1.0%
Steam turbine	5.0%	7.5%	2.5%
Mainframe computer	4.9%	3.7%	-0.8%
Telephone	7.5%	8.5%	1.0%
Telephone exchange	7.5%	8.5%	1.0%
Electric locomotive	4.9%	3.9%	-1.0%
Laser (non-diode)	6.5%	9.0%	2.5%

Sources: Tariff Schedules of the United States Annotated (1987)
Tariff Schedules of the United Kingdom (1987)

Notes:
1 Tariff item definitions currently vary slightly within the EC, causing slight rate variations between countries. Typical rates have been chosen.

2 US charges much higher rates than shown, for imports from some communist countries.

3 Imports from GSP countries and certain other LDCs, are generally exempt duty for the products shown.

APPENDIX IV - ACKNOWLEDGEMENTS

Case Study Interviews

Belgium

Kempense Steenkolenmijnen
Cockerill Mechanical Industries SA
ACEC (Ateliers de Construction Electriques de Charleroi)
SA Philips/Philips and MBLE Associated
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ATEA NV
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CBL Optronics
BN SA

France

Framatome
Jeumont-Schneider
Groupe Bull
Matra Ericsson Telecommunication
Matra Communication
Alcatel - CIT

Germany

Ruhrkohle AG
Deutsche Babcock
Steinmuller
BBC AG
AEG Kanis Gmbh
KWU

Appendix IV (cont'd)

MAN
Siemens AG (Data Systems)
Nixdorf Computer
Comparex
IBM Deutschland
Siemens AG (Telephone exchange equipment)
Telenorma
Zeiss
Leitz
Ordenstock
Krauss Maffei

Italy

Ansaldo Termosud
Ansaldo Componenti
Sulzer Italia
Fiat Aviazione/Fiat Termomeccanica Nucleare
Franco Tosi spA
Italtel
FACE
FATME
Associazione Nazionale Industrie Elettrotechniche ed Elettroniche
IBM - Italia
Honeywell - Bull
Fiat Ferroviaria
Ansaldo Trasporti
Breda
Valfivre

Appendix IV (cont'd)

UK

Babcock Power
NEI Plc
NEI International combustion
Foster Wheeler Power Products Ltd
GEC plc
GEC Energy Systems
GEC Turbine Generators
NEI Parsons
ICL PLC
IBM UK
Plessey
GEC Telecommunications
JK Lasers
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