Research and Experimental Development (R&D) Statistics 2001

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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 (Chapter 1 of *Science, Engineering and Technology Statistics* 2003[1] (Department of Trade and Industry, 2003) details this). Some general conclusions can be drawn, but significance should not be given to small percentage changes between years.

- In 2001 Gross Domestic Expenditure on R&D (GERD) was 1.87 per cent of GDP, very similar to 2000 (Table 2). In terms of international comparisons in 2001 the UK was just below the EU average of 1.93 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 1998/99, after which point the expenditure for subsequent years has slightly increased (Table 4). The overall level of net government expenditure on defence R&D has fallen from 42 per cent in 1993 to 30 per cent in 2001 (Table 6).

- Expenditure in real terms performed by the business sector has increased by 7 per cent on the 2000 total (Table 7).

- Within the manufacturing sector, the chemicals broad product group has the largest share of total R&D expenditure at 35 per cent. The services sector accounts for 19 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 article was published in the August 2002 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) or the OECD[1,2,4,5]. The purpose of this report is to bring together a range of data produced & 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* 2003 (SET 2003).[1] This document will be available on OST's website at http: //www.dti.gov.uk/ost/.

The ONS also conducts an annual survey of R&D in businesses. As in previous years the 2001 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 2001 Business Monitor MA14.[2]

Statistics on expenditure on and employment in R&D by 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 by HEIs. This was based on the allocation of various Funding Council Grants. Full details of the new methodology will be contained in SET 2003.[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 2001 was £18.8 billion in cash terms. GERD is often quoted as a percentage of GDP when making international comparisons. In 2001 UK GERD was 1.82 per cent of GDP, similar to the previous year's figure, but below the provisional OECD estimate for the EU average of 1.93 per cent.

Table 1 shows the interaction between R&D funders and performers. For example £12.7 billion was spent on R&D in the business sector. Of this, £1.5 billion was provided by the government, £3.0 billion came from abroad and £8.2 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, 2001

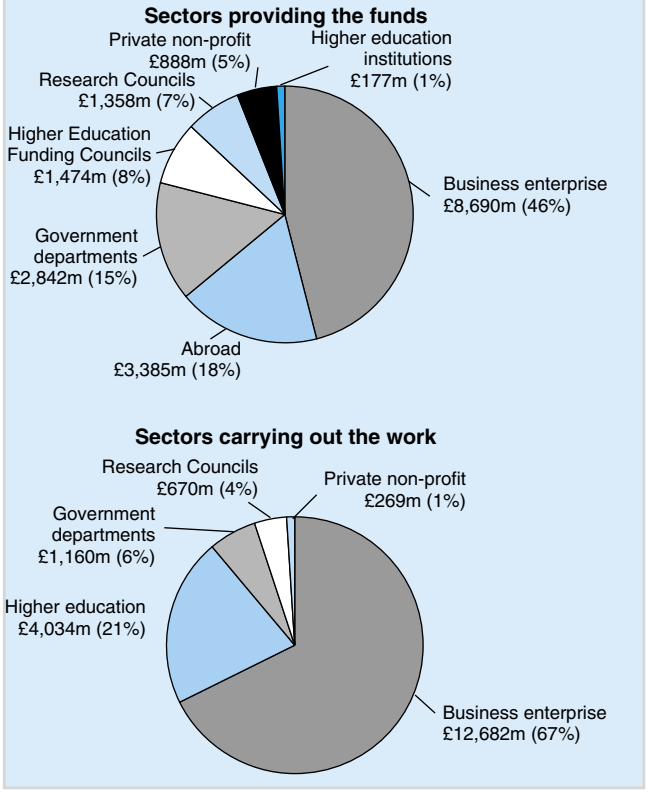


Figure 1 shows that the business sector is the most important sector of the economy in terms of providing funds for and carrying out R&D.

Government R&D expenditure (Tables 4 to 6, 17 and 19)

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 (Table 19).

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 collected by 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 2001/02 the net Government expenditure on R&D (by civil and defence departments) was £6.3 billion, a 3 per cent increase in cash terms on 2000/01. 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 2001–02 was still greater than in 1966–67.

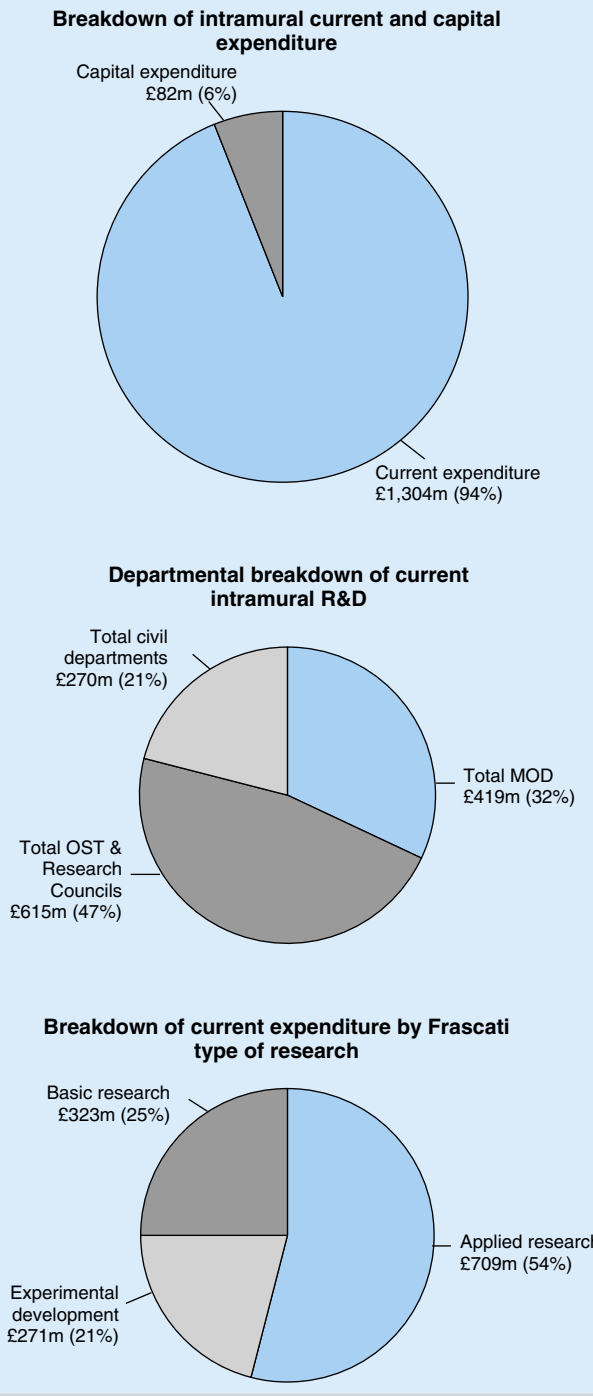
Table 5 shows the breakdown of departmental intramural expenditure (see Figure 2); the current (which is also shown by Frascati type

of research) and capital expenditure. Figure 2 shows that 94 per cent (£1.3 billion) of intramural expenditure is current expenditure. Applied research accounts for 54 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 1993/94 to 2001/02.

Figure 2

Analysis of Central Government Intramural Expenditure 2001–02



There has been a 15 per cent increase in basic research and a 9 per cent increase in applied research between 2000/01 and 2001/02. In 2001/02 defence expenditure accounted for 30 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 2001 R&D expenditure was £12.7 billion. Expenditure in real terms in the business sector has increased by 89 per cent on 1966 figures.

