# Research and experimental development (R&D) statistics, 2003

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In 2003 Gross Domestic Expenditure on R&D was 1.86 per cent of GDP, very similar to 2002. In terms of European comparisons in 2003 the UK was just below the EU average of 1.93 per cent.

Expenditure in real terms performed by the business sector has increased by 1.5 per cent on the 2002 total.

The manufacturing sector accounts for 77 per cent of the total R&D expenditure. Within that figure, the chemicals broad group has the largest share of R&D expenditure at 36 per cent. The service sector accounts for 21 per cent of total R&D expenditure

Within the UK, net expenditure in real terms performed by government peaked in 1980/81. Since then there was a gradual downward trend until 1998/1999 (with a noteworthy exception in 1986/87 of £8.5 billion, higher than in 1980/81of £8.4 billion), after which point the expenditure for subsequent years has slightly increased. The overall level of net government expenditure on defence R&D has fallen from 37 per cent in 1995 to 32 per cent in 2003.

Within regions, spending is highest in the South East for both the business and government sectors.

## 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 changes in the actual or perceived status of organisations (Chapter 1 of *Science, Engineering and Technology Statistics* 2005[2], details this). Some general conclusions can be drawn, but significance should not be given to small percentage changes between years.
- In 2003 Gross Domestic Expenditure on R&D (GERD) was 1.86 per cent of GDP, very similar to 2002 (see Table 2). In terms of European comparisons, in 2003 the UK was just below the EU average of 1.93 per cent.[5] GERD is seen as an important indicator of productivity and competitiveness, both within the UK and internationally.
- Expenditure in real terms performed by the business sector has increased by 1.5 per cent on the 2002 total (see Table 4).
- The manufacturing sector accounts for 77 per cent of total R&D expenditure. Within that figure, the chemicals broad product group has the largest share of R&D expenditure at 36 per cent. The services sector accounts for 21 per cent of total R&D expenditure (see Table 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 (with a noteworthy exception in 1986/87 of £8.5 billion, higher than in 1980/81 of £8.4 billion), after which point the expenditure for subsequent years has slightly increased (Table 10). The overall level of net government expenditure on defence R&D has fallen from 37 per cent in 1995 to 32 per cent in 2003 (see Table 12).
- Within the regions, spending is highest in the South East for both the business and government sectors (Table 14).

## Background

This article is the latest in an annual series, the previous article was published in the September 2004 edition of *Economic Trends*. Most of the figures have already been published by the Office for National Statistics (ONS), the Department of Trade and Industry (Office of Science and Technology) or the Organisation for Economic Co-operation and Development (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

## List of tables



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. But 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: business, Government, higher education institutions (HEIs), and the Private Non-Profit (PNP) sector. Definitions are provided at the end of this article.

ONS conducts an annual survey of R&D in businesses. As in previous years the 2003 survey used a sample survey to minimise burdens on contributors. The register of R&D performers is continually updated; results and detailed methodology notes can be found in the publication *Research and Development in UK Business 2003* (series MA14).[1]

ONS also 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 2005 (SET 2005)*.[2] This document will be available on OST's website at http://www.dti.gov.uk/ost/.

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 2005*.[2]

## 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 2003 was £20.8 billion in cash terms. GERD is often quoted as a percentage of GDP when making international comparisons. In 2003 UK GERD was 1.86 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 £13.7 billion was spent on R&D in the business sector. Of this, £1.5 billion was provided by the government, £3.6 billion came from abroad and £8.6 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 shows that the business sector of the economy is the most important in terms of providing funds for and carrying out R&D.

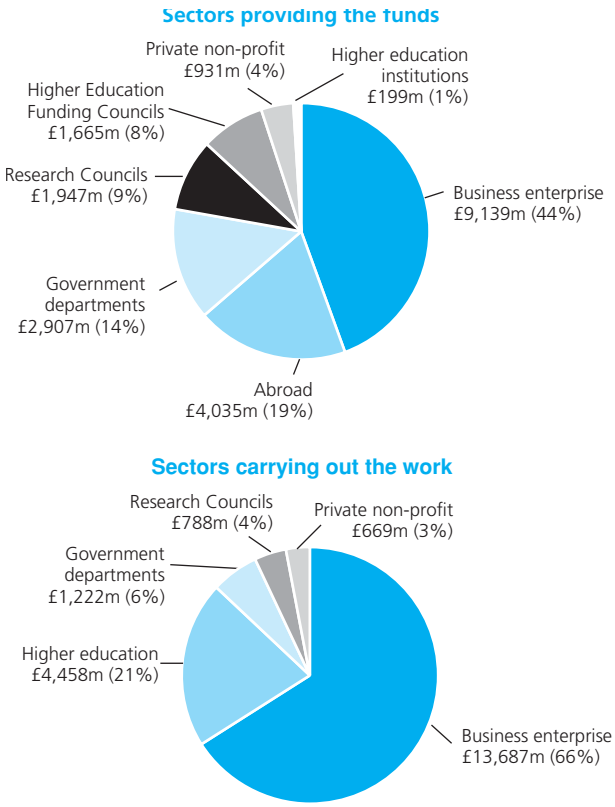
### R&D performed by the Business Sector (Tables 4–9)

Table 4 and Figure 2 show a time series dating back to 1966 for expenditure performed by the business sector. They show that in 2003 R&D expenditure was £13.7 billion. Expenditure in real terms in the business sector has increased by 94 per cent on 1966 figures.

Table 5 shows that within the business sector, the services broad product group accounted for 21 per cent of the total expenditure in 2003, a rise of one per cent on 2002. In the manufacturing sector, the pharmaceuticals and chemicals broad product group had the largest share of R&D expenditure at 28 per cent.

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.

Figure 1
**Gross expenditure on R&D in the UK, by sectors, 2003**




In 2003, civil R&D represented 86 per cent of all R&D expenditure performed by business (see Table 6). Table 7 and Figure 3 show that, in 2003, 71 per cent of civil R&D performed by businesses was funded by businesses themselves. Government funded four per cent of civil R&D, whereas it funded 53 per cent of defence R&D.

A breakdown into detailed product groups is shown in Tables 8 and 9. The product group with the largest expenditure is pharmaceuticals, medical chemicals and botanical products, which accounted for £3.2 billion in 2003, followed by aerospace at £1.7 billion.

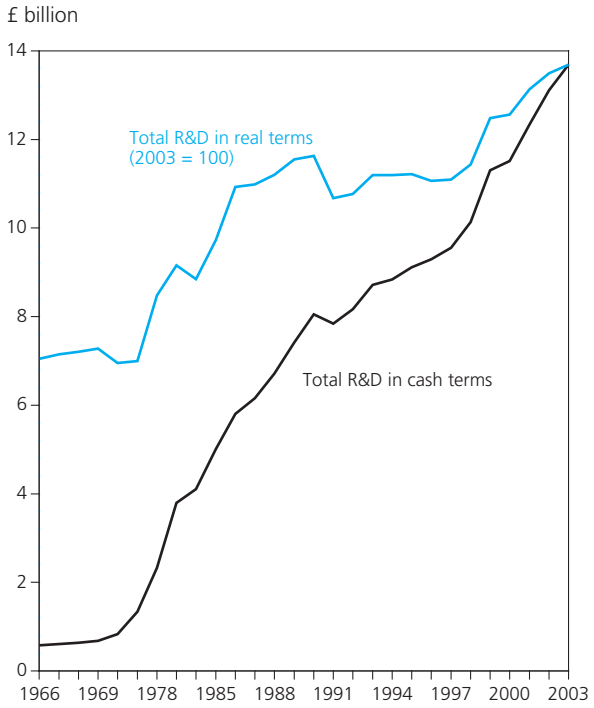
Table 9 shows the split of current and capital expenditure on R&D performed by UK businesses. Current expenditure is the sum of salaries and wages, basic and applied research and experimental development. Capital is the expenditure on land, buildings, plant and machinery.

### Government R&D expenditure (Tables 10 – 12, 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 (for example, Table 17).

Figure 2
## Net business enterprise expenditure on R&D, in cash and real terms, 1966–2003




The UK has a high proportion of central government expenditure devoted to R&D for defence purposes (see Table 19).

Figures in Tables 10 and 12 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 10 to 12 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.

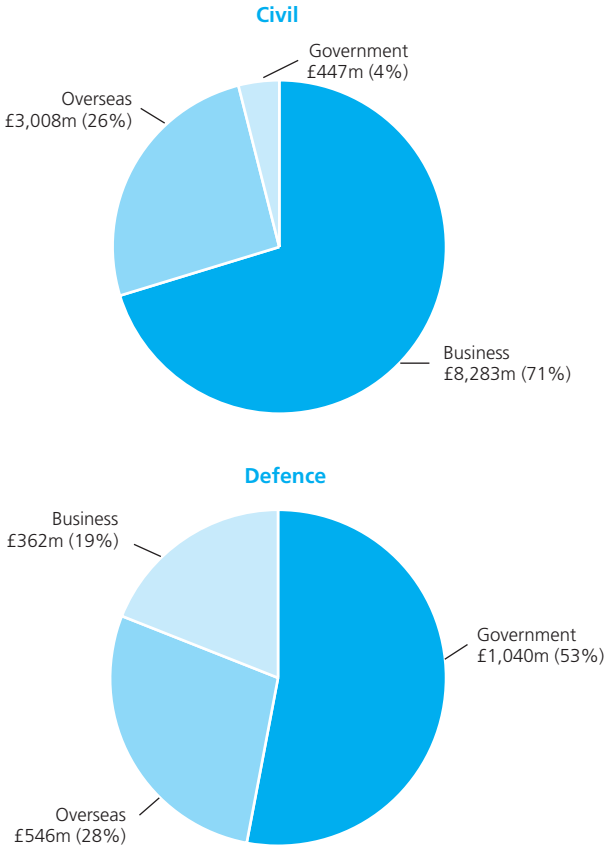
The difference is also attributed to factors such as:

- time lag problems due to differences in accounting periods and not all monies given being used in that financial period
- treatment of VAT
- sub-contracting of R&D work.

