Research and Experimental Development (R&D) Statistics 2000

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Summary of trends

- Measuring expenditure and employment of R&D is difficult because of the subjective judgements that have to be made about the dividing line between R&D and other activities. There are discontinuities in the series arising from the interpretation of definitions, and because of changes in the actual or perceived status of organisations[1], (Chapter 1 details this). Some general conclusions can be drawn, but significance should not be given to small percentage changes between years.

- In 2000 Gross Domestic Expenditure on R&D (GERD) was 1.83 per cent of GDP, very similar to 1999 (Table 2). In terms of international comparisons in 2000 the UK was just below the EU average of 1.88 per cent.[5]

- Within the UK, net expenditure in real terms on R&D by government peaked in 1980–81. Since then there was a gradual downward trend until 1999–2000, after which point the expenditure increases slightly (Table 4). The overall level of net government expenditure on defence R&D has fallen from 41 per cent in 1992 to 36 per cent in 2000 (Table 6).

- Expenditure in real terms performed by the business sector has remained constant when compared to the total in 1999 (Table 7).

- Within the manufacturing sector, the chemicals broad product group has the largest share of total R&D expenditure at 31 per cent. The services sector accounts for 17 per cent of total R&D expenditure (Table 8).

- Within the regions, spending is highest in the South East for both the business & government sectors (Table 14).

Background

This article is the latest in an annual series, the previous issue was published in the August 2001 edition of *Economic Trends*. Most of the figures have already been published by the Office for National Statistics, the Department of Trade and Industry, Office of Science and Technology (OST) or the OECD.[1,2,4,5] The purpose of this report is to bring together a range of data produced and published by ONS in a single annual article and our aim is to continue to inform and stimulate debate within the R&D community.

The R&D statistics published here are consistent with OECD's Frascati Manual[3] which defines Research and Experimental Development (R&D) and gives guidelines on how to measure expenditure and employment on R&D. The manual is applied throughout the OECD so it is possible to make comparisons between countries.[5,6]

R&D is defined as creative work undertaken systematically to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications.

Care should be exercised when using R&D statistics for economic analysis. R&D can lead to the technological inventions that are necessary for a successful innovative economy. However, such inventions are not a sufficient condition for success – many other economic and social factors are important. Undue weight should not be given to the economic significance of R&D's role as a generator of inventions. On the other hand, the economic benefit of R&D is not limited to that role: R&D develops skills and techniques that are important for any economy.

Sources of information

Performers and funders of R&D are divided into four economic sectors: Government, Business, Higher Education Institutions (HEIs), and the Private Non-Profit (PNP) sector. Definitions are provided at the end of this article.

The ONS conducts an annual survey of Central Government R&D, which is addressed to all Government departments. The survey collects data on expenditure and employment for outturn and planning years. The latest detailed results will be published in OST's *Science, Engineering and Technology Statistics* 2002 (SET 2002).[1] This document will be available on OST's web site at **www.dti.gov.uk/ost/**.

The ONS also conducts an annual survey of R&D in businesses. As in previous years the 2000 survey used a sample survey to minimise burdens on contributors. The register of R&D performers is continually updated and results and detailed methodology notes can be found in the 2000 Business Monitor.[2]

Statistics on expenditure and employment on R&D in Higher Education Institutions (HEIs) are based on information collected by Higher Education Funding Councils and HESA (Higher Education Statistics Agency). In 1994 a new methodology was introduced to estimate expenditure on R&D in HEIs. This was based on the allocation of various Funding Council Grants. Full details of the new methodology will be contained in SET 2002.[1]

The Tables

Gross Domestic Expenditure on R&D (GERD) (Tables 1–3)

These tables show the performers and funders of R&D in the UK. Measuring expenditure on R&D performed within each sector avoids problems of omission and double counting that can arise when measuring funds provided for R&D. GERD is the sum of R&D performed in the four sectors. Tables 1 and 2 show that UK GERD in 2000 was £17.5 billion in cash terms. GERD is often quoted as a percentage of GDP when making international comparisons. In 2000 UK GERD was 1.83 per cent of GDP, similar to the previous year's figure, just below the provisional OECD estimate for the EU average of 1.88 per cent.

Table 1 shows the interaction between R&D funders and performers. For example £11.5 billion was spent on R&D in the business sector. Of this, £1.0 billion was provided by the government, £2.5 billion came from abroad and £8.0 billion was funded by businesses from their own sources. Funds from abroad include those from overseas parent companies, contracts for R&D projects, support for R&D provided through European Union schemes and international collaborative projects typically for aerospace or defence projects.

Figure **1**

Gross expenditure on R&D in the UK, by sectors, 2000

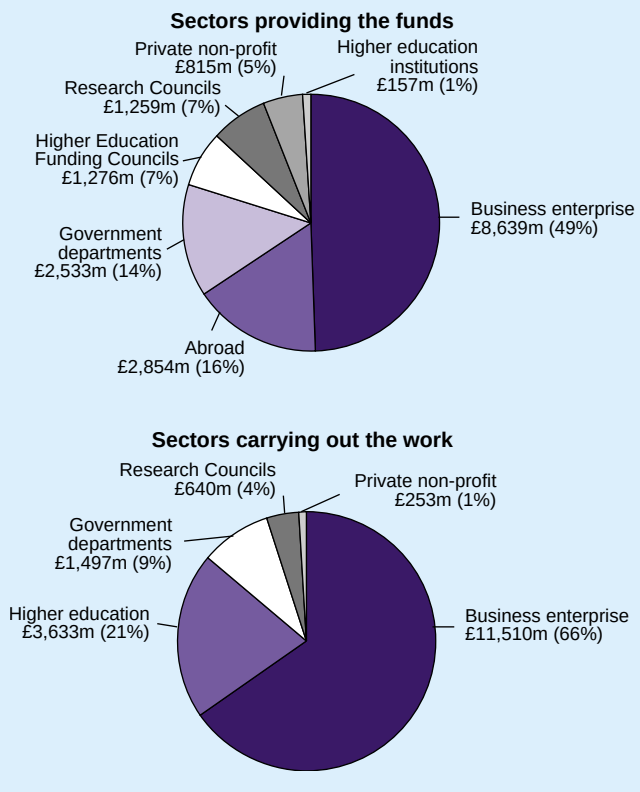


Figure 1 shows that the business sector is the most important sector of the economy in terms of providing funds for and carrying out R&D.

Government R&D expenditure (Tables 4–6)

A department's net expenditure on R&D is its expenditure on R&D performed within the department (intramural), plus its expenditure on R&D outside the department (extramural), minus receipts for R&D.

The sum of a department's net expenditure is the R&D element of the government's budget expenditure. This is used for international comparisons of Government appropriations for R&D (e.g. Table 17). The UK has a high proportion of Central Government expenditure devoted to R&D for defence purposes.

Figures in Tables 4 and 6 for Government's net expenditure on R&D differ from Government funding figures in Tables 1 and 3. This is because Tables 1 to 3 are based on information supplied by R&D (performers) whilst Tables 4 to 6 contain expenditure figures reported by Government departments (funders). The gap is mainly accounted for by differences in the reporting of Government contracts with businesses for certain types of defence R&D and R&D performed abroad but funded by the UK Government. In addition the difference is also attributed to other factors such as time lag problems due to differences in accounting periods and not all monies given being used in that financial period, treatment of VAT and sub-contracting of R&D work.

R&D in NHS hospitals previously included in Table 5 on the basis of the Culyer report[7], are now reported as extramural expenditure. The figures for Central Government intramural R&D in Table 5 are lower than those performed by the government sector in Tables 1 and 2. This is because the latter includes estimates for a small amount of R&D not available from the Government survey and R&D performed by local authorities.

Table 4 shows a time series dating back to 1966–67. This shows that in 2000/01 the net Government expenditure on R&D (by civil and defence departments) was £6.1 billion, a 6 per cent increase on 1999–2000. In real terms, spending on R&D was flat in the late sixties but rose in the seventies to a peak in 1980–81. Since then it has declined although spending in 2000–01 was still greater than in 1966–67.

Table 5 shows the breakdown of departmental intramural expenditure (see Figure 2); the current (which is also shown by Frascati type of research) and capital expenditure. Figure 2 shows that 93 per cent (£1.6 billion) of intramural expenditure is current expenditure. Applied

research accounts for 50 per cent of the total intramural expenditure. Total intramural expenditure is further broken down in Table 5 into Social Science & Humanities (SSH) and Natural Science & Engineering (NSE) research.

Table 6 provides an analysis of net government R&D expenditure by Frascati type of research activity for the period 1992–93 to 2000–01. The share of expenditure attributed to applied research has remained fairly constant over the nine-year period, whereas the share attributed to basic research has increased. In 2000–01 defence expenditure accounted for 36 per cent of total expenditure.

R&D performed by the Business Sector (Tables 7–12)

Table 7 and Figure 3 show a time series dating back to 1966 for expenditure performed by the Business sector. They show that in 2000 R&D expenditure was £11.5 billion. Expenditure in real terms in the business sector has increased by 77 per cent on 1966 figures.

Table 8 shows that within the business sector, the services broad product group accounted for 17 per cent of the total expenditure in 2000. In the manufacturing sector the pharmaceuticals and chemicals broad product group had the largest share of R&D expenditure at 31 per cent of the total.

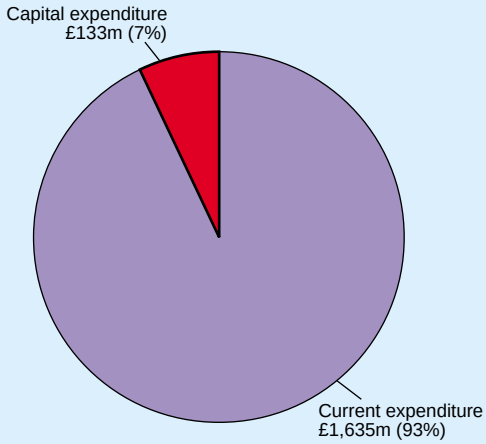
Statistics for civil and defence have been collected separately since 1989. Defence includes all R&D programmes undertaken primarily for defence reasons, regardless of their content or whether they have secondary civil applications.