Table 8 shows that within the business sector, the services broad product group accounted for 19 per cent of the total expenditure in 2001, a rise of 2 per cent on 2000. In the manufacturing sector the pharmaceuticals and chemicals broad product group had the largest share of R&D expenditure at 28 per cent of the total.

Statistics for civil and defence R&D 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 2001, civil R&D represented 82 per cent of all R&D expenditure performed by business (Table 9). Table 10 and figure 4 show that, in 2001, 74 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 59 per cent of defence R&D.

Figure 3

Net business enterprise expenditure on R&D, in cash and real terms, 1967 to 2001

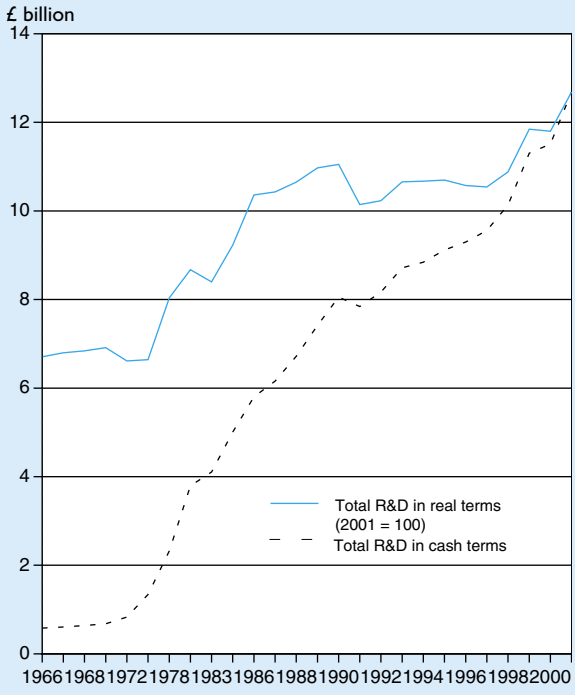
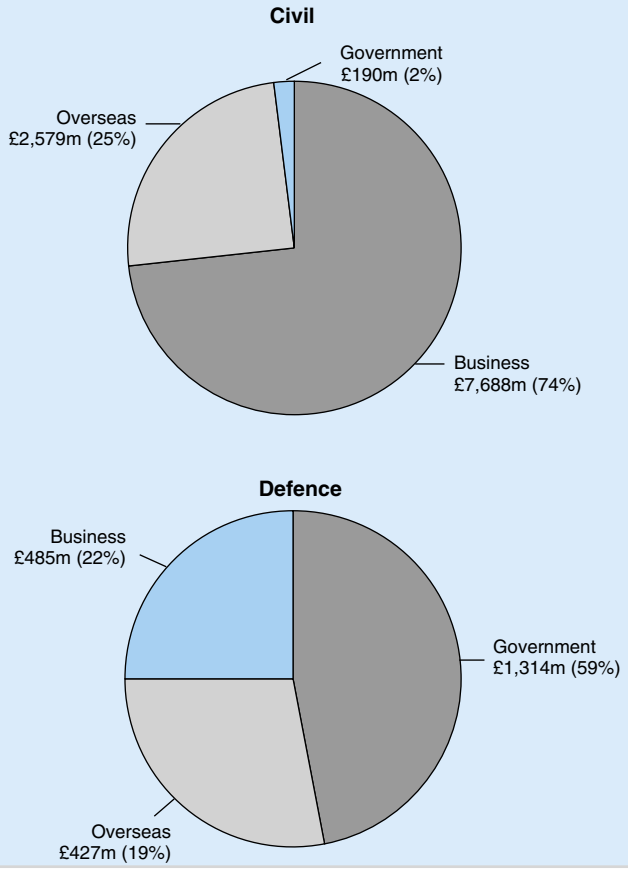


Figure 4

Sources of funds for Business Enterprise R&D, 2001



A 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 £3.0 billion in 2001, followed by Aerospace at £1.2 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 2000 and 2001, employment rates have remained at similar levels, except for government departments where there has been a 37 per cent decrease.

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. 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 2001. 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 is 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 ([5] discusses national variations). Therefore small differences should not be treated as significant when making international comparisons.

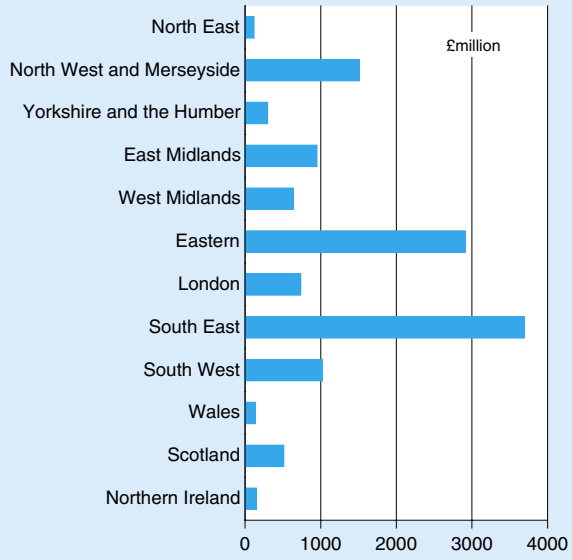
The figures shown for Japan in the tables are estimated by OECD.

Table 16 shows gross expenditure on R&D as a percentage of GDP for the G7 countries over the time period 1993 to 2001. The ratio for GERD has been fairly constant over this time for most of the countries. Figure 7 shows the position in 2001. The UK was ranked 6th. Table 16 also shows BERD and GOVERD as a percentage of GDP.

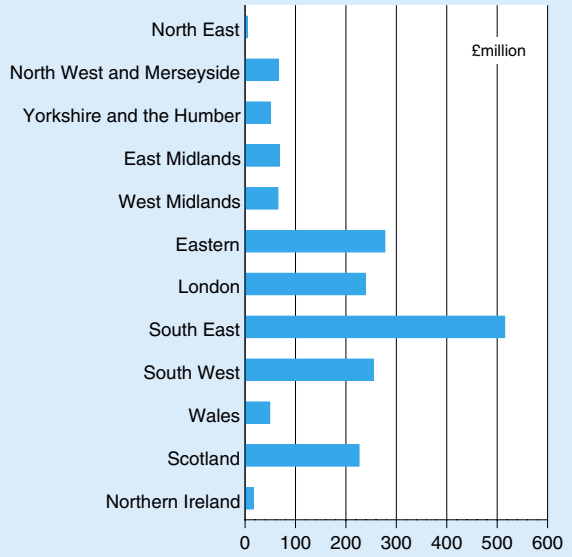
Table 17 shows the international comparisons of GERD by sector of performance and source of funding. Table 18 shows R&D performed in the business sector. Table 16 also shows this as a percentage of GDP; Japan and the USA spend most as a percentage of GDP. International comparison of Government funding of R&D in 2001 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 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.