R&D costs in NHS hospitals previously included in Table 11 on the basis of the Culyer report,[7] are now reported as extramural expenditure. The figures for central government intramural R&D in Table 11 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 10 and Figure 4 show a time series dating back to 1966/67. They show that in 2003/04 the net Government expenditure on R&D (by civil and defence departments) was £7.9 billion, a 3.6 per cent increase in cash terms on 2002/03.

Figure 3
## Source of funds for Business Enterprise R&D, 2003




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 until 1998/99 (with a noteworthy exception in 1986/87 of £8.5 billion, higher than in 1980/81 of £8.4 billion), since when the trend has been upward, although spending in 2003/04 was still greater than in 1966/67.

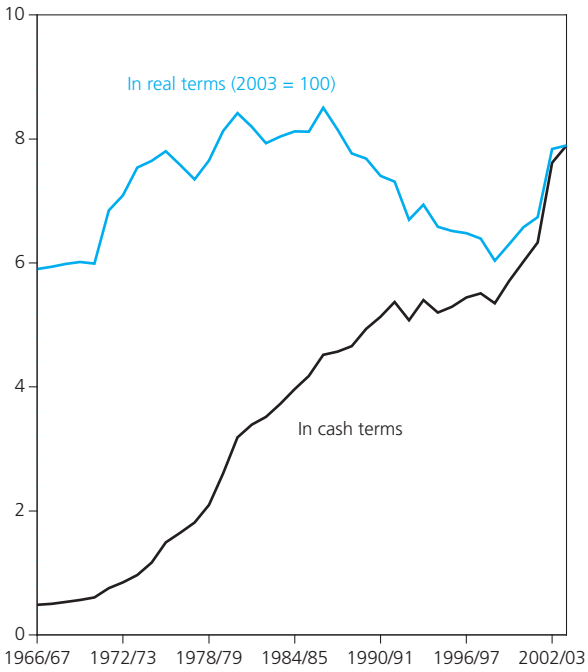
Table 11 shows the breakdown of departmental intramural expenditure (see Figure 5): the current (which is also shown by Frascati type of research) and capital expenditure. Figure 5 shows that 92 per cent (£1.4 billion) of intramural expenditure is current expenditure. Applied research accounts for 47 per cent of the total intramural expenditure. Total intramural expenditure is further broken down in Table 11 into Social Science & Humanities (SSH) and Natural Science & Engineering (NSE) research.

Table 12 provides an analysis of net government R&D expenditure by Frascati type of research activity for the period 1995/96 to 2003/04. There has been an 11 per cent increase in basic research and a four per cent increase in applied research between 2002/03 and 2003/04. In 2003/04 defence expenditure accounted for 32 per cent of total expenditure.

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

Between 2002 and 2003, employment rates have remained at similar levels.

Figure 4
**Total Net Government expenditure on R&D in cash terms and real terms, 1966/67 to 2003/04**




## 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 twelve 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 7). 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 and the East of England region, whilst for the Higher Education Sector, London, the South East and Scotland are prominent (see Figure 6). In terms of personnel estimates as a percentage of the labour force (see Figure 7), the Eastern and South East regions are prominent in both the Business sector and 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 2003/4*[5] discusses national variations). Small differences should not therefore 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 1995 to 2003. The ratio for GERD has been fairly constant over this time for most of the countries. Figure 8 shows the position in 2003. The UK was ranked 6th. Table 16 also shows BERD and GOVERD as a percentage of GDP.

Figure 5
**Analysis of Central Government intramural expenditure 2003–04**

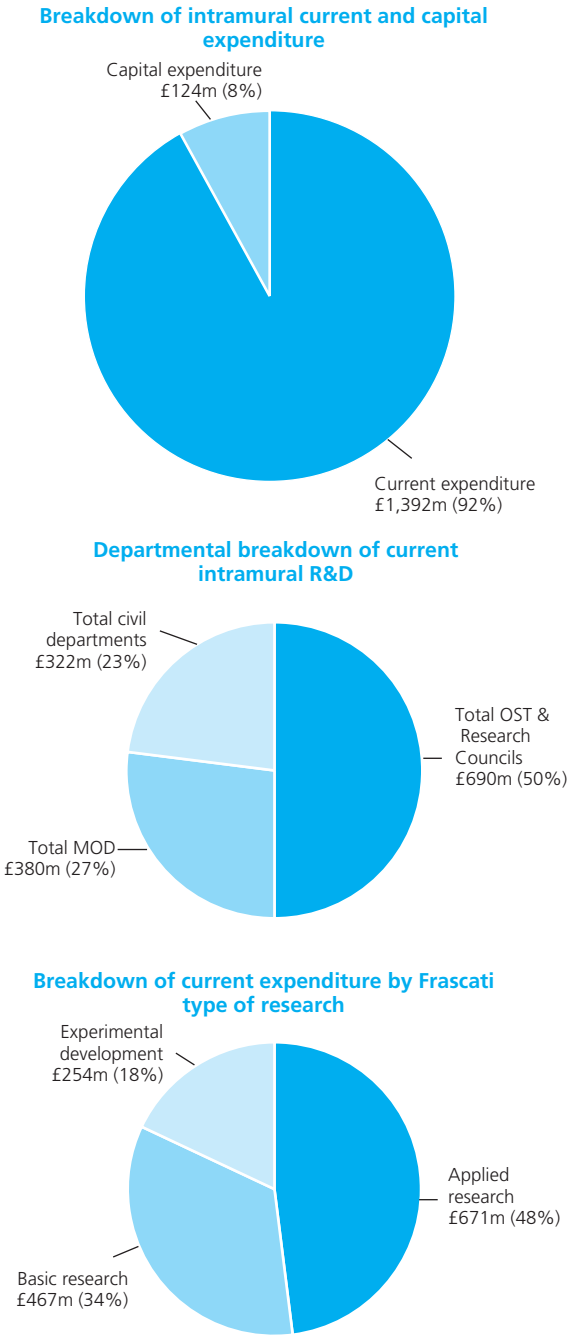


Figure 6

**(i) Estimated regional (GOR) BERD in 2003**

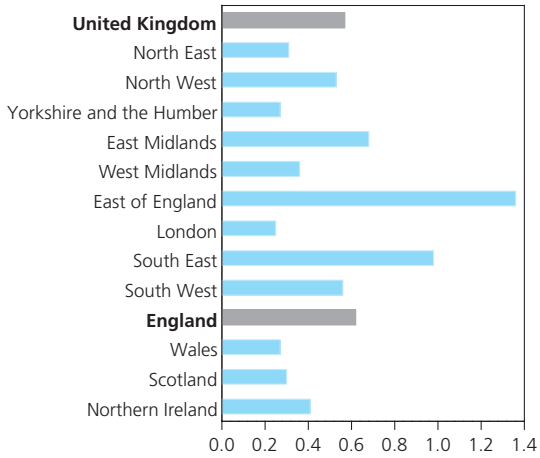

**(ii) Estimated regional (GOR) GOVERD in 2003**


**(iii) Estimated regional (GOR) HERD in 2003**


Figure 7

**(i) Estimated regional (GOR) BERD in 2003**

Percentage of the regional Labour Force




**(ii) Estimated regional (GOR) Government R&D in 2003**

Percentage of the regional Labour Force

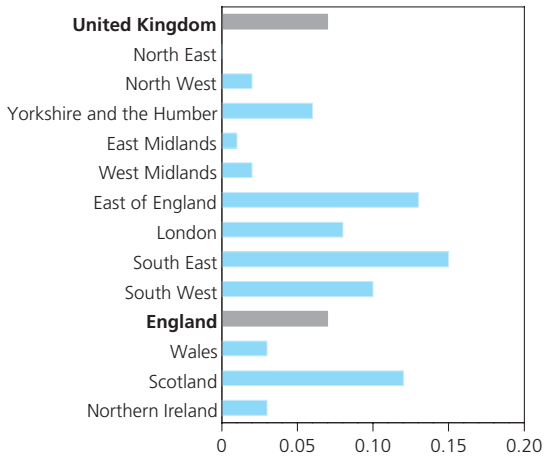
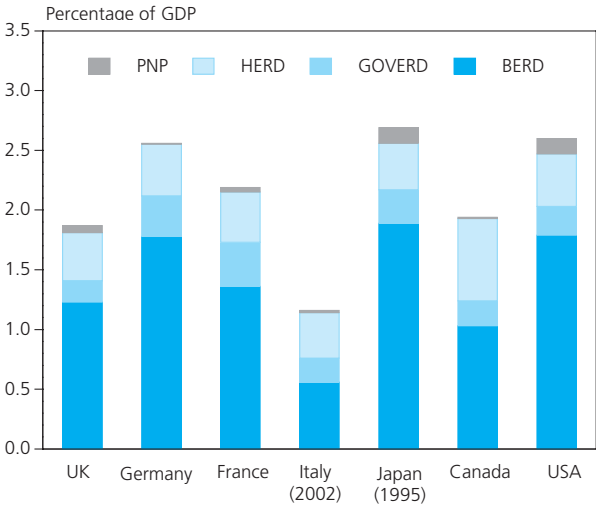



Figure 8

## Comparison of BERD, GOVERD, HERD and PNP as a percentage of GDP, 2003




***Source OECD***

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; the USA and Germany spend most as a percentage of GDP. International comparison of government funding of R&D in 2003 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 R&D funding 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.