In 2000, civil R&D represented 85 per cent of all R&D expenditure performed by business (Table 9). Table 10 and Figure 4 show that, in 2000, 77 per cent of civil R&D performed by businesses was funded by businesses themselves. Government funded 2 per cent of civil R&D, whereas it funded 47 per cent of defence R&D.

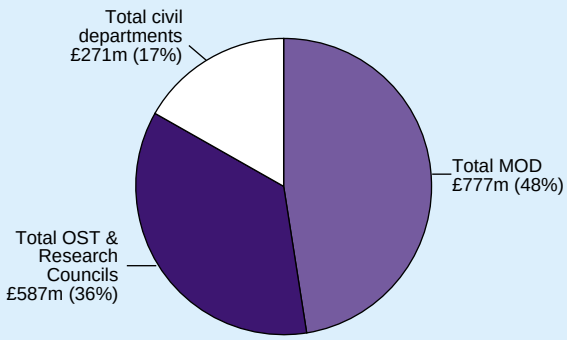
Figure **2**

Analysis of Central Government Intramural Expenditure, 2000–01

Breakdown of intramural current and capital expenditure



Departmental breakdown of current intramural R&D



Breakdown of current expenditure by Frascati type of research

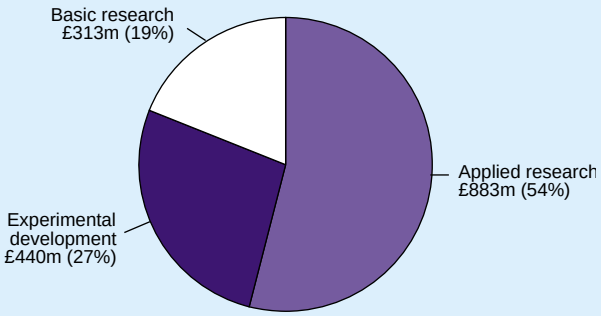


Figure **3**

Net business enterprise expenditure on R&D, in cash and real terms, 1966–2000

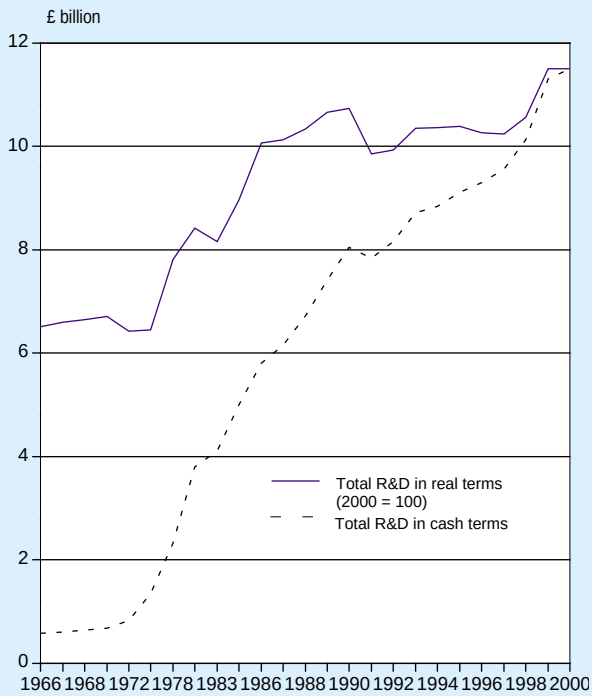
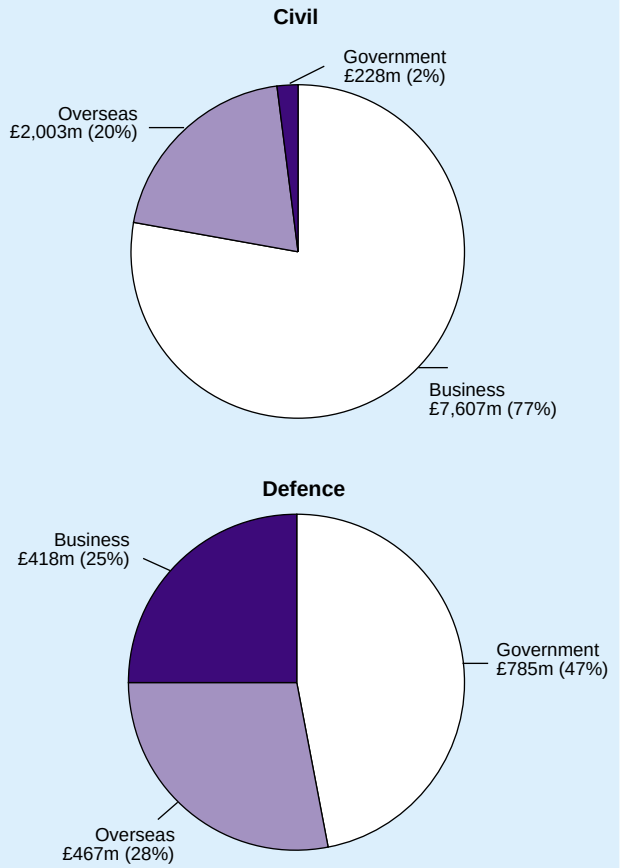


Figure **4**

Sources of funds for Business Enterprise R&D, 2000



The breakdown into detailed product groups is shown in Tables 11 and 12. The product group with the largest expenditure is pharmaceuticals, medical chemicals and botanical products, which accounted for £2.8 billion in 2000, followed by Aerospace at £1.1 billion.

Table 12 shows the split of current and capital expenditure on R&D performed by UK businesses. Current expenditure is the sum of salaries and wages, basic and applied research and experimental development. Capital is the expenditure on land, buildings, plant and machinery.

R&D employment – Government and Business Enterprise (Table 13)

Between 1999 and 2000, employment rates have remained at similar levels.

Regional R&D statistics (Tables 14–15)

Regional estimates for the Government and Business sectors are derived from the ONS surveys of Government and Business Enterprises.

The Higher Education Institutions' (HEI) regional R&D estimates are less reliable and should be treated with special caution. The expenditure estimates are obtained by allocating total R&D performed by HEIs (HERD) to individual HEIs in proportion to their income from research grants and contracts. An estimate of the labour force in Full Time Equivalents (FTE) is not available.

Estimates are given for UK Government Office Regions (GOR). Of the 12 GOR regions the South East of England has the highest number of R&D personnel and the largest expenditure on R&D (this reflects in part the greater size of the South East). To adjust for this the R&D personnel estimates are shown as a percentage of the labour force (see Figure 6). At the time of publication it is not possible to show R&D expenditure as a percentage of GDP because of the unavailability of regional GDP for 2000. Tables 14 and 15 show that, within the UK, the Eastern and South East have the highest concentration of R&D expenditure performed by business. For the Government sector the highest regions are the South East, the South West and the Eastern region, whilst for the Higher Education Sector, London, the South East and Scotland are prominent (see Figure 5). In terms of personnel estimates as a percentage of the labour force (see Figure 6), the Eastern and South East regions are prominent in the Business sector and the South East and South West are prominent in the Government sector.

International comparisons of R&D (Tables 16–19)

Although the guidelines in the Frascati Manual are generally followed, methods of collecting R&D data do vary from country to country (Main Science and Technological Indicators (MSTI)[5] discusses national variations). Therefore small differences should not be treated as significant when making international comparisons.

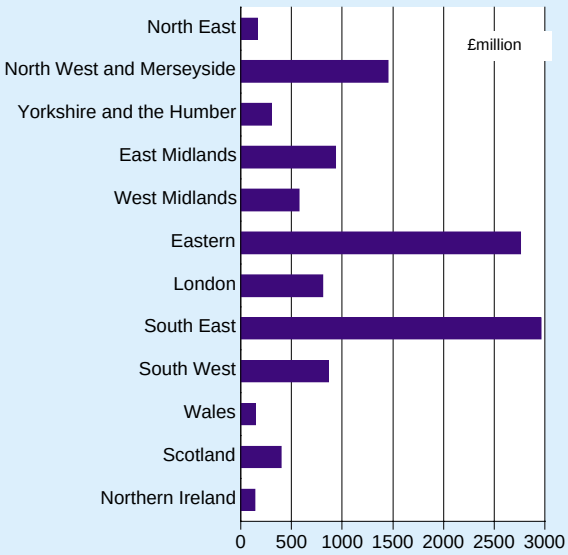
The figures shown for Japan in the tables are estimated by OECD.

Table 16 shows the trend of R&D as a percentage of GDP for the G7 countries over the time period 1992 to 2000. The ratio for GERD has been fairly constant over this time for most of the countries. Figure 7 shows the position in 2000. The UK was ranked fifth. Table 16 also shows BERD and GOVERD as a percentage of GDP.