Figure 5

(i) Estimated regional (GOR) BERD in 2001



(ii) Estimated regional (GOR) GOVERD in 2001



(iii) Estimated regional (GOR) HERD in 2001

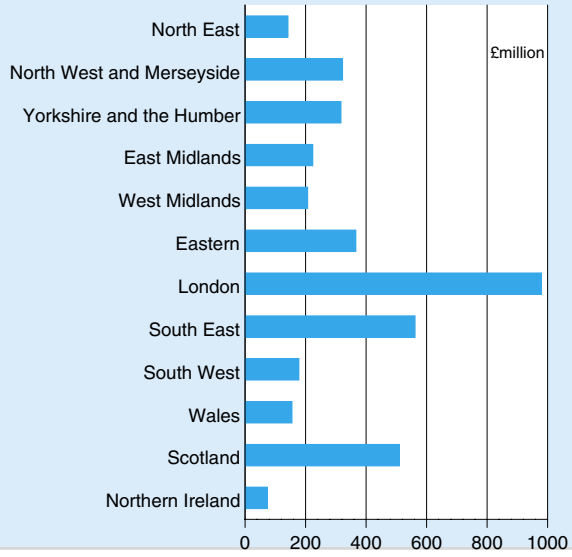
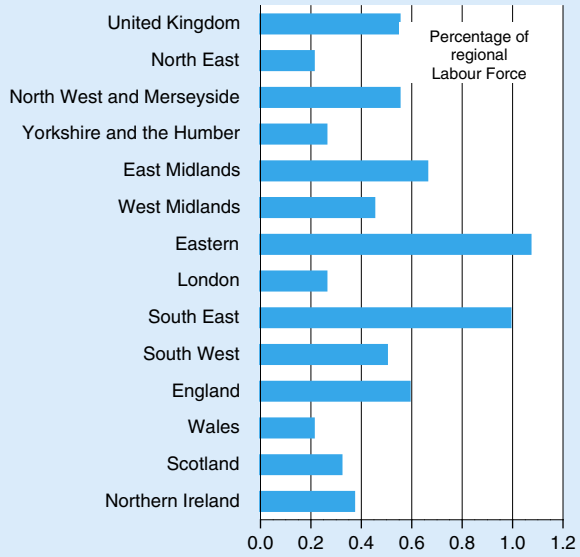
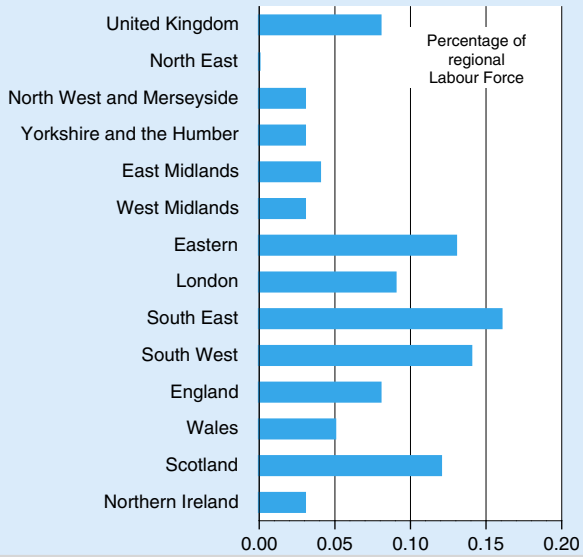


Figure 6

(i) Estimated regional (GOR) BERD in 2001



(ii) Estimated regional (GOR) Government R&D in 2001



Definitions

Type of R&D

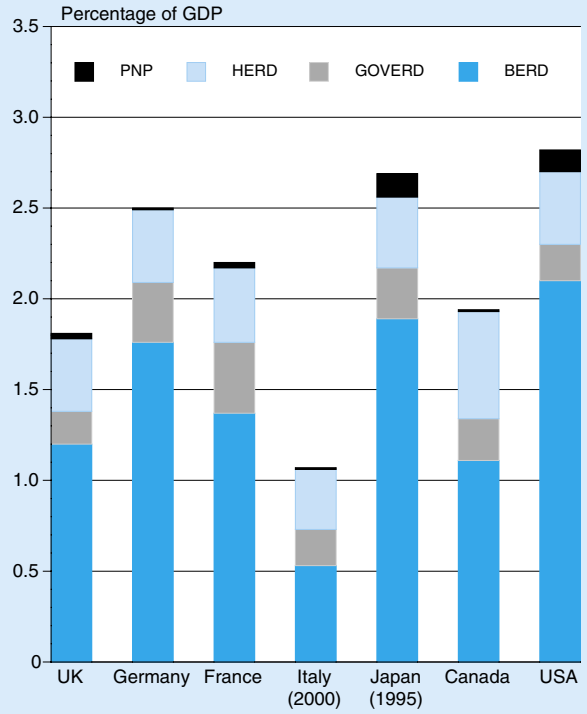
Basic or fundamental research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view.

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

Experimental Development is the use of the results of basic and applied research directed to the introduction of new materials,

Figure 7

Comparison of BERD, GOVERD, HERD and PNP as a percentage of GDP, 2001



Source: OECD

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, 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 are 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. Whilst it has been possible to adjust 93/94 figures it has not been possible to revise the data for previous years because of 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 28 March 2003[4] have been revised slightly due to government department amendments.

Regional data are published using GOR regions and these should not be compared to Nomenclature of Units for Territorial Statistics (NUTS) regional data previously published in this annual article.

Data Analysis Service

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

Jane Morgan Tel no: 01633 813109
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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9. Office for National Statistics First Release, 22 November 2002 Business Enterprise Research and Development 2001. http://www.statistics.gov.uk/pdfdir/berd1102.pdf

Abbreviations

BERD	Business Expenditure on 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, and 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: abbreviations

BBSRC	biotechnology and Biological Sciences Research Council
CCLRC	Council for the Central Laboratories of the Research Councils
DCMS	Department for Culture, Media and Sport
DEFRA	Department for Environment, food and Rural Affairs

DFES	Department for Education and Schools
DFID	Department for International Development
DOH	Department of Health
DTI	Department of Trade and Industry
DTLR	Department for Transport, Local Government and the Regions
DWP	Department for Work and Pensions
EPSRC	Engineering and Physical Sciences Research Council
ESRC	Economic and Social Science Research Council
FSA	Food Standards Agency
HEFC	Higher Education Funding Council
HSE	Health and Safety Executive
HO	Home Office
MOD	Ministry of Defence
MRC	Medical Research Council
NAW	National Assembly for Wales
NERC	Natural Environment Research Council
NHS	National Health Service
NI	Northern Ireland Department of Enterprise, Trade and Investment
OCD	Other Civil Departments
PPARC	Particle Physics and Astronomy Research Council
SE	Scottish Executive

Table 1 Gross expenditure on civil and defence R&D performed in the UK in 2001[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]	937	148	237	1,493	27	2,842	169
Research Councils	7	384	943	11	13	1,358	122
Higher Education Funding Councils	-	-	1,474	-	-	1,474	
Higher education institutions	1	9	166	-	2	177	
Business enterprise	191	37	250	8,168	43	8,690	
Private non-profit	11	53	660	4	161	888	
Abroad	13	39	304	3,006	23	3,385	
Total	1,160	670	4,034	12,682	269	18,815	n/a
Civil							
Government departments[4]	542	143	220	179	27	1,111	152
Research Councils	7	384	943	11	13	1,358	122
Higher Education Funding Councils	-	-	1,474	-	-	1,474	
Higher education institutions	0	9	166	-	2	177	
Business enterprise	179	37	222	7,684	43	8,165	
Private non-profit	11	53	660	4	161	888	
Abroad	7	39	304	2,579	23	2,952	
Total	746	665	3,989	10,456	269	16,125	n/a
Defence							
Government departments[4]	395	5	17	1,314	0	1,731	17
Research Councils	-	-	-	-	-	-	-
Higher Education Funding Councils	-	-	-	-	-	-	
Higher education institutions	0	-	-	-	-	0	
Business enterprise	12	-	28	485	-	525	
Private non-profit	-	-	-	-	-	-	
Abroad	6	-	-	427	-	433	
Total	414	5	45	2,226	0	2,690	n/a

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, (GERD), published on 28 March 2003. GERD data 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.