## 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, 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 *Gross Domestic Expenditure on Research and Development 2003*.[4] However, higher education is identified separately as recommended in the Frascati Manual.

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

*Central Government* includes the central government departments, research councils, higher education funding councils, NDPBs, and Executive Agencies.

*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 1993/94 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.

The estimates of the UK's gross domestic expenditure have been revised between 1996 and 2002.

Between 1996 and 2000 the revisions are mainly due to the Ministry of Defence amending their data. The details are outlined in *Defence Statistics Bulletin 6*, which is available at the following web address: www.dasa.mod.uk/publications/pdfs/bulletin/bulletin6.pdf

A PNP survey was conducted for 2003, which revealed that the sector had been under-estimated in previous years. It also showed that the components of the funding needed revising, particularly the Research Councils. Using the results from this survey and supplementary data from the Research Councils it has been possible to revise the series back to the last PNP survey, which was conducted in 1996. The outcomes of these initiatives have resulted in revisions to the PNP data between 1997 and 2002.

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

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

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| | Tel. 01633 812789 |
| Information on aggregated R&D data | Julie Owens |
| | Tel. 01633 812789 |
| Definitions of R&D[3] | Julie Owens |
| | Tel. 01633 812789 |
| GERD[4] | Julie Owens |
| | Tel. 01633 812789 |
| General information on Science & Technology[2] | Julie Owens |
| | Tel. 01633 812789 |
| International comparisons[5, 6, 8] | Julie Owens |
| | Tel. 01633 812789 |

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9. Office for National Statistics (2004) *Business Enterprise Research and Development 2003* First Release, 26 November 2004. www.statistics.gov.uk


## 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, 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 |

Table 1

## Gross expenditure on civil and defence R&D performed in the UK in 2003[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] | 1,043 | 127 | 230 | 1,479 | 29 | 2,907 | 371 |
| Research Councils | 6 | 502 | 1,022 | 8 | 408 | 1,947 | 204 |
| Higher Education Funding Councils | – | – | 1,665 | – | – | 1,665 | |
| Higher education institutions | 1 | 10 | 182 | – | 6 | 199 | |
| Business enterprise | 143 | 37 | 247 | 8,642 | 70 | 9,139 | 1,259 |
| Private non-profit | 14 | 64 | 747 | 3 | 103 | 931 | |
| Abroad | 15 | 48 | 365 | 3,554 | 53 | 4,035 | |
| **Total** | **1,222** | **788** | **4,458** | **13,687** | **669** | **20,824** | **n/a** |
| **Civil** | | | | | | | |
| Government departments[4] | 694 | 121 | 219 | 439 | 28 | 1,503 | 152 |
| Research Councils | 6 | 502 | 1,022 | 8 | 408 | 1,947 | 204 |
| Higher Education Funding Councils | – | – | 1,665 | – | – | 1,665 | |
| Higher education institutions | 1 | 10 | 182 | – | 6 | 199 | |
| Business enterprise | 123 | 37 | 219 | 8,280 | 70 | 8,729 | |
| Private non-profit | 14 | 64 | 747 | 3 | 103 | 931 | |
| Abroad | 10 | 48 | 365 | 3,008 | 53 | 3,484 | |
| **Total** | **848** | **782** | **4,420** | **11,739** | **669** | **18,457** | **n/a** |
| **Defence** | | | | | | | |
| Government departments[4] | 348 | 6 | 10 | 1,040 | 0 | 1,404 | 219 |
| Research Councils | – | – | – | – | – | – | – |
| Higher Education Funding Councils | – | – | – | – | – | – | |
| Higher education institutions | 0 | – | – | – | – | 0 | |
| Business enterprise | 20 | – | 28 | 362 | – | 410 | |
| Private non-profit | – | – | – | – | – | – | |
| Abroad | 5 | – | – | 546 | – | 551 | |
| **Total** | **374** | **6** | **38** | **1,948** | **0** | **2,366** | **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 24 March 2005.*

*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, 1995 to 2003[1]

£ million

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| **Expenditure in cash terms (£m):** | | | | | | | | | |
| Performed by: | | | | | | | | | |
| Government | 1,462 | 1,553 | 1,403 | 1,471 | 1,464 | 1,593 | 1,160 | 1,053 | 1,222 |
| Research Councils | 581 | 575 | 590 | 591 | 622 | 646 | 670 | 699 | 788 |
| Business enterprise | 9,116 | 9,297 | 9,556 | 10,133 | 11,302 | 11,510 | 12,336 | 13,110 | 13,687 |
| Higher education | 2,696 | 2,792 | 2,893 | 3,040 | 3,324 | 3,648 | 4,034 | 4,416 | 4,458 |
| Private non-profit | 177 | 177 | 212 | 226 | 257 | 322 | 423 | 539 | 669 |
| **Total** | **14,034** | **14,394** | **14,654** | **15,460** | **16,969** | **17,718** | **18,623** | **19,817** | **20,824** |
| **Expenditure in real terms (2003=100)[2] (£m):** | | | | | | | | | |
| Performed by: | | | | | | | | | |
| Government | 1,799 | 1,849 | 1,628 | 1,659 | 1,616 | 1,738 | 1,234 | 1,084 | 1,222 |
| Research Councils | 715 | 684 | 685 | 667 | 687 | 705 | 713 | 719 | 788 |
| Business enterprise | 11,216 | 11,067 | 11,091 | 11,431 | 12,478 | 12,562 | 13,129 | 13,490 | 13,687 |
| Higher education | 3,317 | 3,324 | 3,358 | 3,430 | 3,670 | 3,981 | 4,294 | 4,544 | 4,458 |
| Private non-profit | 218 | 211 | 246 | 255 | 284 | 352 | 450 | 554 | 669 |
| **Total** | **17,266** | **17,135** | **17,008** | **17,441** | **18,735** | **19,337** | **19,821** | **20,391** | **20,824** |
| ***Total as percentage of GDP[3]*** | ***1.93*** | ***1.86*** | ***1.78*** | ***1.78*** | ***1.85*** | ***1.84*** | ***1.85*** | ***1.87*** | ***1.86*** |

*Notes:*

*1 See notes at Table 1.*

*2 GDP deflators are:*

| 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|
| *81.3* | *84.0* | *86.2* | *88.6* | *90.6* | *91.6* | *94.0* | *97.2* | *100.0* |

*3 Gross domestic product values are:* £ million

| 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|
| 728,658 | 773,407 | 822,818 | 868,443 | 919,077 | 961,864 | 1,004,082 | 1,058,060 | 1,116,714 |

Table 3

## Gross expenditure on R&D in the UK by source of funds, 1995 to 2003[1,2]

£ million

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| **Sector providing funds** | | | | | | | | | |
| **Expenditure in cash terms (£m):** | | | | | | | | | |
| Funded by: | | | | | | | | | |
| Government | 2,514 | 2,508 | 2,369 | 2,564 | 2,712 | 2,763 | 2,440 | 2,178 | 2,907 |
| Research Councils | 1,078 | 1,092 | 1,156 | 1,139 | 1,211 | 1,317 | 1,512 | 1,713 | 1,947 |
| Higher Education Funding Councils | 1,018 | 1,027 | 1,033 | 1,085 | 1,157 | 1,276 | 1,474 | 1,626 | 1,665 |
| Higher education | 119 | 121 | 123 | 130 | 143 | 158 | 177 | 196 | 199 |
| Business enterprise | 6,765 | 6,784 | 7,275 | 7,331 | 8,137 | 8,559 | 8,740 | 9,138 | 9,139 |
| Private non-profit | 511 | 545 | 578 | 621 | 701 | 815 | 888 | 963 | 931 |
| Abroad | 2,029 | 2,316 | 2,119 | 2,590 | 2,908 | 2,830 | 3,392 | 4,003 | 4,035 |
| **Total** | **14,034** | **14,394** | **14,654** | **15,460** | **16,969** | **17,718** | **18,623** | **19,817** | **20,824** |
| **Expenditure in real terms (2003=100) (£m):** | | | | | | | | | |
| **Funded by:** | | | | | | | | | |
| Government | 3,093 | 2,986 | 2,750 | 2,892 | 2,994 | 3,016 | 2,597 | 2,241 | 2,907 |
| Research Councils | 1,326 | 1,300 | 1,342 | 1,285 | 1,337 | 1,437 | 1,609 | 1,762 | 1,947 |
| Higher Education Funding Councils | 1,252 | 1,223 | 1,199 | 1,224 | 1,277 | 1,393 | 1,568 | 1,674 | 1,665 |
| Higher education | 146 | 144 | 143 | 147 | 157 | 172 | 188 | 201 | 199 |
| Business enterprise | 8,323 | 8,076 | 8,444 | 8,271 | 8,984 | 9,341 | 9,302 | 9,403 | 9,139 |
| Private non-profit | 629 | 649 | 671 | 701 | 774 | 890 | 945 | 991 | 931 |
| Abroad | 2,497 | 2,757 | 2,460 | 2,922 | 3,211 | 3,089 | 3,610 | 4,119 | 4,035 |
| **Total** | **17,266** | **17,135** | **17,008** | **17,441** | **18,735** | **19,337** | **19,821** | **20,391** | **20,824** |
| ***Total as percentage of GDP*** | ***1.93*** | ***1.86*** | ***1.78*** | ***1.78*** | ***1.85*** | ***1.84*** | ***1.85*** | ***1.87*** | ***1.86*** |