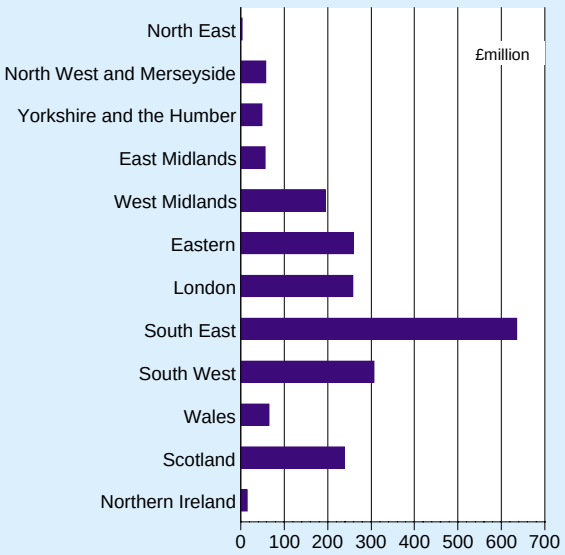
Table 17 shows the international comparisons of GERD by sector of performance and source of funding. Table 18 shows R&D performed in the business sector. Table 16 also shows this as a percentage of GDP; Japan and the USA are the top spenders with the UK holding a middle ranking position. International comparison of Government funding of R&D in 2000 by socio-economic objective is shown in Table 19. Of the G7 countries, the USA and the UK devoted the highest proportion of their total Government funding of R&D to

Figure 5

(i) Estimated regional (GOR) BERD in 2000



(ii) Estimated regional (GOR) GOVERD in 2000



(iii) Estimated regional (GOR) HERD in 2000

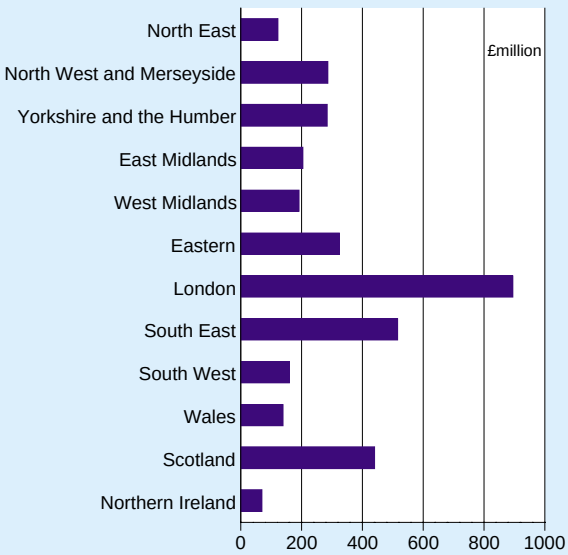
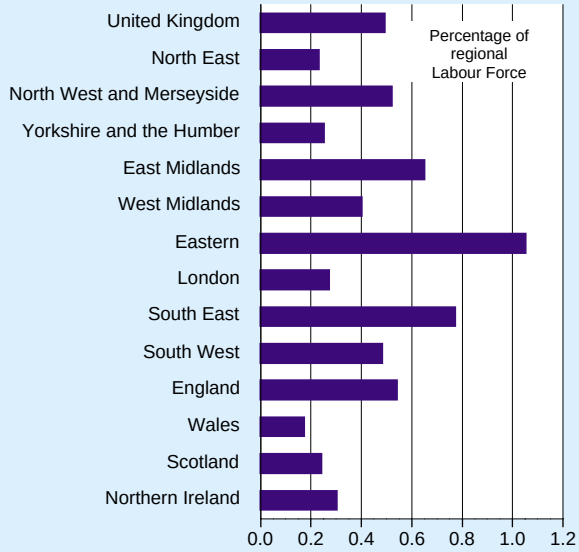
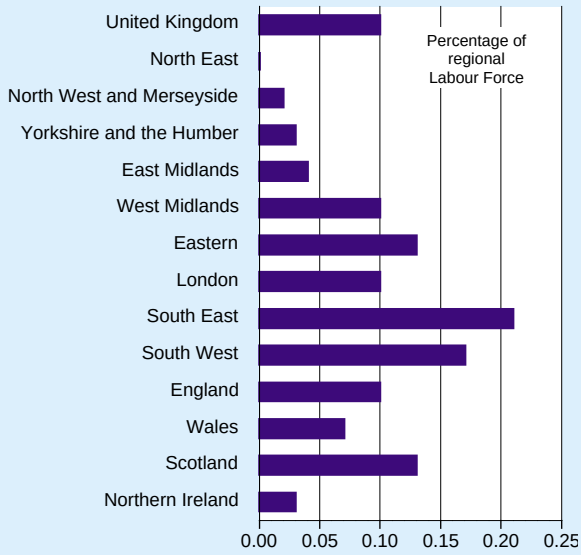


Figure 6

(i) Estimated regional (GOR) BERD in 2000



(ii) Estimated regional (GOR) Government R&D in 2000



defence. For Germany, Italy and Japan about half of their total Government funding of R&D was classified as the advancement of knowledge compared to approximately a third for the UK.

Definitions

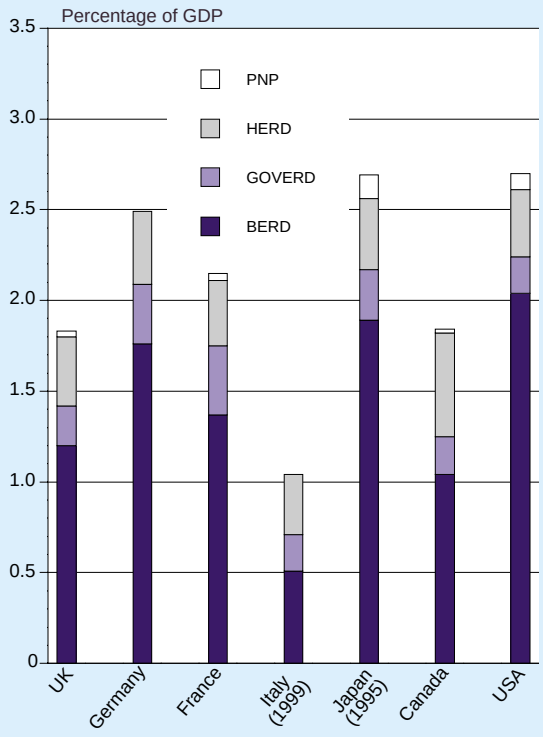
Type of R&D

Basic or fundamental research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

Applied research is research undertaken with either a general or a particular application in view.

Figure **7**

Comparison of BERD, GOVERD, HERD and PNP as a percentage of GDP, 2000



Experimental Development is the use of the results of basic and applied research directed to the introduction of new materials, processes, products, devices and systems, or the improvement of existing ones. It should include the prototype or pilot plant stage, design and drawing required during R&D and innovative work done on contracts with outside organisations, government departments, and public bodies. Firms in the aerospace industry are asked to include expenditure on development batches.

Sectors of the Economy

The four sectors of the economy are defined in an ONS publication.[4] However higher education is identified separately as recommended in the Frascati Manual.

Central Government includes the central government departments, research councils, higher education funding councils, Non-departmental public bodies (NDPBs), and Executive Agencies.

Business Enterprises include private businesses, public corporations, and research associations serving businesses.

Higher Education includes the former polytechnics and central institutions in Scotland as well as the old universities.

Private Non-Profit sector makes up the remainder and includes medical research charities.

Regional data

Data is classified according to the Government Office Regions (GOR).

Rounding

Throughout the tables components of totals have been rounded independently of the totals. Therefore the rounded totals will not always be equal to the sums of the rounded components. Symbols follow the conventions used elsewhere in *Economic Trends*.

Revisions and Discontinuities

In the Government Tables, a new method for estimating Government-funded R&D in HE was introduced in 1994/95, therefore 1993/94 figures have been revised. It is not possible to revise the data for prior years because of the structural changes in the HE sector.

Government figures in some tables (see table footnotes) for 1995/96 onwards, now include NHS Hospital R&D estimates for the first time.

Company mis-reporting has led to a number of revisions in the Business R&D survey. Data for the product group "Refined petroleum products and coke oven products; Processing of nuclear fuel" for the years 1993 to 1998 inclusive have been revised. Similarly the product groups "Wholesale and retail trade" and "Transport and storage" have been revised back to 1992.

Figures relating to gross expenditure on R&D published in the ONS First Release on 22 March 2002[4] have been revised slightly due to government department amendments.

Regional data is published using GOR regions and these should not be compared to NUTS regional data previously published in this annual article.

Data Analysis Service

The ONS is now able to offer additional analysis concerning R&D statistics, e.g. sizeband and regional breakdowns. The contact for this service is:

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e-mail: jane.morgan@ons.gov.uk

For further information on:	ONS Contacts:
Business R&D[2]	Jane Morgan Tel. 01633 813109
Information on aggregated R&D data	Jane Morgan Tel. 01633 813109
Definitions of R&D[3]	Jane Morgan Tel. 01633 813109
GERD[4]	Jane Morgan Tel. 01633 813109
General information on Science & Technology[1]	Steve Churchill Tel. 01633 812003
International comparisons[5,6,8]	Steve Churchill Tel. 01633 812003

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2 Office for National Statistics (2002). *UK Business Enterprise, Research and Development in UK Business*, MA14. **www.statistics.gov.uk/products/p165.asp**

3 Organisation for Economic Co-operation and Development (1993). *Proposed Standard Practice for Surveys of Research and Experimental Development (The Frascati Manual).*

4 Office for National Statistics (2002). First Release, 22 March 2002, *Gross Domestic Expenditure on Research and Development* 2000. **www.statistics.gov.uk/press_release/Archive.asp**

5 Organisation for Economic Co-operation and Development (2002). *Main Science and Technological Indicators* 2002/1.

6 Eurostat (2001). *Research and Development: Annual Statistics* 1990–2000, ISSN 1682-0959.

7 *Supporting Research and Development In The NHS*. (A report to the Minister of Health by a research and development task force chaired by Professor Anthony Culyer), September 1994. ISBN 0 11 321831 1

8 Morgan J. Research and experimental development (R&D statistics) 1999. *Economic Trends*, No. 573, pp. 39–62.

9 Office for National Statistics (2001). First Release 23 November 2001, *Business Enterprise Research and Development* 2000. **www.statistics.gov.uk/press_release/Archive.asp**

Abbreviations

BERD	Business Enterprise R&D
EU	European Union
EUROSTAT	The Statistical Office of the European Communities
FTE	Full Time Equivalent
G7	Group of Seven countries, comprising: UK, Germany, France, Italy, Japan, Canada, USA
GDP	Gross Domestic Product
GERD	Gross (Domestic) Expenditure on R&D
GOVERD	Government Intramural Expenditure on R&D
GOR	Government Office Regions
HEFC	Higher Education Funding Council
HEIs	Higher Education Institutions
HERD	Higher Education Expenditure on R&D
HESA	Higher Education Statistics Agency
NDPB	Non-Departmental Public Body
NHS	National Health Service
NUTS	Nomenclature of Territorial Units for Statistics
OECD	Organisation for Economic Co-operation and Development
ONS	Office for National Statistics
OST	Office of Science and Technology (part of DTI since April 1996)
PPP	Purchasing Power Parities
PNP	Private Non-Profit
R&D	Research and (Experimental) Development