0 represents a value less than 0.5

- represents a nil value

Table 2 Gross expenditure on R&D in the UK by performing sector, 1993 to 2001[1]

£ million

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Expenditure in cash terms (£m):									
Performed by:									
Government	1,928	2,051	1,462	1,495	1,427	1,487	1,450	1,489	1,160
Research Councils	-	-	581	575	590	591	622	646	670
Business enterprise	8,717	8,842	9,116	9,297	9,556	10,133	11,302	11,510	12,682
Higher education	2,312	2,623	2,696	2,792	2,893	3,040	3,324	3,648	4,034
Private non-profit	232	168	177	177	190	203	231	255	269
Total	13,189	13,684	14,034	14,336	14,657	15,454	16,929	17,547	18,815
Expenditure in real terms (2001=100)[2] (£m):									
Performed by:									
Government	2,358	2,475	1,716	1,700	1,574	1,597	1,520	1,526	1,160
Research Councils	-	-	682	654	651	635	652	662	670
Business enterprise	10,658	10,669	10,695	10,572	10,541	10,879	11,847	11,797	12,682
Higher education	2,827	3,165	3,163	3,175	3,192	3,264	3,484	3,739	4,034
Private non-profit	283	203	208	201	210	218	242	262	269
Total	16,126	16,512	16,465	16,302	16,168	16,592	17,745	17,985	18,815
Total as percentage of GDP[3]	***2.02***	***1.98***	***1.93***	***1.85***	***1.78***	***1.78***	***1.84***	***1.82***	***1.87***

Notes:

1 See notes at Table 1.

2 GDP deflators are:

Indexes 2001=100

1993	1994	1995	1996	1997	1998	1999	2000	2001
81.8	82.9	85.2	87.9	90.7	93.1	95.4	97.6	100.0

3 Gross domestic product values are:

£ million

1993	1994	1995	1996	1997	1998	1999	2000	2001
653,582	690,575	729,001	772,856	824,164	868,642	918,202	962,613	1,005,023

Table 3 Gross expenditure on R&D in the UK by source of funds, 1993 to 2001[1,2]

£ million

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Sector providing funds									
Expenditure in cash terms (£m):									
Funded by:									
Government	4,237	4,479	2,514	2,402	2,332	2,535	2,601	2,547	2,842
Research Councils	-	-	1,078	1,092	1,135	1,117	1,185	1,250	1,358
Higher Education Funding Councils	-	-	1,018	1,027	1,033	1,085	1,157	1,276	1,474
Higher education	103	116	119	120	123	130	142	158	177
Business enterprise	6,815	6,886	6,765	6,817	7,321	7,356	8,213	8,648	8,690
Private non-profit	477	514	511	545	578	621	701	815	888
Abroad	1,558	1,689	2,029	2,331	2,136	2,610	2,929	2,854	3,385
Total	13,189	13,684	14,034	14,336	14,657	15,454	16,929	17,547	18,815
Expenditure in real terms (2001=100) (£m):									
Funded by:									
Government	5,180	5,405	2,950	2,731	2,572	2,721	2,727	2,610	2,842
Research Councils	-	-	1,264	1,242	1,252	1,199	1,243	1,281	1,358
Higher Education Funding Councils	-	-	1,194	1,168	1,139	1,165	1,213	1,308	1,474
Higher education	125	140	139	137	135	140	149	162	177
Business enterprise	8,332	8,309	7,937	7,752	8,076	7,898	8,609	8,864	8,690
Private non-profit	583	620	600	620	638	667	735	836	888
Abroad	1,905	2,039	2,381	2,651	2,356	2,802	3,070	2,925	3,385
Total	16,126	16,512	16,465	16,302	16,168	16,592	17,745	17,985	18,815
Total as percentage of GDP	***2.02***	***1.98***	***1.93***	***1.85***	***1.78***	***1.78***	***1.84***	***1.82***	***1.87***

Notes:
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 2001/02

£ million

Year	Total Net Government R&D	
	In cash terms excluding NHS figures	In real terms (2001=100)[1]
1966/67	486	5,619
1967/68	503	5,650
1968/69	531	5,685
1969/70	562	5,713
1970/71	606	5,686
1971/72	755	6,491
1972/73	847	6,739
1973/74	964	7,160
1974/75	1,169	7,252
1975/76	1,495	7,408
1976/77	1,647	7,186
1977/78	1,814	6,963
1978/79	2,097	7,252
1979/80	2,601	7,701
1980/81	3,184	7,972
1981/82	3,395	7,762
1982/83	3,519	7,522
1983/84	3,730	7,632
1984/85	3,964	7,705
1985/86	4,175	7,696
1986/87	4,255	7,595
1987/88	4,408	7,463
1988/89	4,497	7,128
1989/90	4,772	7,059
1990/91	4,955	6,800
1991/92	5,027	6,502
1992/93	5,078	6,362
1993/94	5,402	6,605
1994/95	5,200	6,275
1995/96[2]	5,295	6,212
1996/97[2]	5,351	6,085
1997/98[2]	5,504	6,072
1998/99[2]	5,304	5,695
1999/00[2]	5,782	6,061
2000/01[2]	6,166	6,320
2001/02[2]	6,329	6,329

Notes:

1 See note at Table 2.

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

Table 5 Analysis of Government Intramural expenditure, 2001–02[1,2]

£ 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	148.0	49.3	98.7	-	16.7	164.7	-	164.7
ESRC	4.5	4.5	-	-	0.7	5.2	5.2	-
MRC	196.5	133.8	62.7	-	23.4	219.9	-	219.9
NERC	115.0	38.2	55.1	21.7	8.1	123.1	-	123.1
EPSRC	17.9	9.3	8.6	-	0.6	18.4	-	18.4
PPARC	22.2	19.9	2.2	-	3.4	25.5	-	25.5
CCLRC	111.2	27.6	83.7	-	17.9	129.1	-	129.1
Total OST & Research Councils	**615.2**	**282.7**	**310.9**	**21.7**	**70.7**	**686.0**	**5.2**	**680.8**
Higher Education Funding Councils	-	-	-	-	-	-	-	-
Total Higher Education Funding Councils	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Civil departments								
DEFRA	84.5	18.4	62.7	3.5	4.3	88.8	0.7	88.1
DFEE	6.8	-	1.5	5.4	-	6.8	6.8	-
DTLR	6.5	0.2	6.1	0.3	-	6.5	2.2	4.3
DH (includes NHS)	33.5	1.9	23.3	8.3	2.6	36.1	0.0	36.1
NHS[3]	*0.0*	-	*0.0*	-	-	*0.0*	*0.0*	-
DWP (formerly DSS)	4.4	4.4	-	-	-	4.4	4.4	-
HSC	6.0	-	5.4	0.5	0.2	6.2	0.7	5.5
HO	20.3	-	19.0	1.3	1.0	21.4	13.7	7.7
DCMS (formerly DNH)	10.0	8.5	1.5	0.0	0.3	10.3	1.0	9.4
DFID (formerly ODA)	1.8	-	1.8	-	-	1.8	0.5	1.3
DTI (ex OST)	-	-	-	-	-	-	-	-
FSA	-	-	-	-	-	-	-	-
NI	7.0	0.3	6.5	0.2	0.5	7.5	1.5	6.0
SE (formerly SO)	56.9	4.8	16.6	35.6	0.2	57.1	2.5	54.6
NAW (formerly WO)	5.0	1.2	3.5	0.3	-	5.0	2.7	2.3
Other departments	27.2	1.0	21.9	4.3	2.5	29.7	11.7	18.0
Total civil departments	**270.1**	**40.6**	**169.7**	**59.7**	**11.5**	**281.6**	**48.3**	**233.3**
Total civil R&D	**885.3**	**323.3**	**480.6**	**81.5**	**82.3**	**967.6**	**53.5**	**914.1**
MOD	418.5	-	228.8	189.7	-	418.5	-	418.5
Total	**1,303.8**	**323.3**	**709.4**	**271.2**	**82.3**	**1,386.1**	**53.5**	**1,332.6**

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".