*Notes:*
*1 See notes at Table 1.*
*2 See notes at Table 2.*

Table 4

## Business Enterprise R&D, in cash terms and real terms,1966 to 2003

£ million

| Year | Total Business Enterprise R&D | |
|---|---|---|
| | In cash terms | In real terms (2003=100)[1] |
| 1966 | 580 | 7,045 |
| 1967 | 605 | 7,144 |
| 1968 | 639 | 7,204 |
| 1969 | 680 | 7,279 |
| 1970 | N/S | N/S |
| 1971 | N/S | N/S |
| 1972 | 831 | 6,953 |
| 1973 | N/S | N/S |
| 1974 | N/S | N/S |
| 1975 | 1,340 | 6,994 |
| 1976 | N/S | N/S |
| 1977 | N/S | N/S |
| 1978 | 2,324 | 8,481 |
| 1979 | N/S | N/S |
| 1980 | N/S | N/S |
| 1981 | 3,793 | 9,155 |
| 1982 | N/S | N/S |
| 1983 | 4,104 | 8,846 |
| 1984 | N/S | N/S |
| 1985 | 5,005 | 9,727 |
| 1986 | 5,804 | 10,931 |
| 1987 | 6,159 | 10,985 |
| 1988 | 6,717 | 11,200 |
| 1989 | 7,416 | 11,551 |
| 1990 | 8,054 | 11,627 |
| 1991 | 7,842 | 10,678 |
| 1992 | 8,166 | 10,768 |
| 1993 | 8,717 | 11,196 |
| 1994 | 8,842 | 11,194 |
| 1995 | 9,116 | 11,216 |
| 1996 | 9,297 | 11,067 |
| 1997 | 9,556 | 11,091 |
| 1998 | 10,133 | 11,431 |
| 1999 | 11,302 | 12,478 |
| 2000 | 11,510 | 12,562 |
| 2001 | 12,336 | 13,129 |
| 2002 | 13,110 | 13,490 |
| 2003 | 13,687 | 13,687 |

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

Table 5

## Expenditure on R&D performed in UK businesses: broad product groups, in cash & real terms, 1995 to 2003

£ million

| In cash terms | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| **Manufacturing: Total** | **7,134** | **7,264** | **7,608** | **8,142** | **8,995** | **9,231** | **9,788** | **10,140** | **10,535** |
| Chemicals | 2,515 | 2,479 | 2,831 | 2,926 | 3,253 | 3,528 | 3,562 | 3,887 | 3,793 |
| Mechanical engineering | 660 | 668 | 709 | 730 | 712 | 776 | 907 | 826 | 1,032 |
| Electrical machinery | 1,245 | 1,313 | 1,181 | 1,320 | 1,335 | 1,558 | 1,599 | 1,565 | 1,449 |
| Transport equipment | 833 | 977 | 990 | 1,020 | 1,235 | 1,094 | 1,189 | 1,244 | 1,346 |
| Aerospace | 886 | 812 | 893 | 1,039 | 1,237 | 1,091 | 1,260 | 1,347 | 1,652 |
| Other manufacturing | 994 | 1,016 | 1,004 | 1,108 | 1,222 | 1,183 | 1,271 | 1,272 | 1,264 |
| **Services** | **..** | **1,736** | **1,652** | **1,668** | **1,972** | **1,905** | **2,280** | **2,645** | **2,876** |
| **Other: Total** | **..** | **296** | **295** | **323** | **335** | **374** | **268** | **324** | **276** |
| Agriculture, hunting & forestry; Fishing | .. | 76 | 84 | 102 | 115 | 135 | 96 | 122 | 121 |
| Extractive industries | 65 | 64 | 44 | 41 | 42 | 46 | 43 | 52 | 56 |
| Electricity, gas & water supply | 168 | 148 | 130 | 140 | 137 | 160 | 99 | 116 | 69 |
| Construction | 8 | 8 | 38 | 39 | 41 | 34 | 30 | 35 | 30 |
| **Total** | **9,116** | **9,297** | **9,556** | **10,133** | **11,302** | **11,510** | **12,336** | **13,110** | **13,687** |

| In real terms (at 2003 prices) | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| **Manufacturing: Total** | **8,777** | **8,647** | **8,830** | **9,185** | **9,931** | **10,075** | **10,417** | **10,434** | **10,535** |
| Chemicals | 3,094 | 2,951 | 3,286 | 3,301 | 3,591 | 3,850 | 3,791 | 4,000 | 3,793 |
| Mechanical engineering | 812 | 795 | 823 | 824 | 786 | 847 | 965 | 850 | 1,032 |
| Electrical machinery | 1,532 | 1,563 | 1,371 | 1,489 | 1,474 | 1,700 | 1,702 | 1,610 | 1,449 |
| Transport equipment | 1,025 | 1,163 | 1,149 | 1,151 | 1,364 | 1,194 | 1,265 | 1,280 | 1,346 |
| Aerospace | 1,090 | 967 | 1,036 | 1,172 | 1,366 | 1,191 | 1,341 | 1,386 | 1,652 |
| Other manufacturing | 1,223 | 1,209 | 1,165 | 1,250 | 1,349 | 1,291 | 1,353 | 1,309 | 1,264 |
| **Services** | **..** | **2,067** | **1,917** | **1,882** | **2,177** | **2,079** | **2,427** | **2,722** | **2,876** |
| **Other: Total** | **..** | **352** | **342** | **364** | **370** | **408** | **285** | **333** | **276** |
| Agriculture, hunting & forestry; Fishing | .. | 90 | 97 | 115 | 127 | 147 | 102 | 126 | 121 |
| Extractive industries | 80 | 76 | 51 | 46 | 46 | 50 | 46 | 54 | 56 |
| Electricity, gas & water supply | 207 | 176 | 151 | 158 | 151 | 175 | 105 | 119 | 69 |
| Construction | 10 | 10 | 44 | 44 | 45 | 37 | 32 | 36 | 30 |
| **Total** | **11,216** | **11,067** | **11,091** | **11,431** | **12,478** | **12,562** | **13,129** | **13,490** | **13,687** |

*Notes:*
*1 .. denotes disclosive figures.*

Table 6

## Expenditure on civil and defence R&D performed by Business Enterprises, 1996 to 2003

**(i) in cash terms (£m)**

| | Civil | | | | | | | | Defence | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| **All product groups** | **7,937** | **8,112** | **8,600** | **9,626** | **9,838** | **10,513** | **11,461** | **11,739** | **1,360** | **1,443** | **1,533** | **1,675** | **1,671** | **1,824** | **1,649** | **1,948** |
| **Manufacturing: Total** | **5,997** | **6,303** | **6,725** | **7,376** | **7,582** | **8,089** | **8,626** | **8,754** | **1,268** | **1,305** | **1,417** | **1,619** | **1,649** | **1,699** | **1,514** | **1,781** |
| Chemicals | 2,477 | 2,829 | 2,926 | 3,252 | 3,527 | 3,562 | 3,885 | 3,793 | 2 | 2 | – | 1 | – | – | 2 | – |
| Mechanical engineering | 395 | 407 | 455 | 434 | 463 | 470 | 524 | 466 | 273 | 302 | 276 | 279 | 314 | 437 | 302 | 566 |
| Electrical machinery | 896 | 803 | 916 | 1,013 | 1,163 | 1,200 | 1,204 | 1,131 | 417 | 377 | 404 | 322 | 395 | 399 | 361 | 318 |
| Transport equipment | 967 | 979 | 983 | 1,159 | 1,023 | 1,106 | .. | .. | 10 | 11 | 36 | 77 | 71 | 82 | .. | .. |
| Aerospace | 359 | 412 | 485 | 535 | 457 | 621 | 645 | 859 | 453 | 481 | 554 | 701 | 634 | 639 | 702 | 792 |
| Other manufacturing | 903 | 873 | 960 | 983 | 948 | 1,130 | .. | .. | 113 | 131 | 147 | 239 | 235 | 141 | .. | .. |
| **Services** | **1,644** | **1,513** | **1,552** | **1,915** | **1,883** | **2,155** | **2,511** | **2,709** | **92** | **139** | **116** | **57** | **22** | **125** | **135** | **167** |
| **Other: Total** | **296** | **295** | **322** | **335** | **374** | **268** | **324** | **276** | **–** | **–** | **–** | **–** | **–** | **–** | **–** | **–** |
| Agriculture, hunting & forestry; Fishing | 76 | 84 | 102 | 115 | 135 | 96 | 122 | 121 | – | – | – | – | – | – | – | – |
| Extractive industries | 64 | 44 | 41 | 42 | 46 | 43 | 52 | 56 | – | – | – | – | – | – | – | – |
| Electricity, gas & water supply | 148 | 130 | 140 | 137 | 160 | 99 | 116 | 69 | – | – | – | – | – | – | – | – |
| Construction | 8 | 38 | 39 | 41 | 34 | 30 | 35 | 30 | – | – | – | – | – | – | – | – |