Government Departments

MOD	Ministry of Defence
DFES	Department for Education and Skills
DWP	Department of Work and Pensions

DOH	Department of Health
HSE	Health and Safety Executive
HO	Home Office
DFID	Department for International Development
DTI	Department of Trade and Industry
NI	Northern Ireland Department of Enterprise, Trade & Investment
SE	Scottish Executive
NAW	National Assembly for Wales
DCMS	Department for Culture, Media and Sport
OCD	Other Civil Departments
BBSRC	Biotechnology and Biological Sciences Research Council
ESRC	Economic and Social Research Council
EPSRC	Engineering and Physical Sciences Research Council
MRC	Medical Research Council
NERC	Natural Environment Research Council
PPARC	Particle Physics and Astronomy Research Council
CCLRC	Council for the Central Laboratories of the Research Councils
OST-DTI	Office of Science and Technology
HEFC	Higher Education Funding Council
NHS	National Health Service
FSA	Food Standards Agency
DTLR	Department for Transport, Local Government and the Regions
DEFRA	Department for Environment, Food and Rural Affairs

Table 1 Gross expenditure on civil and defence R&D performed in the UK in 2000[1]

£ million

Sectors providing the funds[2,3]	Sectors carrying out the work[2, 3] Government departments[4]	Research Councils	Higher education	Business enterprise	Private non-profit	Totals	Abroad
Government departments[4]	1,155	94	246	1,011	28	2,533	186
Research Councils	6	413	826	3	12	1,259	122
Higher Education Funding Councils	-	-	1,276	-	-	1,276	
Higher education institutions	0	8	147	-	2	157	
Business enterprise	277	35	259	8,023	44	8,639	
Private non-profit	19	49	598	3	146	815	
Abroad	39	40	282	2,470	21	2,854	
TOTAL	1,497	640	3,633	11,510	253	17,532	n/a
Civil							
Government departments[4]	512	90	214	226	28	1,070	184
Research Councils	6	413	826	3	12	1,259	122
Higher Education Funding Councils	-	-	1,276	-	-	1,276	
Higher education institutions	0	8	147	-	2	157	
Business enterprise	162	35	229	7,604	44	8,075	
Private non-profit	19	49	598	3	146	815	
Abroad	8	40	282	2,003	21	2,355	
TOTAL	707	636	3,572	9,838	253	15,006	n/a
Defence							
Government departments[4]	643	4	31	785	0	1,464	2
Research Councils	-	-	-	-	-	-	-
Higher Education Funding Councils	-	-	-	-	-	-	
Higher education institutions	-	-	-	-	-	-	
Business enterprise	116	-	29	419	-	563	
Private non-profit	0	-	-	-	-	0	
Abroad	31	-	-	467	-	499	
TOTAL	790	4	61	1,671	0	2,526	n/a

Source: ONS

Notes:

General Note:

These estimates are derived from the ONS surveys of government and business enterprise R&D and from information from the HEFC. More details are in the ONS First Release *Gross Domestic Expenditure on Research and Development*, published on 22 March 2002. The First Release has been revised slightly due to departmental amendments.

Notes:

1 Research in the social sciences and humanities is included.

2 The OECD terminology is used for describing the breakdown of GERD by sector.

3 Some of the numbers have been estimated.

4 The total for R&D performed by government includes estimates for a small amount of R&D not available from the Government Survey; R&D performed by local authorities. Since 1996 UK NHS figures have been obtained from the Department of Health and the Scottish Office on the basis of the Culyer report.

Table 2 Gross expenditure on R&D in the UK by performing sector, 1992 to 2000[1]

£ million

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Expenditure in cash terms (£m):									
Performed by:									
Government	1,846	1,928	2,051	1,462	1,495	1,427	1,487	1,450	1,497
Research Councils	-	-	-	581	575	590	591	622	640
Business enterprise	8,167	8,717	8,842	9,116	9,297	9,556	10,133	11,302	11,510
Higher education	2,129	2,312	2,623	2,696	2,792	2,893	3,040	3,324	3,633
Private non-profit	224	232	168	177	177	190	203	231	253
TOTAL	12,367	13,189	13,684	14,034	14,336	14,657	15,454	16,929	17,532
Expenditure in real terms (2000=100)[2] (£m):									
Performed by:									
Government	2,247	2,290	2,404	1,667	1,651	1,530	1,551	1,476	1,497
Research Councils	-	-	-	663	635	633	616	634	640
Business enterprise	9,939	10,353	10,364	10,390	10,271	10,241	10,565	11,510	11,510
Higher education	2,592	2,746	3,074	3,073	3,085	3,101	3,170	3,385	3,633
Private non-profit	273	275	197	202	196	204	212	235	253
TOTAL	15,051	15,665	16,040	15,994	15,838	15,708	16,113	17,240	17,532
Total as percentage of GDP[3]	***2.01***	***2.02***	***1.98***	***1.93***	***1.85***	***1.78***	***1.78***	***1.85***	***1.83***

Notes:

1 See notes at Table 1.

2 GDP deflators are:

1992	1993	1994	1995	1996	1997	1998	1999	2000
82.2	84.2	85.3	87.7	90.5	93.3	95.9	98.2	100.0

3 Gross domestic product values are: £ million

1992	1993	1994	1995	1996	1997	1998	1999	2000
615,404	653,582	690,575	729,001	772,918	824,396	868,809	914,699	956,297

Table 3 Gross expenditure on R&D in the UK by source of funds, 1992 to 2000[1, 2]

£ million

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Sector providing funds									
Expenditure in cash terms (£m):									
Funded by:									
Government	4,089	4,237	4,479	2,514	2,402	2,332	2,535	2,601	2,533
Research Councils	-	-	-	1,078	1,092	1,135	1,117	1,185	1,259
Higher Education Funding Councils	-	-	-	1,018	1,027	1,033	1,085	1,157	1,276
Higher education	99	103	116	119	120	123	130	142	157
Business enterprise	6,339	6,815	6,886	6,765	6,817	7,321	7,356	8,213	8,639
Private non-profit	435	477	514	511	545	578	621	701	815
Abroad	1,404	1,558	1,689	2,029	2,331	2,136	2,610	2,929	2,854
TOTAL	12,367	13,189	13,684	14,034	14,336	14,657	15,454	16,929	17,532
Expenditure in real terms (2000=100) (£m):									
Funded by:									
Government	4,977	5,032	5,250	2,865	2,654	2,499	2,643	2,649	2,533
Research Councils	-	-	-	1,228	1,207	1,216	1,164	1,207	1,259
Higher Education Funding Councils	-	-	-	1,160	1,135	1,107	1,131	1,178	1,276
Higher education	121	122	136	135	133	131	136	145	157
Business enterprise	7,715	8,094	8,072	7,710	7,531	7,846	7,670	8,364	8,639
Private non-profit	530	567	602	583	603	620	648	714	815
Abroad	1,709	1,851	1,980	2,313	2,576	2,289	2,721	2,982	2,854
TOTAL	15,051	15,665	16,040	15,994	15,838	15,708	16,113	17,240	17,532
Total as percentage of GDP	***2.01***	***2.02***	***1.98***	***1.93***	***1.85***	***1.78***	***1.78***	***1.85***	***1.83***

Notes: ***Source: ONS***

1 See notes at Table 1.
2 See notes at Table 2.

Table 4 Total Net Government expenditure on R&D in cash terms and real terms, 1966–67 to 2000–01

£ million

Year	Total Net Government R&D	
	In cash terms excluding NHS figures	In real terms (2000=100)[1]
1966–67	486	5,459
1967–68	503	5,488
1968–69	531	5,522
1969–70	562	5,550
1970–71	606	5,523
1971–72	755	6,306
1972–73	847	6,546
1973–74	964	6,955
1974–75	1,169	7,045
1975–76	1,495	7,196
1976–77	1,647	6,981
1977–78	1,814	6,764
1978–79	2,097	7,044
1979–80	2,601	7,480
1980–81	3,184	7,744
1981–82	3,395	7,540
1982–83	3,519	7,307
1983–84	3,730	7,414
1984–85	3,964	7,485
1985–86	4,175	7,476
1986–87	4,255	7,377
1987–88	4,408	7,250
1988–89	4,497	6,924
1989–90	4,772	6,857
1990–91	4,955	6,605
1991–92	5,027	6,317
1992–93	5,078	6,180
1993–94	5,402	6,416
1994–95	5,200	6,096
1995–96[2]	5,295	6,035
1996–97[2]	5,351	5,912
1997–98[2]	5,504	5,899
1998–99[2]	5,304	5,531
1999–00[2]	5,782	5,888
2000–01[2]	6,141	6,141

Notes:

1 See note at Table 2.

2 Figures for NHS are available in SET 2002.[1]

Source: ONS

Table 5 Analysis of Government Intramural expenditure, 2000–01[1,2,4]