Table 6 Analysis of net Government R&D expenditure by Frascati type of research activity, 1993/94 to 2001/02[1]

£ million

	1993/94	1994/95	1995/96[2]	1996/97[2]	1997/98[2]	1998/99[2]	1999/00[2]	2000/01[2]	2001/02[2]
Total Government R&D									
Basic	1,571	-	-	-	-	-	-	-	-
- pure	-	1,253	1,273	1,322	1,334	1,369	1,492	1,691	1,964
- orientated	-	472	504	524	523	535	566	620	683
Applied - strategic	1,019	879	1,004	1,109	1,079	1,020	1,153	1,257	1,308
- specific	1,050	1,075	1,322	1,224	1,198	1,178	1,059	1,029	1,156
Experimental development	1,762	1,492	1,530	1,570	1,757	1,592	1,902	1,966	1,638
Total £m	**5,402**	**5,171**	**5,634**	**5,750**	**5,891**	**5,695**	**6,172**	**6,564**	**6,748**
Civil R&D									
Basic	1,571	-	-	-	-	-	-	-	-
- pure	-	1,253	1,273	1,322	1,334	1,369	1,467	1,666	1,964
- orientated	-	472	504	524	523	535	566	620	682
Applied - strategic	962	810	839	948	923	875	985	1,097	1,157
- specific	454	479	813	681	698	704	667	657	750
Experimental development	137	126	136	131	102	116	141	145	137
Total £m	**3,124**	**3,140**	**3,565**	**3,606**	**3,580**	**3,599**	**3,827**	**4,185**	**4,691**
Defence R&D									
Basic	-	-	-	-	-	-	-	-	-
- pure	-	-	-	-	-	-	25	25	-
- orientated	-	-	-	-	-	-	-	-	0
Applied - strategic	58	69	166	160	156	145	167	161	151
- specific	596	596	510	544	500	475	392	372	406
Experimental development	1,624	1,366	1,394	1,439	1,655	1,476	1,761	1,821	1,500
Total £m	**2,278**	**2,032**	**2,070**	**2,144**	**2,311**	**2,096**	**2,345**	**2,379**	**2,057**

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].

Table 7 Business Enterprise R&D, in cash terms and real terms, 1966 to 2001

£ million

Year	Total Business Enterprise R&D	
	In cash terms	In real terms (2001=100)[1]
1966	580	6,706
1967	605	6,795
1968	639	6,841
1969	680	6,913
1970	N/S	N/S
1971	N/S	N/S
1972	831	6,612
1973	N/S	N/S
1974	N/S	N/S
1975	1,340	6,640
1976	N/S	N/S
1977	N/S	N/S
1978	2,324	8,037
1979	N/S	N/S
1980	N/S	N/S
1981	3,793	8,673
1982	N/S	N/S
1983	4,104	8,397
1984	N/S	N/S
1985	5,005	9,224
1986	5,804	10,360
1987	6,159	10,428
1988	6,717	10,648
1989	7,416	10,971
1990	8,054	11,052
1991	7,842	10,143
1992	8,166	10,231
1993	8,717	10,658
1994	8,842	10,669
1995	9,116	10,695
1996	9,297	10,572
1997	9,556	10,541
1998	10,133	10,879
1999	11,302	11,847
2000	11,510	11,798
2001	12,682	12,682

Notes:
1 See notes at Table 2.
(N/S) = No survey carried out

Table 8 Expenditure on R&D performed in UK businesses: broad product groups, in cash & real terms, 1993 to 2001

£ million

In cash terms	1993	1994	1995	1996	1997	1998	1999	2000	2001
Manufacturing: Total	**6,965**	**7,051**	**7,134**	**7,264**	**7,608**	**8,142**	**8,995**	**9,231**	**10,040**
Chemicals	2,400	2,509	2,515	2,479	2,831	2,926	3,253	3,528	3,563
Mechanical engineering	665	761	660	668	709	730	712	776	1,041
Electrical machinery	1,386	1,218	1,245	1,313	1,181	1,320	1,335	1,558	1,734
Transport equipment	717	710	833	977	990	1,020	1,235	1,094	1,161
Aerospace	782	860	886	812	893	1,039	1,237	1,091	1,260
Other manufacturing	1,015	993	994	1,016	1,004	1,108	1,222	1,183	1,282
Services	**1,376**	**1,458**	**..**	**1,736**	**1,652**	**1,668**	**1,972**	**1,905**	**2,377**
Other: Total	**376**	**334**	**..**	**296**	**295**	**323**	**335**	**374**	**265**
Agriculture, hunting & forestry; Fishing	89	80	..	76	84	102	115	135	96
Extractive industries	62	66	65	64	44	41	42	46	40
Electricity, gas & water supply	214	177	168	148	130	140	137	160	99
Construction	11	11	8	8	38	39	41	34	30
Total	8,717	8,842	9,116	9,297	9,556	10,133	11,302	11,510	12,682

In real terms (at 2001 prices)	1993	1994	1995	1996	1997	1998	1999	2000	2001
Manufacturing: Total	**8,516**	**8,508**	**8,370**	**8,260**	**8,393**	**8,741**	**9,429**	**9,462**	**10,040**
Chemicals	2,934	3,027	2,951	2,819	3,123	3,141	3,410	3,616	3,563
Mechanical engineering	813	918	774	760	782	784	746	796	1,041
Electrical machinery	1,695	1,470	1,461	1,493	1,303	1,417	1,399	1,597	1,734
Transport equipment	877	857	977	1,111	1,092	1,095	1,295	1,122	1,161
Aerospace	956	1,038	1,039	923	985	1,115	1,297	1,119	1,260
Other manufacturing	1,241	1,198	1,166	1,155	1,108	1,190	1,281	1,213	1,282
Services	**1,682**	**1,759**	**..**	**1,974**	**1,822**	**1,791**	**2,067**	**1,952**	**2,377**
Other: Total	**460**	**403**	**..**	**337**	**325**	**347**	**351**	**383**	**265**
Agriculture, hunting & forestry; Fishing	109	97	..	86	93	110	121	138	96
Extractive industries	76	80	76	73	49	44	44	47	40
Electricity, gas & water supply	262	214	197	168	143	150	144	164	99
Construction	13	13	9	9	42	42	43	35	30
Total	**10,658**	**10,669**	**10,695**	**10,572**	**10,541**	**10,879**	**11,847**	**11,797**	**12,682**

Notes:

1 denotes disclosive figures.