**(ii) in real terms (£m 2003 prices)[1]**

| | Civil | | | | | | | | Defence | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
| **All product groups** | **9,448** | **9,415** | **9,702** | **10,628** | **10,737** | **11,189** | **11,793** | **11,739** | **1,619** | **1,675** | **1,729** | **1,849** | **1,824** | **1,941** | **1,697** | **1,948** |
| **Manufacturing: Total** | **7,139** | **7,316** | **7,587** | **8,144** | **8,275** | **8,609** | **8,876** | **8,754** | **1,509** | **1,515** | **1,599** | **1,787** | **1,800** | **1,808** | **1,558** | **1,781** |
| Chemicals | 2,949 | 3,283 | 3,301 | 3,590 | 3,849 | 3,791 | 3,998 | 3,793 | 2 | 2 | – | 1 | – | – | 2 | – |
| Mechanical engineering | 470 | 472 | 513 | 479 | 505 | 500 | 539 | 466 | 325 | 351 | 311 | 308 | 343 | 465 | 311 | 566 |
| Electrical machinery | 1,067 | 932 | 1,033 | 1,118 | 1,269 | 1,277 | 1,239 | 1,131 | 496 | 438 | 456 | 356 | 431 | 425 | 371 | 318 |
| Transport equipment | 1,151 | 1,136 | 1,109 | 1,280 | 1,116 | 1,177 | .. | .. | 12 | 13 | 41 | 85 | 77 | 87 | .. | .. |
| Aerospace | 427 | 478 | 547 | 591 | 499 | 661 | 664 | 859 | 539 | 558 | 625 | 774 | 692 | 680 | 722 | 792 |
| Other manufacturing | 1,075 | 1,013 | 1,083 | 1,085 | 1,035 | 1,203 | .. | .. | 135 | 152 | 166 | 264 | 256 | 150 | .. | .. |
| **Services** | **1,957** | **1,756** | **1,751** | **2,114** | **2,055** | **2,294** | **2,584** | **2,709** | **110** | **161** | **131** | **63** | **24** | **133** | **139** | **167** |
| **Other: Total** | **352** | **342** | **363** | **370** | **408** | **285** | **333** | **276** | **–** | **–** | **–** | **–** | **–** | **–** | **–** | **–** |
| Agriculture, hunting & forestry; Fishing | 90 | 97 | 115 | 127 | 147 | 102 | 126 | 121 | – | – | – | – | – | – | – | – |
| Extractive industries | 76 | 51 | 46 | 46 | 50 | 46 | 54 | 56 | – | – | – | – | – | – | – | – |
| Electricity, gas & water supply | 176 | 151 | 158 | 151 | 175 | 105 | 119 | 69 | – | – | – | – | – | – | – | – |
| Construction | 10 | 44 | 44 | 45 | 37 | 32 | 36 | 30 | – | – | – | – | – | – | – | – |

*Notes:*

*1 See table 2 for deflators*

Table 7

## Sources of funds for business enterprise R&D in cash terms, 1995 to 2003

£ million, cash terms

| | | Government £m | Overseas £m | Mainly own resources[1] £m | Total intramural R&D £m |
|---|---|---|---|---|---|
| **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 | 419 | 1,671 |
| **2001** | | **1,101** | **3,012** | **8,222** | **12,336** |
| *of which:* | Civil | 191 | 2,585 | 7,737 | 10,513 |
| | Defence | 911 | 427 | 486 | 1,824 |
| **2002** | | **884** | **3,567** | **8,658** | **13,110** |
| *of which:* | Civil | 193 | 3,026 | 8,242 | 11,461 |
| | Defence | 691 | 541 | 417 | 1,649 |
| **2003** | | **1,487** | **3,554** | **8,645** | **13,687** |
| *of which:* | Civil | 447 | 3,008 | 8,283 | 11,739 |
| | Defence | 1,040 | 546 | 362 | 1,948 |
| | | Per cent | Per cent | Per cent | Per cent |
| **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** | | ***9*** | ***24*** | ***67*** | ***100*** |
| *of which:* | Civil | *2* | *25* | *74* | *100* |
| | Defence | *50* | *23* | *27* | *100* |
| **2002** | | ***7*** | ***27*** | ***66*** | ***100*** |
| *of which:* | Civil | *2* | *26* | *72* | *100* |
| | Defence | *42* | *33* | *25* | *100* |
| **2003** | | ***11*** | ***26*** | ***63*** | ***100*** |
| *of which:* | Civil | *4* | *26* | *71* | *100* |
| | Defence | *53* | *28* | *19* | *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 8

## Intramural expenditure on R&D performed by UK businesses: detailed product groups, 1995 to 2003

£ million

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 |
|---|---|---|---|---|---|---|---|---|---|
| **Total** | **9,116** | **9,297** | **9,556** | **10,133** | **11,302** | **11,510** | **12,336** | **13,110** | **13,687** |
| Agriculture, hunting and forestry; Fishing | .. | 76 | 84 | 102 | 115 | 135 | 96 | 122 | 121 |
| Extractive Industries | .. | 64 | 44 | 41 | 42 | 46 | 43 | 52 | 56 |
| Food products and beverages; Tobacco products | 189 | 198 | 180 | 242 | 237 | 264 | 314 | 299 | 306 |
| Textiles, clothing and leather products | 23 | 27 | 33 | 33 | 28 | 29 | 17 | 19 | 20 |
| Pulp, paper and paper products; printing and publishing; Wood and straw products | 39 | 57 | 44 | 49 | 45 | 38 | 34 | 44 | 45 |
| Refined petroleum products and coke oven products; Processing of nuclear fuel | 239 | 230 | 225 | 234 | 212 | 182 | 250 | 258 | 277 |
| Chemicals, man- made fibres | 701 | 627 | 680 | 688 | 718 | 682 | 522 | 583 | 552 |
| Pharmaceuticals, medical chemicals and botanical products | 1,813 | 1,852 | 2,151 | 2,238 | 2,535 | 2,846 | 3,040 | 3,304 | 3,241 |
| Rubber and plastic products | 60 | 67 | 60 | 66 | 72 | 54 | 45 | 64 | 64 |
| Other non-metallic mineral products | 54 | 60 | 47 | 56 | 59 | .. | 41 | 46 | 48 |
| Casting of iron and steel | 46 | 39 | 39 | 47 | 41 | .. | 31 | 32 | 29 |
| Non-ferrous metals | 20 | 15 | 15 | 20 | 22 | 21 | 19 | 16 | 6 |
| Fabricated metal products | 100 | 91 | 88 | 90 | 70 | 73 | 64 | 59 | 60 |
| Machinery and equipment | 583 | 577 | 622 | 640 | 642 | 703 | 843 | 767 | 973 |
| Office machinery and computers | 150 | 161 | 102 | 125 | 111 | 113 | 105 | 146 | 58 |
| Electrical machinery and apparatus | 494 | 490 | 424 | 423 | 357 | 422 | 451 | 462 | 443 |
| Radio, television and communication equipment | 602 | 662 | 655 | 772 | 867 | 1,024 | 1,044 | 957 | 948 |
| Precision instruments | 303 | 307 | 336 | 340 | 473 | 480 | 488 | 442 | 400 |
| Motor vehicles and parts | 795 | 926 | 924 | 913 | 1,060 | 864 | 898 | 929 | 1,173 |
| Other transport equipment | 18 | 30 | 50 | 72 | 99 | 158 | 208 | .. | .. |
| Shipbuilding and repairs | 20 | 20 | 15 | 36 | 76 | 72 | 83 | .. | .. |
| Aerospace | 886 | 812 | 893 | 1,039 | 1,237 | 1,091 | 1,260 | 1,347 | 1,652 |
| Furniture; Other manufactured goods | 21 | 16 | 25 | 20 | 33 | 27 | 31 | 48 | 68 |
| Recycling | .. | 1 | - | - | 1 | 1 | 1 | 3 | 2 |
| Electricity, gas and water supply | 168 | 148 | 130 | 140 | 137 | 160 | 99 | 116 | 69 |
| Construction | 8 | 8 | 38 | 39 | 41 | 34 | 30 | 35 | 30 |
| Wholesale and retail trade | .. | .. | .. | .. | .. | .. | 55 | 69 | .. |
| Transport and storage | .. | .. | .. | .. | .. | .. | 12 | 10 | .. |
| Post and telecommunications | 414 | 455 | 496 | 449 | 565 | 674 | 733 | 742 | 660 |
| Miscellaneous business activities; Technical testing and analysis | .. | 141 | 142 | 157 | 196 | 131 | 242 | 360 | 288 |
| Computer and related activities | 675 | 749 | 680 | 688 | 713 | 611 | 725 | 888 | 1,323 |
| Research and development services | 247 | 369 | 313 | 346 | 448 | 428 | 495 | 558 | 465 |
| Public administration | 14 | 10 | 6 | 8 | 11 | 12 | 18 | 18 | 24 |

*Notes:*
*1 .. denotes disclosive figures.*
*2 Zero denotes a value less than 0.5*
*3 See notes about revisions to past data.*