£ million

	Current expenditure	Breakdown of current Frascati R&D expenditure: Basic	Applied	Experimental development	Capital expenditure	TOTAL INTRAMURAL	SSH	NSE
OST - DTI	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Research Councils								
BBSRC	147.1	50.3	96.9	-	14.3	161.4	-	161.4
ESRC	4.2	4.2	-	-	0.8	4.9	4.9	-
MRC	177.1	107.7	69.4	-	28.7	205.8	-	205.8
NERC	116.1	37.3	66.6	12.2	8.4	124.5	-	124.5
EPSRC	17.0	17.0	-	-	-	17.0	-	17.0
PPARC	27.3	24.5	2.7	-	3.1	30.4	-	30.4
CCLRC	98.1	24.3	73.7	-	14.7	112.8	-	112.8
Total OST & Research Councils	**586.9**	**265.3**	**309.4**	**12.2**	**70.0**	**656.8**	**4.9**	**651.9**
Higher Education Funding Councils	-	-	-	-	-	-	-	-
Total Higher Education Funding Councils	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Civil departments								
DEFRA	86.3	17.8	64.9	3.6	4.5	90.7	0.8	89.9
DFEE	11.2	-	6.4	4.8	0.0	11.2	11.2	-
DTLR	5.6	0.2	5.0	0.4	-	5.6	1.9	3.7
DH (includes NHS)	31.5	1.3	23.8	6.3	2.0	33.5	0.2	33.3
NHS[3]	-	-	-	-	-	-	-	-
DSS	1.0	1.0	-	-	-	1.0	1.0	-
HSC	6.6	-	5.9	0.7	0.4	7.0	1.0	6.0
HO	21.9	-	20.4	1.6	0.9	22.9	14.2	8.7
DCMS (formerly DNH)	9.9	8.4	1.5	-	0.5	10.4	0.9	9.5
DFID (formerly ODA)	2.6	-	2.6	-	-	2.6	1.0	1.6
DTI (ex OST)	6.9	3.5	3.5	-	-	6.9	-	6.9
FSA	-	-	-	-	-	-	-	-
NI	7.6	0.3	6.7	0.6	0.5	8.1	1.5	6.6
SE (formerly SO)	53.4	14.0	38.6	0.8	0.2	53.6	3.0	50.6
NAW (formerly WO)	2.1	0.4	1.3	0.4	-	2.1	0.8	1.3
Other departments	24.8	0.8	20.5	3.4	2.6	27.3	10.0	17.4
Total civil departments	**271.4**	**47.7**	**201.1**	**22.6**	**11.6**	**283.0**	**47.5**	**235.5**
Total civil R&D	**858.3**	**313.1**	**510.4**	**34.8**	**81.6**	**939.9**	**52.4**	**887.5**
MOD	777.1	-	372.2	404.9	50.9	828.0	13.1	814.9
TOTAL	**1,635.4**	**313.1**	**882.6**	**439.7**	**132.5**	**1,767.9**	**65.5**	**1,702.4**

Notes:

1 Excludes Research Councils' pensions/other costs.
2 Includes intramural R&D funded by other departments.
3 NHS expenditure figures are now reported as extramural.
4 Full departmental titles can be found under "Abbreviations" in the "Definitions" section.

Source: ONS

Table 6 Analysis of net Government R&D expenditure by Frascati type of research activity, 1992–93 to 2000–2001[1]

£ million

	1992–93	1993–94	1994–95	1995–96[2]	1996–97[2]	1997–98[2]	1998–99[2]	1999–00[2]	2000–01[2]
Total Government R&D									
Basic	1,511	1,571	-	-	-	-	-	-	-
- pure	-	-	1,253	1,273	1,322	1,334	1,369	1,492	1,691
- orientated	-	-	472	504	524	523	535	566	620
Applied - strategic	953	1,019	879	1,004	1,109	1,079	1,020	1,153	1,256
- specific	870	1,050	1,075	1,322	1,224	1,198	1,178	1,059	1,005
Experimental development	1,744	1,762	1,492	1,530	1,570	1,757	1,592	1,902	1,966
Total £m	**5,078**	**5,402**	**5,171**	**5,634**	**5,750**	**5,891**	**5,695**	**6,172**	**6,539**
Civil R&D									
Basic	1,511	1,571	-	-	-	-	-	-	-
- pure	-	-	1,253	1,273	1,322	1,334	1,369	1,467	1,666
- orientated	-	-	472	504	524	523	535	566	620
Applied - strategic	907	962	810	839	948	923	875	985	1,096
- specific	403	454	479	813	681	698	704	667	633
Experimental development	177	137	126	136	131	102	116	141	145
Total £m	**2,997**	**3,124**	**3,140**	**3,565**	**3,606**	**3,580**	**3,599**	**3,827**	**4,160**
Defence R&D									
Basic	-	-	-	-	-	-	-	-	-
- pure	-	-	-	-	-	-	-	25	25
- orientated	-	-	-	-	-	-	-	-	-
Applied - strategic	46	58	69	166	160	156	145	167	161
- specific	467	596	596	510	544	500	475	392	372
Experimental development	1,568	1,624	1,366	1,394	1,439	1,655	1,476	1,761	1,821
Total £m	**2,080**	**2,278**	**2,032**	**2,070**	**2,144**	**2,311**	**2,096**	**2,345**	**2,379**

Notes:

1 For the purpose of this analysis Research Councils expenditure for Pensions/Other costs have been excluded from 1994–95 onwards.

2 Includes NHS estimates.[1]

Source: ONS

Table 7 Business Enterprise R&D, in cash terms and real terms, 1966–2000

£ million

Year	Total Business Enterprise R&D	
	In cash terms	In real terms (2000=100)[1]
1966	580	6,515
1967	605	6,601
1968	639	6,645
1969	680	6,715
1970	N/S	N/S
1971	N/S	N/S
1972	831	6,422
1973	N/S	N/S
1974	N/S	N/S
1975	1,340	6,450
1976	N/S	N/S
1977	N/S	N/S
1978	2,324	7,807
1979	N/S	N/S
1980	N/S	N/S
1981	3,793	8,425
1982	N/S	N/S
1983	4,104	8,157
1984	N/S	N/S
1985	5,005	8,961
1986	5,804	10,064
1987	6,159	10,130
1988	6,717	10,343
1989	7,416	10,657
1990	8,054	10,736
1991	7,842	9,853
1992	8,166	9,938
1993	8,717	10,353
1994	8,842	10,364
1995	9,116	10,389
1996	9,297	10,271
1997	9,556	10,242
1998	10,133	10,565
1999	11,302	11,510
2000	11,510	11,510

Notes:

1 See notes at Table 2.

2 See notes about revisions to past data.

(N/S) = No survey carried out

Source: ONS

Table 8 Expenditure on R&D performed in UK businesses: broad product groups, in cash & real terms, 1992–2000

£ million

In cash terms	1992	1993	1994	1995	1996	1997	1998	1999	2000
Manufacturing: Total	**6,558**	**6,965**	**7,051**	**7,134**	**7,264**	**7,608**	**8,142**	**8,995**	**9,231**
Chemicals	2,166	2,400	2,509	2,515	2,479	2,831	2,926	3,253	3,528
Mechanical engineering	580	665	761	660	668	709	730	712	776
Electrical machinery	1,258	1,386	1,218	1,245	1,313	1,181	1,320	1,335	1,558
Transport equipment	670	717	710	833	977	990	1,020	1,235	1,094
Aerospace	898	782	860	886	812	893	1,039	1,237	1,091
Other manufacturing	986	1,015	993	994	1,016	1,004	1,108	1,222	1,183
Services	**1,201**	**1,376**	**1,458**	**..**	**1,736**	**1,652**	**1,668**	**1,972**	**1,905**
Other: Total	**408**	**376**	**334**	**..**	**296**	**295**	**323**	**335**	**374**
Agriculture, hunting & forestry; Fishing	80	89	80	..	76	84	102	115	135
Extractive industries	126	62	66	65	64	44	41	42	46
Electricity, gas & water supply	187	214	177	168	148	130	140	137	160
Construction	15	11	11	8	8	38	39	41	34
TOTAL	8,166	8,717	8,842	9,116	9,297	9,556	10,133	11,302	11,510

In real terms (at 2000 prices)	1992	1993	1994	1995	1996	1997r	1998r	1999	2000
Manufacturing: Total	**7,981**	**8,272**	**8,265**	**8,130**	**8,025**	**8,154**	**8,489**	**9,160**	**9,231**
Chemicals	2,636	2,850	2,941	2,866	2,739	3,034	3,051	3,313	3,528
Mechanical engineering	706	790	892	752	738	760	761	725	776
Electrical machinery	1,531	1,646	1,428	1,419	1,451	1,266	1,376	1,360	1,558
Transport equipment	815	852	832	949	1,079	1,061	1,063	1,258	1,094
Aerospace	1,093	929	1,008	1,010	897	957	1,083	1,260	1,091
Other manufacturing	1,200	1,206	1,164	1,133	1,122	1,076	1,155	1,244	1,183
Services	**1,462**	**1,634**	**1,709**	**..**	**1,918**	**1,771**	**1,739**	**2,008**	**1,905**
Other: Total	**497**	**447**	**391**	**..**	**327**	**316**	**337**	**341**	**374**
Agriculture, hunting & forestry; Fishing	97	106	94	..	84	90	106	117	135
Extractive industries	153	74	77	74	71	47	43	43	46
Electricity, gas & water supply	228	254	207	191	164	139	146	140	160
Construction	18	13	13	9	9	41	41	42	34
TOTAL	**9,938**	**10,353**	**10,364**	**10,389**	**10,271**	**10,242**	**10,565**	**11,510**	**11,510**

Notes:
1 .. denotes disclosive figures.
2 See notes about revisions to past data.