Table 9 Expenditure on civil and defence R&D performed by Business Enterprises, 1993 to 2001

(i) in cash terms (£m)

	Civil								Defence							
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
All product groups	7,421	7,725	7,937	8,112	8,600	9,626	9,838	10,456	1,420	1,391	1,360	1,443	1,533	1,675	1,671	2,226
Manufacturing: Total	5,717	5,865	5,997	6,303	6,725	7,376	7,582	8,073	1,334	1,292	1,268	1,305	1,417	1,619	1,649	1,967
Chemicals	2,500	2,511	2,477	2,829	2,926	3,252	3,527	3,562	9	3	2	2	-	1	-	-
Mechanical engineering	415	418	395	407	455	434	463	470	346	266	273	302	276	279	314	571
Electrical machinery	824	823	896	803	916	1,013	1,163	1,200	394	423	417	377	404	322	395	533
Transport equipment	699	823	967	979	983	1,159	1,023	1,079	11	10	10	11	36	77	71	82
Aerospace	380	413	359	412	485	535	457	621	480	473	453	481	554	701	634	639
Other manufacturing	899	878	903	873	960	983	948	1,141	94	117	113	131	147	239	235	141
Services	1,372	..	1,644	1,513	1,552	1,915	1,883	2,118	87	99	92	139	116	57	22	259
Other: Total	334	..	296	295	322	335	374	265	1	-	-	-	-	-	-	-
Agriculture, hunting & forestry; Fishing	80	..	76	84	102	115	135	96	-	-	-	-	-	-	-	-
Extractive industries	66	65	64	44	41	42	46	40	-	-	-	-	-	-	-	-
Electricity, gas & water supply	177	168	148	130	140	137	160	99	1	-	-	-	-	-	-	-
Construction	11	8	8	38	39	41	34	30	-	-	-	-	-	-	-	-

(ii) in real terms (£m 2001 prices)[1]

	Civil								Defence							
	1994	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
All product groups	8,955	9,063	9,026	8,949	9,233	10,090	9,838	10,456	1,713	1,632	1,547	1,592	1,646	1,756	1,713	2,226
Manufacturing: Total	6,898	6,881	6,819	6,953	7,220	7,732	7,582	8,073	1,610	1,516	1,442	1,440	1,521	1,697	1,690	1,967
Chemicals	3,017	2,946	2,817	3,121	3,141	3,409	3,527	3,562	11	4	2	2	-	1	-	-
Mechanical engineering	501	490	449	449	488	455	463	470	418	312	310	333	296	292	322	571
Electrical machinery	994	966	1,019	886	983	1,062	1,163	1,200	475	496	474	416	434	338	405	533
Transport equipment	843	966	1,100	1,080	1,055	1,215	1,023	1,079	13	12	11	12	39	81	73	82
Aerospace	459	485	408	454	521	561	457	621	579	555	515	531	595	735	650	639
Other manufacturing	1,085	1,030	1,027	963	1,031	1,030	948	1,141	113	137	128	145	158	251	241	141
Services	1,656	..	1,869	1,669	1,666	2,007	1,883	2,118	105	116	105	153	125	60	23	259
Other: Total	403	..	337	325	346	351	374	265	1	-	-	-	-	-	-	-
Agriculture, hunting & forestry; Fishing	97	..	86	93	110	121	135	96	-	-	-	-	-	-	-	-
Extractive industries	80	76	73	49	44	44	46	40	-	-	-	-	-	-	-	-
Electricity, gas & water supply	214	197	168	143	150	144	160	99	1	-	-	-	-	-	-	-
Construction	13	9	9	42	42	43	34	30	-	-	-	-	-	-	-	-

Notes:
1 See Table 2 for deflators.

Table 10 Sources of funds for business enterprise R&D in cash terms, 1993 to 2001

£ million, cash terms

		Government £m	Overseas £m	Mainly own resources[1] £m	Total intramural R&D £m
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
2001		**1,504**	**3,006**	**8,172**	**12,682**
of which:	**Civil**	190	2,579	7,688	10,456
	Defence	1,314	427	485	2,226
		%	**%**	**%**	**%**
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
2001		**12**	**24**	**64**	**100**
of which:	**Civil**	2	25	74	100
	Defence	59	19	22	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.

Table 11 Intramural expenditure on R&D performed by UK businesses: detailed product groups, 1993 to 2001

£ million

	1993	1994	1995	1996	1997	1998	1999	2000	2001
Total	**8,717**	**8,842**	**9,116**	**9,297**	**9,556**	**10,133**	**11,302**	**11,510**	**12,682**
Agriculture, hunting and forestry; Fishing	89	80	..	76	84	102	115	135	96
Extractive Industries	62	66	..	64	44	41	42	46	40
Food products and beverages; Tobacco products	191	228	189	198	180	242	237	264	314
Textiles, clothing and leather products	44	22	23	27	33	33	28	29	31
Pulp, paper and paper products; printing and publishing; Wood and straw products	40	44	39	57	44	49	45	38	34
Refined petroleum products and coke oven products; Processing of nuclear fuel	224	203	239	230	225	234	212	182	250
Chemicals, man- made fibres	721	689	701	627	680	688	718	682	522
Pharmaceuticals, medical chemicals and botanical products	1,679	1,820	1,813	1,852	2,151	2,238	2,535	2,846	3,040
Rubber and plastic products	67	72	60	67	60	66	72	54	45
Other non-metallic mineral products	42	56	54	60	47	56	59	..	41
Casting of iron and steel	50	51	46	39	39	47	41	..	28
Non-ferrous metals	16	15	20	15	15	20	22	21	19
Fabricated metal products	72	72	100	91	88	90	70	73	64
Machinery and equipment	593	689	583	577	622	640	642	703	977
Office machinery and computers	252	134	150	161	102	125	111	113	105
Electrical machinery and apparatus	a576	567	494	490	424	423	357	422	585
Radio, television and communication equipment	558	517	602	662	655	772	867	1,024	1,044
Precision instruments	312	273	303	307	336	340	473	480	488
Motor vehicles and parts	682	669	795	926	924	913	1,060	864	870
Other transport equipment	17	24	18	30	50	72	99	158	208
Shipbuilding and repairs	18	17	20	20	15	36	76	72	83
Aerospace	782	860	886	812	893	1,039	1,237	1,091	1,260
Furniture; Other manufactured goods	28	28	21	16	25	20	33	27	31
Recycling	1	1	..	1	-	-	1	1	1
Electricity, gas and water supply	214	177	168	148	130	140	137	160	99
Construction	11	11	8	8	38	39	41	34	30
Wholesale and retail trade	..	..	..	..	..	..	..	..	55
Transport and storage	..	..	..	..	..	..	..	..	12
Post and telecommunications	389	408	414	455	496	449	565	674	733
Miscellaneous business activities; Technical testing and analysis	118	104	..	141	142	157	196	131	343
Computer and related activities	635	744	675	749	680	688	713	611	724
Research and development services	199	178	247	369	313	346	448	428	493
Public administration	16	10	14	10	6	8	11	12	18

Notes:

1 .. denotes disclosive figures.