Table 9

## Current and capital expenditure, and as a percentage of the total, on R&D performed by UK Businesses: detailed product groups, 2003

| | 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 | Per cent | Per cent | Per cent | Per cent | Per cent |
| **Total** | **13,687** | **1,210** | **12,476** | **6,090** | **6,386** | ***100*** | ***9*** | ***91*** | ***44*** | ***47*** |
| Agriculture, hunting and forestry; Fishing | 121 | 16 | 104 | 58 | 47 | *100* | *14* | *86* | *48* | *39* |
| Extractive Industries | 56 | 2 | 54 | 36 | 17 | *100* | *4* | *96* | *65* | *31* |
| Food products and beverages; Tobacco products | 306 | 36 | 269 | 158 | 111 | *100* | *12* | *88* | *52* | *36* |
| Textiles, clothing and leather products | 20 | 13 | 7 | 4 | 3 | *100* | *65* | *35* | *20* | *14* |
| Pulp, paper and paper products; Printing and publishing; Wood and straw products | 45 | 2 | 43 | 15 | 28 | *100* | *4* | *96* | *33* | *63* |
| Refined petroleum products and coke oven products; Processing of nuclear fuel | 277 | 45 | 232 | 80 | 151 | *100* | *16* | *84* | *29* | *55* |
| Chemicals, man-made fibres | 552 | 43 | 509 | 271 | 238 | *100* | *8* | *92* | *49* | *43* |
| Pharmaceuticals, medical chemicals and botanical products | 3,241 | 490 | 2,751 | 1,236 | 1,515 | *100* | *15* | *85* | *38* | *47* |
| Rubber and plastic products | 64 | 6 | 58 | 25 | 33 | *100* | *10* | *90* | *39* | *51* |
| Other non-metallic mineral products | 48 | 4 | 44 | 24 | 20 | *100* | *8* | *92* | *50* | *42* |
| Casting of iron and steel | 29 | 0 | 28 | 15 | 13 | *100* | *2* | *98* | *53* | *45* |
| Non-ferrous metals | 6 | 1 | 5 | 3 | 3 | *100* | *11* | *89* | *44* | *45* |
| Fabricated metal products | 60 | 4 | 56 | 28 | 28 | *100* | *7* | *93* | *46* | *47* |
| Machinery equipment | 973 | 15 | 958 | 393 | 564 | *100* | *2* | *98* | *40* | *58* |
| Office machinery and computers | 58 | 1 | 57 | 29 | 28 | *100* | *2* | *98* | *50* | *49* |
| Electrical machinery and apparatus | 443 | 37 | 405 | 202 | 204 | *100* | *8* | *92* | *46* | *46* |
| Radio, television and communication equipment | 948 | 43 | 905 | 463 | 442 | *100* | *5* | *95* | *49* | *47* |
| Precision instruments | 400 | 47 | 354 | 208 | 146 | *100* | *12* | *88* | *52* | *36* |
| Motor vehicles and parts | 1,173 | 40 | 1,133 | 595 | 538 | *100* | *3* | *97* | *51* | *46* |
| Other transport equipment | .. | .. | .. | .. | .. | *100* | .. | .. | .. | .. |
| Shipbuilding and repairs | .. | .. | .. | .. | .. | *100* | .. | .. | .. | .. |
| Aerospace | 1,652 | 233 | 1,418 | 557 | 861 | *100* | *14* | *86* | *34* | *52* |
| Furniture; Other manufactured goods | 68 | 0 | 68 | 64 | 4 | *100* | *0* | *100* | *94* | *6* |
| Recycling | 2 | 0 | 2 | 2 | 1 | *100* | *2* | *98* | *73* | *25* |
| Electricity, gas and water supply | 69 | 6 | 63 | 48 | 14 | *100* | *9* | *91* | *71* | *21* |
| Construction | 30 | 1 | 29 | 18 | 11 | *100* | *3* | *97* | *60* | *37* |
| Wholesale and retail trades | .. | 15 | .. | .. | 36 | *100* | .. | .. | .. | .. |
| Transport and storage | .. | 0 | .. | .. | 1 | *100* | .. | .. | .. | .. |
| Post and telecommunications | 660 | 8 | 652 | 282 | 370 | *100* | *1* | *99* | *43* | *56* |
| Miscellaneous business activities; Technical testing and analysis | 288 | 16 | 273 | 166 | 106 | *100* | *5* | *95* | *58* | *37* |
| Computer related activities | 1,323 | 54 | 1,269 | 764 | 505 | *100* | *4* | *96* | *58* | *38* |
| Research and development services | 465 | 27 | 438 | 224 | 214 | *100* | *6* | *94* | *48* | *46* |
| Public administration | 24 | 4 | 21 | 4 | 17 | *100* | *15* | *85* | *17* | *68* |

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

Table 10

## Total Net Government expenditure on R&D in cash terms and real terms, 1966/67 to 2003/04

£ million

| | Total Net Government R&D | |
|---|---|---|
| Year | In cash terms excluding NHS figures | In real terms (2003=100)[1] |
| 1966/67 | 486 | 5,903 |
| 1967/68 | 503 | 5,939 |
| 1968/69 | 531 | 5,986 |
| 1969/70 | 562 | 6,016 |
| 1970/71 | 606 | 5,988 |
| 1971/72 | 755 | 6,845 |
| 1972/73 | 847 | 7,087 |
| 1973/74 | 964 | 7,539 |
| 1974/75 | 1,169 | 7,649 |
| 1975/76 | 1,495 | 7,803 |
| 1976/77 | 1,647 | 7,579 |
| 1977/78 | 1,814 | 7,347 |
| 1978/79 | 2,097 | 7,652 |
| 1979/80 | 2,601 | 8,124 |
| 1980/81 | 3,184 | 8,417 |
| 1981/82 | 3,395 | 8,194 |
| 1982/83 | 3,519 | 7,933 |
| 1983/84 | 3,730 | 8,040 |
| 1984/85 | 3,964 | 8,120 |
| 1985/86 | 4,175 | 8,115 |
| 1986/87 | 4,516 | 8,505 |
| 1987/88 | 4,568 | 8,148 |
| 1988/89 | 4,656 | 7,763 |
| 1989/90 | 4,934 | 7,685 |
| 1990/91 | 5,130 | 7,406 |
| 1991/92 | 5,371 | 7,313 |
| 1992/93 | 5,078 | 6,695 |
| 1993/94 | 5,402 | 6,939 |
| 1994/95 | 5,200 | 6,584 |
| 1995/96[2] | 5,295 | 6,515 |
| 1996/97[2] | 5,442 | 6,478 |
| 1997/98[2] | 5,507 | 6,391 |
| 1998/99[2] | 5,349 | 6,034 |
| 1999/00[2] | 5,709 | 6,303 |
| 2000/01[2] | 6,027 | 6,577 |
| 2001/02[2] | 6,329 | 6,736 |
| 2002/03[2] | 7,618 | 7,839 |
| 2003/04[2] | 7,893 | 7,893 |

*Notes:*

*1 See note at Table 2.*

*2 Figures for NHS are available in SET 2004 (ref 1).*

Table 11
## Analysis of Government Intramural expenditure, 2003/04[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 | 146.4 | 53.5 | 92.9 | – | 26.4 | **172.8** | – | 172.8 |
| ESRC | 6.0 | 6.0 | – | – | 1.0 | **6.9** | 6.9 | – |
| MRC | 222.6 | 143.8 | 78.8 | – | 26.5 | **249.1** | – | 249.1 |
| NERC | 140.3 | 81.0 | 46.0 | 13.3 | 25.3 | **165.7** | – | 165.7 |
| EPSRC | 18.6 | 9.7 | 8.9 | – | 0.8 | **19.4** | – | 19.4 |
| PPARC | 31.5 | 28.4 | 3.2 | – | 5.1 | **36.6** | – | 36.6 |
| CCLRC | 124.4 | 30.8 | 93.5 | – | 27.5 | **151.8** | – | 151.8 |
| **Total OST & Research Councils** | **689.8** | **353.2** | **323.3** | **13.3** | **112.5** | **802.3** | **6.9** | **795.4** |
| Higher Education Funding Councils | – | – | – | – | – | – | – | – |
| **Total Higher Education Funding Councils** | – | – | – | – | – | – | – | – |
| **Civil departments** | | | | | | | | |
| DEFRA | 97.6 | 19.6 | 76.8 | 1.2 | 4.0 | **101.6** | 0.9 | 100.7 |
| DFES | 6.7 | 0.0 | 3.0 | 3.7 | – | **6.7** | 6.7 | – |
| ODPM | 4.7 | 0.1 | 4.5 | 0.1 | – | **4.7** | 3.3 | 1.4 |
| DFT | 3.4 | 0.0 | 3.0 | 0.3 | – | **3.4** | 0.4 | 2.9 |
| DH (includes NHS) | 32.5 | – | 25.8 | 6.8 | 1.9 | **34.4** | 0.7 | 33.7 |
| NHS(3) | – | – | – | – | – | – | – | – |
| DWP (formerly DSS) | 5.9 | 5.9 | – | – | – | **5.9** | 5.9 | – |
| HSC | 5.3 | – | 5.0 | 0.3 | 0.3 | **5.6** | 0.6 | 5.0 |
| HO | 42.9 | 31.0 | 11.9 | – | 1.0 | **43.9** | 32.2 | 11.6 |
| DCMS (formerly DNH) | 15.3 | 9.9 | 5.3 | – | 0.3 | **15.5** | 2.7 | 12.9 |
| DFID (formerly ODA) | 1.7 | – | 1.7 | – | – | **1.7** | 1.3 | 0.4 |
| DTI (ex OST) | – | – | – | – | – | – | – | – |
| FSA | – | – | – | – | – | – | – | – |
| NI | 6.5 | 0.3 | 5.9 | 0.3 | 0.5 | **7.0** | 0.5 | 6.6 |
| SE (formerly SO) | 60.7 | 44.5 | 14.3 | 1.8 | 0.5 | **61.2** | 2.3 | 58.9 |
| NAW (formerly WO) | 8.5 | 0.9 | 6.9 | 0.6 | – | **8.5** | 5.8 | 2.7 |
| Other departments | 30.2 | 1.2 | 19.5 | 9.6 | 2.9 | **33.1** | 11.6 | 21.6 |
| **Total civil departments** | **321.9** | **113.7** | **183.6** | **24.7** | **11.3** | **333.3** | **74.9** | **258.4** |
| **Total civil R&D** | **1,011.7** | **466.9** | **506.8** | **38.0** | **123.8** | **1,135.5** | **81.8** | **1,053.8** |
| MOD | 379.9 | – | 163.9 | 216.0 | – | **379.9** | – | 379.9 |
| **Total** | **1,391.6** | **466.9** | **670.7** | **254.0** | **123.8** | **1,515.4** | **81.8** | **1,433.6** |