Table 9 Expenditure on civil and defence R&D performed by Business Enterprises, 1993–2000

(i) in cash terms (£m)

	Civil								Defence							
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
All product groups	7,375	7,421	7,725	7,937	8,112	8,600	9,626	9,838	1,342	1,420	1,391	1,360	1,443	1,533	1,675	1,671
Manufacturing: Total	5,742	5,717	5,865	5,997	6,303	6,725	7,376	7,582	1,221	1,334	1,292	1,268	1,305	1,417	1,619	1,649
Chemicals	2,311	2,500	2,511	2,477	2,829	2,926	3,252	3,527	89	9	3	2	2	-	1	-
Mechanical engineering	467	415	418	395	407	455	434	463	198	346	266	273	302	276	279	314
Electrical machinery	1,031	824	823	896	803	916	1,013	1,163	354	394	423	417	377	404	322	395
Transport equipment	655	699	823	967	979	983	1,159	1,023	62	11	10	10	11	36	77	71
Aerospace	337	380	413	359	412	485	535	457	445	480	473	453	481	554	701	634
Other manufacturing	941	899	878	903	873	960	983	948	73	94	117	113	131	147	239	235
Services	..	1,372	..	1,644	1,513	1,552	1,915	1,883	..	87	99	92	139	116	57	22
Other: Total	..	334	..	296	295	322	335	374	..	1	-	-	-	-	-	-
Agriculture, hunting & forestry; Fishing	89	80	..	76	84	102	115	135	-	-	-	-	-	-	-	-
Extractive industries	62	66	65	64	44	41	42	46	-	-	-	-	-	-	-	-
Electricity, gas & water supply	..	177	168	148	130	140	137	160	..	1	-	-	-	-	-	-
Construction	11	11	8	8	38	39	41	34	-	-	-	-	-	-	-	-

(ii) in real terms (£m 2000 prices)[1]

	Civil								Defence							
	1993	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
All product groups	**8,759**	**8,698**	**8,804**	**8,769**	**8,694**	**8,966**	**9,803**	**9,838**	**1,594**	**1,664**	**1,585**	**1,503**	**1,547**	**1,598**	**1,706**	**1,671**
Manufacturing: Total	6,820	6,701	6,684	6,625	6,755	7,012	7,512	7,582	1,450	1,564	1,472	1,401	1,399	1,477	1,649	1,649
Chemicals	2,745	2,930	2,862	2,737	3,032	3,051	3,312	3,527	106	11	3	2	2	-	1	-
Mechanical engineering	555	486	476	436	436	474	442	463	235	406	303	302	324	288	284	314
Electrical machinery	1,225	966	938	990	861	955	1,032	1,163	420	462	482	461	404	421	328	395
Transport equipment	778	819	938	1,068	1,049	1,025	1,180	1,023	74	13	11	11	12	38	78	71
Aerospace	400	445	471	397	442	506	545	457	529	563	539	500	516	578	714	634
Other manufacturing	1,118	1,054	1,001	998	936	1,001	1,001	948	87	110	133	125	140	153	243	235
Services	..	1,608	..	1,816	1,622	1,618	1,950	1,883	..	102	113	102	149	121	58	22
Other: Total	..	391	..	327	316	336	341	374	..	1	-	-	-	-	-	-
Agriculture, hunting & forestry; Fishing	106	94	..	84	90	106	117	135	-	-	-	-	-	-	-	-
Extractive industries	74	77	74	71	47	43	43	46	-	-	-	-	-	-	-	-
Electricity, gas & water supply	..	207	191	164	139	146	140	160	..	1	-	-	-	-	-	-
Construction	13	13	9	9	41	41	42	34	-	-	-	-	-	-	-	-

Notes: ***Source: ONS***

1 See Table 2 for deflators

2 Broad product groups have been refined and expanded in order to more accurately categorise the data.

3 See notes about revisions to past data.

Table 10 Sources of funds for business enterprise R&D in cash terms, 1992–2000

£ million, cash terms

		Government £m	Overseas £m	Mainly own resources[1] £m	Total intramural R&D £m
1992		**1,021**	**1,220**	**5,926**	**8,166**
of which:	**Civil**	344	931	5,511	6,785
	Defence	678	289	415	1,382
1993		**965**	**1,345**	**6,409**	**8,717**
of which:	**Civil**	244	1,048	6,085	7,375
	Defence	722	295	324	1,342
1994		**910**	**1,410**	**6,523**	**8,842**
of which:	**Civil**	198	1,071	6,152	7,421
	Defence	713	338	370	1,420
1995		**953**	**1,738**	**6,426**	**9,116**
of which:	**Civil**	224	1,409	6,093	7,725
	Defence	729	329	333	1,391
1996		**842**	**2,018**	**6,438**	**9,297**
of which:	**Civil**	150	1,715	6,074	7,937
	Defence	693	303	364	1,360
1997		**915**	**1,800**	**6,841**	**9,556**
of which:	**Civil**	198	1,475	6,439	8,112
	Defence	717	325	401	1,443
1998		**1,094**	**2,238**	**6,800**	**10,133**
of which:	**Civil**	307	1,857	6,435	8,600
	Defence	787	381	365	1,533
1999		**1,157**	**2,570**	**7,575**	**11,302**
of which:	**Civil**	316	2,092	7,219	9,626
	Defence	841	478	356	1,675
2000		**1,013**	**2,470**	**8,026**	**11,510**
of which:	**Civil**	228	2,003	7,607	9,838
	Defence	785	467	418	1,671
		%	**%**	**%**	**%**
1992		***13***	***15***	***73***	***100***
of which:	**Civil**	*5*	*14*	*81*	*100*
	Defence	*49*	*21*	*30*	*100*
1993		***11***	***15***	***74***	***100***
of which:	**Civil**	*3*	*14*	*83*	*100*
	Defence	*54*	*22*	*24*	*100*
1994		***10***	***16***	***74***	***100***
of which:	**Civil**	*3*	*14*	*83*	*100*
	Defence	*50*	*24*	*26*	*100*
1995		***10***	***19***	***70***	***100***
of which:	**Civil**	*3*	*18*	*79*	*100*
	Defence	*52*	*24*	*24*	*100*
1996		***9***	***22***	***69***	***100***
of which:	**Civil**	*2*	*22*	*77*	*100*
	Defence	*51*	*22*	*27*	*100*
1997		***10***	***19***	***72***	***100***
of which:	**Civil**	*2*	*18*	*79*	*100*
	Defence	*50*	*23*	*28*	*100*
1998		***11***	***22***	***67***	***100***
of which:	**Civil**	*4*	*22*	*75*	*100*
	Defence	*51*	*25*	*24*	*100*
1999		***10***	***23***	***67***	***100***
of which:	**Civil**	*3*	*22*	*75*	*100*
	Defence	*50*	*29*	*21*	*100*
2000		***9***	***21***	***70***	***100***
of which:	**Civil**	*2*	*20*	*77*	*100*
	Defence	*47*	*28*	*25*	*100*

Notes:

1 Mainly own resources includes Other Private sector funds which is shown separately in ONS's First Release for Business Enterprise R&D.

2 See notes about revisions to past data.

Source: ONS

Table 11 Intramural expenditure on R&D performed in UK businesses: detailed product groups, 1992–2000

£ million

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Total	**8,166**	**8,717**	**8,842**	**9,116**	**9,297**	**9,556**	**10,133**	**11,302**	**11,510**
Agriculture, hunting and forestry; Fishing	80	89	80	..	76	84	102	115	135
Extractive Industries	126	62	66	..	64	44	41	42	46
Food products and beverages; Tobacco products	225	191	228	189	198	180	242	237	264
Textiles, clothing and leather products	25	44	22	23	27	33	33	28	29
Pulp, paper and paper products; printing and publishing; Wood and straw products	44	40	44	39	57	44	49	45	38
Refined petroleum products and coke oven products; Processing of nuclear fuel	253	224	203	239	230	225	234	212	182
Chemicals, man-made fibres	720	721	689	701	627	680	688	718	682
Pharmaceuticals, medical chemicals and botanical products	1,446	1,679	1,820	1,813	1,852	2,151	2,238	2,535	2,846
Rubber and plastic products	25	67	72	60	67	60	66	72	54
Other non-metallic mineral products	43	42	56	54	60	47	56	59	..
Casting of iron and steel	43	50	51	46	39	39	47	41	..
Non-ferrous metals	22	16	15	20	15	15	20	22	21
Fabricated metal products	63	72	72	100	91	88	90	70	73
Machinery and equipment	517	593	689	583	577	622	640	642	703
Office machinery and computers	256	252	134	150	161	102	125	111	113
Electrical machinery and apparatus	523	576	567	494	490	424	423	357	422
Radio, television and communication equipment	479	558	517	602	662	655	772	867	1,024
Precision instruments	283	312	273	303	307	336	340	473	480
Motor vehicles and parts	636	682	669	795	926	924	913	1,060	864
Other transport equipment	18	17	24	18	30	50	72	99	158
Shipbuilding and repairs	16	18	17	20	20	15	36	76	72
Aerospace	898	782	860	886	812	893	1,039	1,237	1,091
Furniture; Other manufactured goods	22	28	28	21	16	25	20	33	27
Recycling	1	1	1	..	1	-	-	1	1
Electricity, gas and water supply	187	214	177	168	148	130	140	137	160
Construction	15	11	11	8	8	38	39	41	34
Wholesale and retail trade	..	..	..	..	..	..	..	..	..
Transport and storage	..	..	..	..	..	..	..	..	..
Post and telecommunications	386	389	408	414	455	496	449	565	674
Miscellaneous business activities; Technical testing and analysis	86	118	104	..	141	142	157	196	131
Computer and related activities	555	635	744	675	749	680	688	713	611
Research and development services	142	199	178	247	369	313	346	448	428
Public administration	18	16	10	14	10	6	8	11	12

Notes:

1 .. denotes disclosive figures.