2 Zero denotes a value less than 0.5.

3 See notes about revisions to past data.

Table 12 Current and capital expenditure, and as a percentage of the total, on R&D performed by UK Businesses: detailed product groups, 2001

	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	**12,682**	**1,681**	**11,001**	**4,978**	**6,023**	***100***	***13***	***87***	***39***	***47***
Agriculture, hunting and forestry; Fishing	96	16	79	40	39	*100*	*17*	*83*	*42*	*41*
Extractive Industries	40	1	38	21	17	*100*	*4*	*96*	*53*	*44*
Food products and beverages; Tobacco products	314	69	245	125	120	*100*	*22*	*78*	*40*	*38*
Textiles, clothing and leather products	31	1	30	25	5	*100*	*2*	*98*	*80*	*18*
Pulp, paper and paper products; Printing and publishing; Wood and straw products	34	6	29	10	19	*100*	*17*	*83*	*29*	*54*
Refined petroleum products and coke oven products; Processing of nuclear fuel	250	53	198	73	125	*100*	*21*	*79*	*29*	*50*
Chemicals, man-made fibres	522	46	477	255	221	*100*	*9*	*91*	*49*	*42*
Pharmaceuticals, medical chemicals and botanical products	3,040	507	2,533	1,058	1,475	*100*	*17*	*83*	*35*	*49*
Rubber and plastic products	45	8	37	20	18	*100*	*18*	*82*	*43*	*39*
Other non-metallic mineral products	41	6	35	18	17	*100*	*15*	*85*	*43*	*42*
Casting of iron and steel	28	0	28	28	-	*100*	*1*	*99*	*99*	*-*
Non-ferrous metals	19	1	17	9	9	*100*	*8*	*92*	*46*	*47*
Fabricated metal products	64	5	59	28	31	*100*	*7*	*93*	*44*	*49*
Machinery equipment	977	217	759	345	414	*100*	*22*	*78*	*35*	*42*
Office machinery and computers	105	6	99	41	58	*100*	*6*	*94*	*39*	*55*
Electrical machinery and apparatus	585	180	405	194	211	*100*	*31*	*69*	*33*	*36*
Radio, television and communication equipment	1,044	114	930	386	544	*100*	*11*	*89*	*37*	*52*
Precision instruments	488	44	444	228	216	*100*	*9*	*91*	*47*	*44*
Motor vehicles and parts	870	50	820	410	410	*100*	*6*	*94*	*47*	*47*
Other transport equipment	208	..	..	23	..	*100*	*..*	*..*	*11*	*..*
Shipbuilding and repairs	83	..	..	47	..	*100*	*..*	*..*	*57*	*..*
Aerospace	1,260	35	1,225	427	798	*100*	*3*	*97*	*34*	*63*
Furniture; Other manufactured goods	31	2	29	21	8	*100*	*6*	*94*	*69*	*25*
Recycling	1	0	1	0	0	*100*	*6*	*94*	*63*	*31*
Electricity, gas and water supply	99	2	97	53	44	*100*	*2*	*98*	*53*	*45*
Construction	30	2	28	18	11	*100*	*6*	*94*	*58*	*36*
Wholesale and retail trades	55	2	53	43	10	*100*	*3*	*97*	*78*	*19*
Transport and storage	12	-	12	8	4	*100*	*-*	*100*	*64*	*36*
Post and telecommunications	733	27	706	314	392	*100*	*4*	*96*	*43*	*53*
Miscellaneous business activities; Technical testing and analysis	343	160	183	120	63	*100*	*47*	*53*	*35*	*18*
Computer related activities	724	70	654	367	286	*100*	*10*	*90*	*51*	*40*
Research and development services	493	44	449	222	227	*100*	*9*	*91*	*45*	*46*
Public administration	18	5	13	2	10	*100*	*30*	*70*	*14*	*57*

Notes:

1 Zero denotes a value less than 0.5
2 .. denotes disclosive figures.

Table 13 Government and business enterprise personnel engaged on R&D in the UK, 1993 to 2001

Full time equivalents, thousands

	1993	1994	1995	1996	1997	1998	1999	2000	2001	% change in 2001 from 2000
Personnel engaged on R&D										
- Business Enterprise	156	150	145	142	137	148	153	145	152	*4*
- Research Councils	13	12	12	12	11	11	11	11	12	*3*
- Government Departments[1]	22	20	17	16	15	18	18	19	12	*–36*
Total Civil	**159**	**148**	**143**	**141**	**135**	**145**	**149**	**144**	**146**	***1***
Total Defence	**32**	**35**	**31**	**29**	**28**	**32**	**33**	**31**	**29**	***–7***
Researchers										
- Business Enterprise	84	79	82	82	83	91	92	86	93	*9*
- Research Councils	6	6	6	5	5	5	5	5	5	*1*
- Government Departments[1]	8	8	8	8	7	9	10	10	5	*–52*
Total Civil	**81**	**75**	**78**	**78**	**78**	**87**	**87**	**82**	**85**	***3***
Total Defence	**17**	**18**	**17**	**17**	**17**	**19**	**20**	**19**	**19**	***–1***
Technicians										
- Business Enterprise	39	40	33	33	30	32	33	30	28	*–6*
- Research Councils	3	2	2	3	3	3	3	3	3	*5*
- Government Departments[1]	4	4	4	3	3	4	4	4	3	*–17*
Total Civil	**40**	**38**	**33**	**33**	**29**	**32**	**32**	**30**	**28**	***–5***
Total Defence	**6**	**8**	**7**	**6**	**6**	**7**	**7**	**7**	**6**	***–14***
Admin & other staff										
- Business Enterprise	33	31	29	27	24	24	28	30	31	*2*
- Research Councils	4	4	4	4	3	3	3	3	4	*5*
- Government Departments[1]	9	8	5	5	4	5	5	5	4	*–19*
Total Civil	**36**	**34**	**33**	**29**	**27**	**27**	**30**	**35**	**35**	***1***
Total Defence	**10**	**9**	**7**	**6**	**5**	**6**	**6**	**3**	**3**	***–6***

Note:
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, 2001[1]

£ million

	R&D performed within business (BERD)	R&D performed within Government Establishments (GOVERD)[2]	R&D performed within Higher Education Institutions (HERD)
United Kingdom	**12,682**	**1,829**	**4,035**
North East	118	4	142
North West and Merseyside	1,512	66	322
Yorkshire and the Humber	298	50	317
East Midlands	950	68	224
West Midlands	641	65	207
Eastern	2,913	277	366
London	737	238	980
South East	3,693	515	562
South West	1,022	254	178
England	**11,885**	**1,537**	**3,297**
Wales	136	49	155
Scotland	512	226	510
Northern Ireland	150	16	73

Note:

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, 2001[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	**151.8**	***0.55***	**23.4**	***0.08***
North East	2.3	*0.21*	0.1	*0.00*
North West and Merseyside	16.5	*0.55*	0.8	*0.03*
Yorkshire and the Humber	6.0	*0.26*	0.6	*0.03*
East Midlands	13.3	*0.66*	0.9	*0.04*
West Midlands	11.1	*0.45*	0.8	*0.03*
Eastern	28.7	*1.07*	3.5	*0.13*
London	9.0	*0.26*	3.1	*0.09*
South East	40.2	*0.99*	6.6	*0.16*
South West	11.9	*0.50*	3.3	*0.14*
England	**139.0**	***0.59***	**19.7**	***0.08***
Wales	2.5	*0.21*	0.6	*0.05*
Scotland	7.6	*0.32*	2.9	*0.12*
Northern Ireland	2.6	*0.37*	0.2	*0.03*

Notes:

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 2002.