*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" in the "Definitions" section.*

Table 12

## Analysis of net Government R&D expenditure by Frascati type of research activity, 1995/96 to 2003/04[1]

£ million

| | | 1995/96 | 1996/97 | 1997/98 | 1998/99 | 1999/00 | 2000/01 | 2001/02 | 2002/03 | 2003/04 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Total Government R&D** | | | | | | | | | | |
| Basic | - pure | 1,273 | 1,322 | 1,334 | 1,369 | 1,467 | 1,666 | 1,964 | 2,228 | 2,487 |
| | - orientated | 504 | 524 | 523 | 535 | 566 | 620 | 683 | 718 | 768 |
| Applied | - strategic | 1,004 | N/A | N/A | N/A | N/A | N/A | 1,308 | 1,394 | 1,446 |
| | - specific | 1,322 | N/A | N/A | N/A | N/A | N/A | 1,156 | 1,351 | 1,409 |
| Experimental development | | 1,530 | 1,693 | 1,852 | 1,697 | 1,862 | 1,818 | 1,638 | 2,362 | 2,268 |
| **Total £m** | | **5,634** | **5,840** | **5,894** | **5,739** | **6,099** | **6,425** | **6,748** | **8,052** | **8,379** |
| **Civil R&D** | | | | | | | | | | |
| Basic | - pure | 1,273 | 1,322 | 1,334 | 1,369 | 1,467 | 1,666 | 1,964 | 2,228 | 2,487 |
| | - orientated | 504 | 524 | 523 | 535 | 566 | 620 | 682 | 718 | 768 |
| Applied | - strategic | 839 | 948 | 923 | 875 | 985 | 1,097 | 1,157 | 1,268 | 1,316 |
| | - specific | 813 | 681 | 698 | 704 | 667 | 657 | 750 | 962 | 1,014 |
| Experimental development | | 136 | 131 | 102 | 116 | 141 | 145 | 137 | 144 | 116 |
| **Total £m** | | **3,565** | **3,606** | **3,580** | **3,599** | **3,827** | **4,185** | **4,691** | **5,318** | **5,702** |
| **Defence R&D** | | | | | | | | | | |
| Basic | - pure | – | – | – | – | – | – | – | – | – |
| | - orientated | – | – | – | – | – | – | – | – | – |
| Applied | - strategic | 166 | N/A | N/A | N/A | N/A | N/A | 151 | 127 | 129 |
| | - specific | 510 | N/A | N/A | N/A | N/A | N/A | 406 | 389 | 395 |
| Experimental development | | 1,394 | 1,562 | 1,750 | 1,581 | 1,721 | 1,673 | 1,500 | 2,218 | 2,153 |
| **Total £m** | | **2,070** | **2,234** | **2,314** | **2,140** | **2,272** | **2,240** | **2,057** | **2,734** | **2,677** |

*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 for all years (ref 1)*

Table 13

## Government and business enterprise personnel engaged on R&D in the UK, 1995 to 2003

Full time equivalents, thousands

| | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | Percentage change in 2003 from 2002 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Personnel engaged on R&D** | | | | | | | | | | |
| - Business Enterprise | 145 | 142 | 137 | 148 | 153 | 145 | 152 | 167 | 163 | *–2* |
| - Research Councils | 12 | 12 | 11 | 11 | 11 | 11 | 12 | 11 | 11 | *1* |
| - Government Departments[1] | 17 | 16 | 15 | 18 | 18 | 19 | 12 | 10 | 10 | *–1* |
| **Total Civil** | **143** | **141** | **135** | **145** | **149** | **144** | **147** | **158** | **155** | ***–2*** |
| **Total Defence** | **31** | **29** | **28** | **32** | **33** | **31** | **29** | **30** | **29** | ***–3*** |
| Researchers | | | | | | | | | | |
| - Business Enterprise | 82 | 82 | 83 | 91 | 92 | 86 | 93 | 105 | 103 | *–2* |
| - Research Councils | 6 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | *–1* |
| - Government Departments[1] | 8 | 8 | 7 | 9 | 10 | 10 | 5 | 4 | 4 | *6* |
| **Total Civil** | **78** | **78** | **78** | **87** | **87** | **82** | **85** | **94** | **94** | ***0*** |
| **Total Defence** | **17** | **17** | **17** | **19** | **20** | **19** | **19** | **20** | **18** | ***–10*** |
| **Technicians** | | | | | | | | | | |
| - Business Enterprise | 33 | 33 | 30 | 32 | 33 | 30 | 28 | 30 | 27 | *–11* |
| - Research Councils | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | *–13* |
| - Government Departments[1] | 4 | 3 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | *–5* |
| **Total Civil** | **33** | **33** | **29** | **32** | **32** | **30** | **28** | **30** | **27** | ***–10*** |
| **Total Defence** | **7** | **6** | **6** | **7** | **7** | **7** | **6** | **6** | **5** | ***–14*** |
| **Admin & Other Staff** | | | | | | | | | | |
| - Business Enterprise | 29 | 27 | 24 | 24 | 28 | 30 | 31 | 32 | 33 | *4* |
| - Research Councils | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 4 | *16* |
| - Government Departments[1] | 5 | 5 | 4 | 5 | 5 | 5 | 4 | 3 | 3 | *–7* |
| **Total Civil** | **33** | **29** | **27** | **27** | **30** | **33** | **34** | **34** | **34** | ***–1*** |
| **Total Defence** | **7** | **6** | **5** | **6** | **6** | **5** | **4** | **4** | **6** | ***41*** |

*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, 2003[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** | **13,687** | **2,010** | **4,457** |
| North East | 281 | 2 | 158 |
| North West | 1,559 | 54 | 363 |
| Yorkshire and the Humber | 382 | 134 | 347 |
| East Midlands | 929 | 22 | 223 |
| West Midlands | 587 | 38 | 228 |
| East of England | 3,453 | 336 | 412 |
| London | 771 | 279 | 1,069 |
| South East | 3,464 | 583 | 614 |
| South West | 1,359 | 231 | 192 |
| **England** | **12,786** | **1,678** | **3,606** |
| Wales | 264 | 43 | 175 |
| Scotland | 521 | 271 | 575 |
| Northern Ireland | 116 | 17 | 100 |

*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, 2003[1]

| | R&D performed within business | | R&D performed within Government establishments[2] | |
|---|---|---|---|---|
| | Full time equivalents 000's | Percentage of the regional Labour Force[3, 4] | Full time equivalents 000's | Percentage of the regional Labour Force[3, 4] |
| **United Kingdom** | **162.9** | **0.57** | **21.3** | **0.07** |
| North East | 3.5 | 0.31 | 0.0 | 0.00 |
| North West | 16.7 | 0.53 | 0.6 | 0.02 |
| Yorkshire and the Humber | 6.3 | 0.27 | 1.4 | 0.06 |
| East Midlands | 14.2 | 0.68 | 0.2 | 0.01 |
| West Midlands | 9.0 | 0.36 | 0.4 | 0.02 |
| East of England | 37.1 | 1.36 | 3.6 | 0.13 |
| London | 9.0 | 0.25 | 3.0 | 0.08 |
| South East | 39.6 | 0.98 | 6.2 | 0.15 |
| South West | 13.7 | 0.56 | 2.4 | 0.10 |
| **England** | **148.9** | **0.62** | **17.7** | **0.07** |
| Wales | 3.6 | 0.27 | 0.5 | 0.03 |
| Scotland | 7.4 | 0.30 | 2.9 | 0.12 |
| Northern Ireland | 2.9 | 0.41 | 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 2004.*