2 Zero denotes a value less than 0.5

3 For 1992 Furniture; Wood and straw products was included with Pulp, paper and paper products; Printing and publishing.

4 See notes about revisions to past data.

Source: ONS

Table 12 Current and capital expenditure, and as a percentage, on R&D performed in the UK Businesses: detailed product groups, 2000

	Total	Capital Total	Current Total	Salaries and wages	Other current	Total	Capital Total	Current Total	Salaries and wages	Other current
	£m	£m	£m	£m	£m	%	%	%	%	%
Total	**11,510**	**1,179**	**10,331**	**4,625**	**5,706**	***100***	***10***	***90***	***40***	***50***
Agriculture, hunting and forestry; Fishing	135	23	111	65	46	*100*	*17*	*83*	*48*	*34*
Extractive Industries	46	2	44	25	19	*100*	*3*	*97*	*56*	*41*
Food products and beverages; Tobacco products	264	29	235	131	105	*100*	*11*	*89*	*49*	*40*
Textiles, clothing and leather products	29	5	25	18	6	*100*	*16*	*84*	*63*	*21*
Pulp, paper and paper products; Printing and publishing; Wood and straw products	38	1	37	11	26	*100*	*3*	*97*	*29*	*68*
Refined petroleum products and coke oven products; Processing of nuclear fuel	182	..	..	..	95	*100*	..	..	..	*52*
Chemicals, man-made fibres	682	75	607	300	307	*100*	*11*	*89*	*44*	*45*
Pharmaceuticals, medical chemicals and botanical products	2,846	532	2,314	938	1,376	*100*	*19*	*81*	*33*	*48*
Rubber and plastic products	54	11	44	22	21	*100*	*19*	*81*	*41*	*39*
Other non-metallic mineral products	..	..	..	..	..	*100*	..	..	..	..
Casting of iron and steel	..	..	..	..	..	*100*	..	..	..	..
Non-ferrous metals	21	2	20	10	10	*100*	*8*	*92*	*46*	*46*
Fabricated metal products	73	3	70	33	37	*100*	*4*	*96*	*45*	*51*
Machinery equipment	703	27	676	302	374	*100*	*4*	*96*	*43*	*53*
Office machinery and computers	113	11	102	41	61	*100*	*10*	*90*	*36*	*54*
Electrical machinery and apparatus	422	43	379	154	225	*100*	*10*	*90*	*37*	*53*
Radio, television and communication equipment	1,024	140	883	416	467	*100*	*14*	*86*	*41*	*46*
Precision instruments	480	16	465	230	235	*100*	*3*	*97*	*48*	*49*
Motor vehicles and parts	864	64	800	415	385	*100*	*7*	*93*	*48*	*45*
Other transport equipment	158	2	157	18	139	*100*	*1*	*99*	*11*	*88*
Shipbuilding and repairs	72	1	71	40	31	*100*	*2*	*98*	*55*	*43*
Aerospace	1,091	60	1,032	360	672	*100*	*5*	*95*	*33*	*62*
Furniture; Other manufactured goods	27	1	26	17	9	*100*	*4*	*96*	*62*	*34*
Recycling	1	0	1	0	0	*100*	*6*	*94*	*63*	*31*
Electricity, gas and water supply	160	7	153	72	80	*100*	*5*	*95*	*45*	*50*
Construction	34	2	32	20	12	*100*	*5*	*95*	*60*	*35*
Wholesale and retail trades	..	0	..	..	..	*100*	..	..	..	..
Transport and storage	..	-	..	..	..	*100*	..	..	..	..
Post and telecommunications	674	28	646	294	352	*100*	*4*	*96*	*44*	*52*
Miscellaneous business activities; Technical testing and analysis	131	7	124	68	56	*100*	*6*	*94*	*51*	*43*
Computer related activities	611	37	575	303	271	*100*	*6*	*94*	*50*	*44*
Research and development services	428	18	410	199	211	*100*	*4*	*96*	*47*	*49*
Public administration	12	5	6	1	5	*100*	*45*	*55*	*8*	*47*

Notes:
1 Zero denotes a value less than 0.5

Source: ONS

Table 13 Government and business enterprise personnel engaged on R&D in the UK, 1992–2000

Full time equivalents, thousands

	1992	1993	1994	1995	1996	1997	1998	1999	2000	% change in 2000 from 1999
PERSONNEL ENGAGED ON R&D										
- Business Enterprise	152	156	150	145	142	137	148	153	145	*-5*
- Research Councils	13	13	12	12	12	11	11	11	11	*-1*
- Government Departments[1]	25	22	20	17	16	15	18	18	18	*0*
Total Civil	**150**	**159**	**148**	**143**	**141**	**135**	**145**	**149**	**144**	***-3***
Total Defence	**40**	**32**	**35**	**31**	**29**	**28**	**32**	**33**	**31**	***-7***
RESEARCHERS										
- Business Enterprise	80	84	79	82	82	83	91	92	86	*-7*
- Research Councils	6	6	6	6	5	5	5	5	5	*-3*
- Government Departments[1]	9	8	8	8	8	7	9	10	10	*1*
Total Civil	**77**	**81**	**75**	**78**	**78**	**78**	**87**	**87**	**82**	***-6***
Total Defence	**18**	**17**	**18**	**17**	**17**	**17**	**19**	**20**	**19**	***-8***
TECHNICIANS										
- Business Enterprise	37	39	40	33	33	30	32	33	30	*-10*
- Research Councils	2	3	2	2	3	3	3	3	3	*-3*
- Government Departments[1]	4	4	4	4	3	3	4	4	4	*-2*
Total Civil	**35**	**40**	**38**	**33**	**33**	**29**	**32**	**32**	**30**	***-9***
Total Defence	**8**	**6**	**8**	**7**	**6**	**6**	**7**	**7**	**7**	***-8***
ADMIN & OTHER STAFF										
- Business Enterprise	35	33	31	29	27	24	24	28	30	*8*
- Research Councils	5	4	4	4	4	3	3	3	3	*3*
- Government Departments[1]	11	9	8	5	5	4	5	5	5	*-1*
Total Civil	**37**	**36**	**34**	**33**	**29**	**27**	**27**	**30**	**35**	***16***
Total Defence	**14**	**10**	**9**	**7**	**6**	**5**	**6**	**6**	**3**	***-45***

Note: ***Source: ONS***

1 Excludes NHS employment, as these figures were not available.

Table 14 Estimated GOR breakdown of expenditure on Intramural R&D in the Business, Government and Higher Education sectors, 2000[1]

	R&D performed within business (BERD)	R&D performed Government Establishments (GOVERD)[2]	R&D perfomed within Higher Education Institutions (HERD)
United Kingdom	**11,510**	**2,134**	**3,633**
North East	164	2	122
North West and Merseyside	1,451	57	287
Yorkshire and the Humber	304	48	284
East Midlands	933	56	204
West Midlands	576	194	192
Eastern	2,758	259	324
London	810	258	895
South East	2,964	635	515
South West	867	307	160
England	**10,827**	**1,816**	**2,984**
Wales	144	65	139
Scotland	400	238	440
Northern Ireland	139	15	70

Note: ***Source: ONS***

1 Regional GDP figures are not available at time of publication and therefore it is not possible to show R&D expenditure as a percentage of regional GDP.
2 Figures include estimates for those areas of Central Government not available from the Government Survey and local authorities.

Table 15 Estimated regional breakdown of personnel engaged on R&D in the Business and Government sectors, 2000[1]

	R&D performed within business		R&D performed within Government establishments[2]	
	Full time equivalents 000's	% of the regional Labour Force[3,4]	Full time equivalents 000's	% of the regional Labour Force[3,4]
United Kingdom	**145.5**	***0.49***	**29.7**	***0.10***
North East	2.7	*0.23*	0.0	*0.00*
North West and Merseyside	17.2	*0.52*	0.8	*0.02*
Yorkshire and the Humber	6.1	*0.25*	0.7	*0.03*
East Midlands	13.7	*0.65*	0.8	*0.04*
West Midlands	10.5	*0.40*	2.7	*0.10*
Eastern	30.0	*1.05*	3.6	*0.13*
London	9.9	*0.27*	3.6	*0.10*
South East	32.7	*0.77*	8.8	*0.21*
South West	12.0	*0.48*	4.3	*0.17*
England	**134.9**	***0.54***	**25.2**	***0.10***
Wales	2.3	*0.17*	0.9	*0.07*
Scotland	6.0	*0.24*	3.3	*0.13*
Northern Ireland	2.3	*0.30*	0.2	*0.03*

Notes: ***Source: ONS***

1 Regional breakdown is based on the GOR (Government Office Region) classification.
2 Government sector covers Central Government only. Local Authorities, NHS and those areas of Central Government not available from the Government survey are excluded
3 Labour Force figure used is a head count. An estimate of the Labour Force in full-time equivalents(FTE) is not available. Using the head count figure gives a lower percentage than a FTE would give.
Labour Force figures relate to those in employment, rather than all those economically active.
4 Labour Force figures are for Spring 2001.

Table 16 OECD Science and Technology indicators
Gross Expenditure on R&D: International Comparisons, 1992–2000