Table 16 OECD Science and Technology indicators
Gross Expenditure on R&D: International Comparisons, 1993 to 2001

	Year	UK	Germany	France[1]	Italy[2]	Japan[3]	Canada	USA[4]
Gross Domestic Product (GDP)[5]	1993	653.6	980.6	700.7	649.6	1,682.4	361.1	4,195.6
(£ billion at ppp)[6]	1994	690.6	1,058.9	731.0	696.1	1,757.6	391.6	4,513.0
	1995	729.0	1,142.9	784.7	753.9	1,915.2	441.4	4,798.7
	1996	772.9	1,139.2	779.2	773.9	1,986.3	447.7	4,991.9
	1997	824.2	1,186.3	794.4	786.7	2,015.4	465.5	5,197.9
	1998	868.6	1,256.6	854.5	860.7	1,988.3	487.1	5,635.5
	1999	918.2	1,316.6	906.0	897.8	2,054.8	527.4	5,992.8
	2000	962.6	1,386.5	971.1	935.5	2,130.7	558.6	6,300.3
	2001	1,005.0	1,388.5	1,021.5	973.7	2,152.8	575.9	6,419.1
Gross Expenditure on R&D (GERD)	1993	13.2	23.1	16.8	7.3	44.0 (e)	6.1	105.9
(£ billion at ppp)[6]	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	-	7.5	127.4
	1997	14.7	27.2	17.6	8.3	-	7.8	133.9
	1998	15.5	29.1 (e)	18.5	9.2	-	8.7	146.6
	1999	16.9	32.1	19.7	9.3	-	9.5	158.8
	2000	17.5	34.6 (e)	21.2	10.0	-	10.5	171.1
	2001	18.8	34.5 (e)	22.5 (p)	-	-	11.2 (p)	180.8 (p)
GERD as a percentage of GDP	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)*	*1.72*	*2.51*
	1996	*1.85*	*2.26 (e)*	*2.30*	*1.01*	..	*1.68*	*2.55*
	1997	*1.78*	*2.29*	*2.22*	*1.05*	..	*1.68*	*2.58*
	1998	*1.78*	*2.31 (e)*	*2.17*	*1.07*	..	*1.79*	*2.60*
	1999	*1.84*	*2.44*	*2.18*	*1.04*	..	*1.81*	*2.65*
	2000	*1.82*	*2.49 (e)*	*2.18*	*1.07*	..	*1.87*	*2.72*
	2001	*1.87*	*2.49 (e)*	*2.20 (p)*	..	..	*1.94 (p)*	*2.82 (p)*
BERD as a percentage of GDP	1993	*1.33*	*1.58*	*1.48*	*0.60*	*1.86*	*0.90*	*1.78*
	1994	*1.28*	*1.51 (e)*	*1.45*	*0.56*	*1.83*	*1.00*	*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	*1.23*	*1.70*	*1.38*	*0.51*	..	*1.06*	*1.98*
	2000	*1.20*	*1.75 (e)*	*1.37*	*0.53*	..	*1.09*	*2.04*
	2001	*1.26*	*1.76 (e)*	*1.37 (p)*	*0.56 (p)*	..	*1.11 (p)*	*2.10 (p)*
GOVERD as a percentage of GDP	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*	*0.27*	*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*	*0.20*
	2000	*0.22*	*0.34*	*0.38*	*0.20*	..	*0.22*	*0.18*
	2001	*0.18*	*0.33 (e)*	*0.39 (p)*	*0.22 (p)*	..	*0.23 (p)*	*0.20 (p)*
HERD as a percentage of GDP	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*	..	*0.49*	*0.36*
	1999	*0.36*	*0.40*	*0.37*	*0.33*	..	*0.53*	*0.37*
	2000	*0.38*	*0.40*	*0.41*	*0.33*	..	*0.55*	*0.38*
	2001	*0.40*	*0.40 (e)*	*0.41 (p)*	..	..	*0.59 (p)*	*0.40 (p)*

Source: OECD databank (May 2003)

Notes:
1 There are breaks in series for all data between 1996 and 1997.
2 There are breaks in series for GERD and HERD between 1996 and 1997.
3 Data for Japan are adjusted by OECD.
4 Excludes most or all capital expenditure.
5 The measure of GDP used is at market prices.
6 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 2001

Per cent

	UK	Germany[1]	France (p)[2]	Italy[3]	Japan (e)[4]	Canada (p)	USA (p)[5]
Percentage by sector of performance							
Government	*9.7*	*13.4*	*17.7*	*18.9*	*10.4*	*11.9*	*7.0*
Business enterprise	*67.4*	*70.5*	*62.4*	*50.1*	*70.3*	*57.5*	*74.4*
Higher education	*21.4*	*16.0*	*18.5*	*31.0*	*14.5*	*30.3*	*14.2*
Other	*1.4*	*-*	*1.4*	*-*	*4.8*	*0.3*	*4.5*
Total	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***
Percentage by source of funds							
Government	*30.2*	*31.5*	*38.7*	*50.8*	*20.9*	*31.3*	*26.9*
Business enterprise	*46.2*	*66.0*	*52.5*	*43.0*	*72.3*	*41.9*	*68.3*
Abroad	*18.0*	*2.1*	*7.2*	*6.2*	*0.1*	*17.8*	*-*
Other[6]	*5.7*	*0.4*	*1.6*	*-*	*6.7*	*9.0*	*4.8*
Total	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***	***100.0***

Source: OECD databank (May 2003)

Notes:
1 Data for "other" included elsewhere.
2 Source of funds data for France are for 2000.
3 For Italy, sector of performance data are for 2000 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

Table 18 R&D performed in the Business Enterprise sector (BERD), 1993 to 2001

£ billion at ppp[1]

Year	UK	Germany	France[2]	Italy	Japan[3]	Canada	USA[4]
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	-	4.3	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	-	5.6	118.9
2000	11.5	24.3 (e)	13.3	5.0	-	6.1	128.8
2001	12.7	24.4 (e)	14.0 (p)	5.5 (p)	-	6.4 (p)	134.5 (p)

Source: OECD databank (May 2003)

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

Table 19 International comparison of Government funding of R&D in 2001 by socio-economic objective (percentage distribution)[1]

Per cent

		UK	Germany (p)	France (p)	Italy	Japan[2]	Canada (p)	USA[3]
Agriculture, forestry and fishing		*3.9*	*2.4*	*2.1*	*1.9*	*3.5*	*10.3*	*2.5*
Industrial development		*3.5*	*12.1*	*6.3*	*10.2*	*7.5*	*12.1*	*0.5*
Energy		*0.5*	*3.4*	*3.9*	*3.6*	*17.4*	*4.5*	*1.5*
Infrastructure		*1.5*	*1.7*	*0.6*	*0.4*	*4.4*	*3.0*	*2.0*
Environmental protection		*1.9*	*3.1*	*2.9*	*2.3*	*0.8*	*4.5*	*0.7*
Health		*15.0*	*4.0*	*5.8*	*7.0*	*3.9*	*11.3*	*24.8*
Social development and services		*4.0*	*4.5*	*0.8*	*4.4*	*0.9*	*2.8*	*0.9*
Earth and atmosphere		*1.6*	*1.8*	*0.8*	*1.9*	*1.9*	*4.5*	*1.2*
Advancement of knowledge		*35.3*	*55.1*	*41.4*	*57.0*	*48.6*	*34.5*	*6.3*
Civil space		*2.1*	*4.7*	*9.8*	*7.3*	*6.7*	*6.6*	*7.1*
Defence		*30.5*	*7.1*	*23.2*	*4.0*	*4.3*	*4.8*	*52.7*
Not elsewhere classified		*0.3*	*0.1*	*2.3*	*-*	*-*	*1.2*	*-*
	%	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Total	**£ million[4]**	**6,774**	**11,382**	**10,162**	**6,742**	**14,836**	**2,997**	**55,580**

Source: OECD databank (May 2003)

Notes:
1 Data for Canada are for 2000.
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