	Year	UK	Germany[1]	France[2]	Italy[3]	Japan[4]	Canada	USA[5]
Gross Domestic Product (GDP)[6] (£ billion at ppp)[7]	1992	615.4	940.5	683.7	640.7	1,576.1	332.1	3,855.9
	1993	653.6	980.6	700.7	649.6	1,682.4	362.3	4,195.6
	1994	690.6	1,058.9	731.0	696.1	1,757.6	392.6	4,513.0
	1995	729.0	1,142.9	784.7	753.9	1,915.2	442.6	4,798.7
	1996	772.9	1,139.2	779.2	773.9	1,986.3	448.9	4,991.9
	1997	824.4	1,186.3	794.4	786.7	2,015.4	466.7	5,197.9
	1998	868.8	1,256.6	854.5	860.7	2,000.6	488.8	5,635.6
	1999	914.7	1,313.7	902.7	898.2	2,054.8	524.5	5,989.0
	2000	956.3	1,376.7	946.9	939.1	2,132.7	557.4	6,348.0
Gross Expenditure on R&D (GERD) (£ billion at ppp)[7]	1992	12.4	22.6 (e)	16.3	7.6	42.5 (e)	5.5	102.1
	1993	13.2	23.1	16.8	7.3	44.0 (e)	6.2	105.9
	1994	13.7	23.9 (e)	17.1	7.3	45.1 (e)	6.9	109.5
	1995	14.0	25.8 (e)	18.1	7.5	51.4 (e)	7.6	120.4
	1996	14.3	25.7 (e)	17.9	7.8	..	7.6	127.4
	1997	14.7	27.2	17.6	8.3	..	7.9	134.1
	1998	15.5	29.1 (e)	18.5	9.2	..	8.7	146.9
	1999	16.9	32.1	19.7	9.3	..	9.4	159.2
	2000	17.5	34.2 (e)	20.3 (p)	..	..	10.2 (p)	171.7 (p)
GERD as a percentage of GDP	1992	*2.01*	*2.41 (e)*	*2.38*	*1.18*	*2.70 (e)*	*1.65*	*2.65*
	1993	*2.02*	*2.35*	*2.40*	*1.13*	*2.62 (e)*	*1.70*	*2.52*
	1994	*1.98*	*2.26 (e)*	*2.34*	*1.05*	*2.57 (e)*	*1.76*	*2.43*
	1995	*1.93*	*2.26 (e)*	*2.31*	*1.00*	*2.69 (e)*	*1.73*	*2.51*
	1996	*1.85*	*2.26 (e)*	*2.30*	*1.01*	..	*1.69*	*2.55*
	1997	*1.78*	*2.29*	*2.22*	*1.05*	..	*1.70*	*2.58*
	1998	*1.78*	*2.31 (e)*	*2.17*	*1.07*	..	*1.79*	*2.61*
	1999	*1.85*	*2.44*	*2.19*	*1.04*	..	*1.80*	*2.66*
	2000	*1.83*	*2.48 (e)*	..	..	..	*1.84 (p)*	*2.70 (p)*
BERD as a percentage of GDP	1992	*1.33*	*1.66 (e)*	*1.49*	*0.66*	*1.99*	*0.83*	*1.90*
	1993	*1.33*	*1.58*	*1.48*	*0.60*	*1.86*	*0.89*	*1.78*
	1994	*1.28*	*1.51 (e)*	*1.45*	*0.56*	*1.83*	*0.99*	*1.71*
	1995	*1.25*	*1.50*	*1.41*	*0.53*	*1.89*	*1.00*	*1.80*
	1996	*1.20*	*1.49 (e)*	*1.41*	*0.54*	..	*0.97*	*1.87*
	1997	*1.16*	*1.54*	*1.39*	*0.52*	..	*1.01*	*1.91*
	1998	*1.17*	*1.57 (e)*	*1.35*	*0.52*	..	*1.07*	*1.94*
	1999	*1.24*	*1.70*	*1.38*	*0.51*	..	*1.02*	*1.99*
	2000	*1.20*	*1.76 (e)*	*1.37 (p)*	*0.51 (p)*	..	*1.04 (p)*	*2.04 (p)*
GOVERD as a percentage of GDP	1992	*0.30*	*0.34*	*0.50*	*0.26*	*0.24*	*0.29*	*0.26*
	1993	*0.30*	*0.36*	*0.51*	*0.24*	*0.26*	*0.28*	*0.26*
	1994	*0.30*	*0.34*	*0.48*	*0.22*	*0.25*	*0.26*	*0.24*
	1995	*0.28*	*0.35*	*0.48*	*0.21*	*0.28*	*0.25*	*0.24*
	1996	*0.27*	*0.34*	*0.47*	*0.20*	..	*0.25*	*0.22*
	1997	*0.24*	*0.34*	*0.41*	*0.20*	..	*0.22*	*0.21*
	1998	*0.24*	*0.34*	*0.40*	*0.22*	..	*0.22*	*0.20*
	1999	*0.23*	*0.34*	*0.40*	*0.20*	..	*0.22*	*0.21*
	2000	*0.22*	*0.33 (e)*	*0.38 (p)*	*0.21 (p)*	..	*0.21 (p)*	*0.20 (p)*
HERD as a percentage of GDP	1992	*0.35*	*0.41 (e)*	*0.36*	*0.26*	*0.35 (e)*	*0.51*	*0.39*
	1993	*0.35*	*0.41*	*0.38*	*0.28*	*0.37 (e)*	*0.51*	*0.39*
	1994	*0.38*	*0.41*	*0.38*	*0.27*	*0.36 (e)*	*0.48*	*0.38*
	1995	*0.37*	*0.41*	*0.39*	*0.25*	*0.39 (e)*	*0.46*	*0.38*
	1996	*0.36*	*0.42*	*0.39*	*0.27*	..	*0.45*	*0.38*
	1997	*0.35*	*0.41*	*0.39*	*0.32*	..	*0.45*	*0.37*
	1998	*0.35*	*0.40*	*0.38*	*0.34*	..	*0.48*	*0.37*
	1999	*0.36*	*0.40*	*0.38*	*0.33*	..	*0.54*	*0.37*
	2000	*0.38*	*0.40 (e)*	*0.36 (p)*	..	..	*0.57 (p)*	*0.37 (p)*

Source: OECD databank (May 2002)

Notes:
1 There are breaks in the GERD series between 1991 and 1992.
2 There are breaks in series for all data between 1996 and 1997.
3 There are breaks in series for GERD and HERD between 1996 and 1997.
4 Data for Japan are adjusted by OECD.
5 Excludes most or all capital expenditure.
6 The measure of GDP used is at market prices.
7 Amounts are converted to £ sterling using the purchasing power parities (ppp) developed by the OECD.
p = provisional.
e = estimate.

Table 17 International comparison of gross expenditure on R&D by sector of performance and source of funding, 2000

Per cent

	UK	Germany[1]	France (p)[2]	Italy (p)[3]	Japan (e)[4]	Canada (p)	USA (p)[5]
Percentage by sector of performance							
Government	*12.2*	*13.3*	*17.8*	*19.2*	*10.4*	*11.3*	*7.5*
Business enterprise	*65.6*	*70.8*	*64.0*	*49.3*	*70.3*	*56.8*	*75.3*
Higher education	*20.7*	*16.0*	*16.7*	*31.5*	*14.5*	*31.0*	*13.6*
Other	*1.4*	*-*	*1.5*	*-*	*4.8*	*1.0*	*3.6*
Total	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***
Percentage by source of funds							
Government	*28.9*	*31.4*	*36.9*	*50.8*	*20.9*	*31.8*	*27.3*
Business enterprise	*49.3*	*66.1*	*54.1*	*43.0*	*72.3*	*42.6*	*68.2*
Abroad	*16.3*	*2.1*	*7.0*	*6.2*	*0.1*	*15.8*	*-*
Other[6]	*5.5*	*0.4*	*1.9*	*-*	*6.7*	*9.9*	*4.4*
Total	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***

Notes:

1 Data for "other" included elsewhere.
2 Source of funds data for France are for 1999.
3 For Italy, sector of performance data are for 1999 and source of funds data are for 1996.
4 Data for Japan are OECD estimates and are for 1995.
5 Excludes most or all capital expenditure.
6 For UK data, "Other" consists of Higher Education & Private Non-Profit expenditure. For the remaining countries, "Other" represents other national sources.
(p) = provisional (e) = estimate

Source: OECD databank (May 2002)

Table 18 R&D performed in the Business Enterprise sector (BERD), 1992–2000

£ billion at ppp[1]

Year	UK	Germany	France[2]	Italy	Japan[3]	Canada	USA[4]
1992	8.2	15.6 (e)	10.2	4.2	31.3	2.8	73.3
1993	8.7	15.5	10.4	3.9	31.3	3.2	74.8
1994	8.8	16.0 (e)	10.6	3.9	32.1	3.9	77.2
1995	9.1	17.1	11.1	4.0	36.2	4.4	86.4
1996	9.3	17.0 (e)	11.0	4.2	..	4.4	93.2
1997	9.6	18.3	11.0	4.1	..	4.7	99.2
1998	10.1	19.8 (e)	11.5	4.4	..	5.2	109.3
1999	11.3	22.4	12.5	4.6	..	5.4	118.9
2000	11.5	24.2 (e)	13.0 (p)	4.8 (p)	..	5.8 (p)	129.3 (p)

Notes:

1 Amounts are converted to £ sterling using the purchasing power parities (ppp) developed by the OECD.
2 There is a break in series between 1996 and 1997.
3 Data for Japan are adjusted by OECD.
4 Excludes most or all capital expenditure.
p = provisional e = estimate

Source: OECD databank (May 2002)

Table 19 International comparison of Government funding of R&D in 2000 by socio-economic objective (percentage distribution)[1]

Per cent

		UK	Germany (p)	France (p)	Italy	Japan[2]	Canada (p)	USA (p)[3]
Agriculture, forestry and fishing		*4.1*	*2.5*	*2.5*	*2.2*	*3.5*	*10.8*	*2.2*
Industrial development		*1.7*	*12.3*	*6.4*	*13.8*	*6.8*	*10.0*	*0.5*
Energy		*0.5*	*3.5*	*5.1*	*4.0*	*18.1*	*4.5*	*1.3*
Infrastructure		*1.2*	*1.6*	*0.7*	*0.2*	*3.7*	*3.4*	*2.1*
Environmental protection		*2.3*	*3.4*	*1.8*	*2.3*	*0.8*	*3.9*	*0.7*
Health		*14.5*	*3.4*	*5.6*	*6.7*	*3.9*	*9.2*	*23.5*
Social development and services		*4.1*	*3.6*	*0.7*	*3.2*	*0.9*	*2.6*	*0.9*
Earth and atmosphere		*1.3*	*1.8*	*0.6*	*1.4*	*1.7*	*5.3*	*1.4*
Advancement of knowledge		*31.5*	*55.1*	*40.4*	*57.8*	*49.4*	*37.0*	*6.3*
Civil space		*2.2*	*4.5*	*11.0*	*7.7*	*5.6*	*6.6*	*6.8*
Defence		*36.3*	*8.0*	*22.6*	*0.8*	*4.1*	*5.4*	*54.1*
Not elsewhere classified		*0.3*	*0.1*	*2.6*	*-*	*1.5*	*1.2*	*-*
	%	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Total	**£ million[4]**	**6,563**	**11,084**	**8,825**	**6,174**	**13,640**	**2,914**	**50,902**

Notes:

1 Data for Canada are for 1999.
2 Data for Japan are OECD estimates.
3 Excludes most or all capital expenditure.
4 Amounts are converted to £ sterling using the purchasing power parities (ppp) developed by the OECD.
(p) = provisional

Source: OECD databank (May 2002)