Table 16

## OECD Science and Technology indicators Gross Expenditure on R&D: International Comparisons, 1995 to 2003

| | Year | UK | Germany | France | Italy | Japan[1] | Canada | USA[2] |
|---|---|---|---|---|---|---|---|---|
| **Gross Domestic Product (GDP)[3]** | 1995 | 728.7 | 1,094.5 | 768.5 | 742.1 | 1,757.9 | 408.4 | 4,566.1 |
| (£ billion at ppp)[4] | 1996 | 773.4 | 1,140.2 | 801.1 | 775.9 | 1,865.7 | 425.8 | 4,861.5 |
| | 1997 | 822.8 | 1,160.0 | 837.1 | 793.0 | 1,923.3 | 449.3 | 5,144.0 |
| | 1998 | 868.4 | 1,215.6 | 891.2 | 847.8 | 1,954.1 | 480.5 | 5,509.1 |
| | 1999 | 919.1 | 1,269.6 | 940.5 | 881.7 | 2,015.8 | 523.2 | 5,934.9 |
| | 2000 | 961.9 | 1,308.4 | 981.6 | 913.3 | 2,092.5 | 544.0 | 6,175.6 |
| | 2001 | 1,004.1 | 1,325.8 | 1,022.9 | 928.3 | 2,122.5 | 559.2 | 6,284.5 |
| | 2002 | 1,058.1 | 1,341.3 | 1,034.9 | 932.3 | 2,115.3 | 566.2 | 6,366.2 |
| | 2003 | 1,116.7 | 1,386.4 | 1,061.5 | 956.9 | 2,247.2 | 597.6 | 6,789.7 |
| **Gross Expenditure on R&D (GERD)** | 1995 | 14.0 | 24.6 (e) | 17.8 | 7.4 | 47.3 | 7.0 | 114.5 |
| (£ billion at ppp)[4] | 1996 | 14.4 | 25.6 (e) | 18.4 | 7.8 | - | 7.1 | 123.8 |
| | 1997 | 14.7 | 26.6 | 18.6 (a) | 8.3 (a) | - | 7.6 | 132.6 |
| | 1998 | 15.5 | 28.1 (e) | 19.3 | 9.0 | - | 8.6 | 143.7 (a) |
| | 1999 | 17.0 | 30.9 | 20.5 | 9.2 | - | 9.5 | 157.1 |
| | 2000 | 17.7 | 32.6 | 21.4 (a) | 9.8 | - | 10.5 | 167.7 |
| | 2001 | 18.6 | 33.2 | 22.8 | 10.3 | - | 11.6 | 171.4 |
| | 2002 | 19.8 | 34.0 | 23.4 | 10.8 | - | 11.1 | 169.1 (p) |
| | 2003 | 20.8 | 35.4 (e) | 23.3 (p) | - | - | 11.6 (p) | 176.4 (p) |
| **GERD as a percentage of GDP** | 1995 | *1.93* | *2.25 (e)* | *2.31* | *1.00* | *2.69* | *1.72* | *2.51* |
| | 1996 | *1.86* | *2.25 (e)* | *2.30* | *1.01* | .. | *1.68* | *2.55* |
| | 1997 | *1.78* | *2.29* | *2.22 (a)* | *1.05 (a)* | .. | *1.68* | *2.58* |
| | 1998 | *1.78* | *2.31 (e)* | *2.17* | *1.07* | .. | *1.79* | *2.61 (a)* |
| | 1999 | *1.85* | *2.44* | *2.18* | *1.04* | .. | *1.82* | *2.65* |
| | 2000 | *1.84* | *2.49* | *2.18 (a)* | *1.07* | .. | *1.93* | *2.72* |
| | 2001 | *1.85* | *2.51* | *2.23* | *1.11* | .. | *2.08* | *2.73* |
| | 2002 | *1.87* | *2.53* | *2.26* | *1.16* | .. | *1.96* | *2.66 (p)* |
| | 2003 | *1.86* | *2.55 (e)* | *2.19 (p)* | .. | .. | *1.94 (p)* | *2.60 (p)* |
| **BERD as a percentage of GDP** | 1995 | *1.25* | *1.49* | *1.41* | *0.53* | *1.89* | *1.00* | *1.80* |
| | 1996 | *1.20* | *1.48 (e)* | *1.41* | *0.54* | .. | *0.97* | *1.86* |
| | 1997 | *1.16* | *1.54* | *1.39 (a)* | *0.52* | .. | *1.01* | *1.91* |
| | 1998 | *1.17* | *1.57 (e)* | *1.35* | *0.52* | .. | *1.08* | *1.95* |
| | 1999 | *1.23* | *1.70* | *1.38* | *0.51* | .. | *1.08* | *1.98* |
| | 2000 | *1.20* | *1.75* | *1.36* | *0.53* | .. | *1.16* | *2.04* |
| | 2001 | *1.23* | *1.75* | *1.41 (a)* | *0.55* | .. | *1.27* | *1.99* |
| | 2002 | *1.24* | *1.75* | *1.43* | *0.56* | .. | *1.09* | *1.87 (p)* |
| | 2003 | *1.23* | *1.78 (e)* | *1.36 (p)* | *0.55 (p)* | .. | *1.03 (p)* | *1.79 (p)* |
| **GOVERD as a percentage of GDP** | 1995 | *0.28* | *0.35* | *0.48* | *0.21* | *0.28* | *0.25* | *0.24* |
| | 1996 | *0.28* | *0.34* | *0.47* | *0.20* | .. | *0.25* | *0.22* |
| | 1997 | *0.24* | *0.34* | *0.41 (a)* | *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 | *0.23* | *0.34* | *0.38 (a)* | *0.20* | .. | *0.22* | *0.19* |
| | 2001 | *0.18* | *0.34* | *0.37* | *0.20* | .. | *0.22* | *0.21* |
| | 2002 | *0.17* | *0.35* | *0.37* | *0.20* | .. | *0.22* | *0.23 (p)* |
| | 2003 | *0.18* | *0.34 (e)* | *0.37 (p)* | *0.21 (p)* | .. | *0.21 (p)* | *0.24 (p)* |
| **HERD as a percentage of GDP** | 1995 | *0.37* | *0.41* | *0.39* | *0.25* | *0.39* | *0.46* | *0.38* |
| | 1996 | *0.36* | *0.42* | *0.39* | *0.27* | .. | *0.45* | *0.37* |
| | 1997 | *0.35* | *0.41* | *0.39 (a)* | *0.32 (a)* | .. | *0.45* | *0.37* |
| | 1998 | *0.35* | *0.40* | *0.38* | *0.34* | .. | *0.49* | *0.36 (a)* |
| | 1999 | *0.36* | *0.40* | *0.37* | *0.33* | .. | *0.53* | *0.37* |
| | 2000 | *0.38* | *0.40* | *0.41 (a)* | *0.33* | .. | *0.55* | *0.37* |
| | 2001 | *0.40* | *0.41* | *0.42* | *0.36* | .. | *0.59* | *0.39* |
| | 2002 | *0.42* | *0.43* | *0.43* | *0.38* | .. | *0.65* | *0.42 (p)* |
| | 2003 | *0.40* | *0.43 (e)* | *0.42 (p)* | .. | .. | *0.69 (p)* | *0.44 (p)* |

***Source: OECD databank (June 2005)***

*Notes:*

*1 Data for Japan are adjusted by OECD.*

*2 Excludes most or all capital expenditure.*

*3 The measure of GDP used is at market prices.*

*4 Amounts are converted to £ sterling using the purchasing power parities (ppp) developed by the OECD.*

*(a) = break in series with previous year*

*(p) = provisional*

*(e) = estimate*

Table 17

## International comparison of gross expenditure on R&D by sector of performance and source of funding, 2003

Per cent

| | UK | Germany[1] | France (p)[2] | Italy[3] | Japan (e)[4] | Canada (p) | USA (p)[5] |
|---|---|---|---|---|---|---|---|
| **Percentage by sector of performance** | | | | | | | |
| Government | *8.8* | *13.4* | *17.1* | *17.6* | *10.4* | *11.0* | *9.1* |
| Business enterprise | *66.2* | *69.8* | *62.3* | *48.3* | *70.3* | *53.0* | *68.9* |
| Higher education | *22.3* | *16.8* | *19.3* | *32.8* | *14.5* | *35.7* | *16.8* |
| Other | *2.7* | *..* | *1.4* | *1.3* | *4.8* | *0.3* | *5.3* |
| **Total** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** |
| **Percentage by source of funds** | | | | | | | |
| Government | *27.8* | *31.1* | *38.4* | *50.8* | *20.9* | *34.5* | *31.2* |
| Business enterprise | *46.1* | *66.1* | *52.1* | *43.0* | *72.3* | *47.5* | *63.1* |
| Abroad | *20.2* | *2.3* | *8.0* | *6.2* | *0.1* | *8.1* | *..* |
| Other[6] | *5.8* | *0.4* | *1.6* | *..* | *6.7* | *9.9* | *5.7* |
| **Total** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** |

***Source: OECD databank (June 2005)***

*Notes:*
*1 Data for "other" included elsewhere.*
*2 Source of funds data for France are for 2002.*
*3 For Italy, sector of performance data are for 2002 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), 1995 to 2003

£ billion at ppp[1]

| Year | UK | Germany | France | Italy | Japan[2] | Canada | USA[3] |
|---|---|---|---|---|---|---|---|
| 1995 | 9.1 | 16.3 | 10.8 | 4.0 | 33.2 | 4.1 | 82.2 |
| 1996 | 9.3 | 16.9 (e) | 11.3 | 4.2 | – | 4.1 | 90.6 |
| 1997 | 9.6 | 17.9 | 11.6 (a) | 4.2 | – | 4.5 | 98.2 |
| 1998 | 10.1 | 19.1 (e) | 12.0 | 4.4 | – | 5.2 | 107.2 |
| 1999 | 11.3 | 21.6 | 12.9 | 4.5 | – | 5.6 | 117.7 |
| 2000 | 11.5 | 22.9 | 13.4 | 4.9 | – | 6.3 | 126.2 |
| 2001 | 12.3 | 23.2 | 14.4 (a) | 5.1 | – | 7.1 | 125.1 |
| 2002 | 13.1 | 23.5 | 14.8 | 5.2 | – | 6.1 | 118.7 |
| 2003 | 13.7 | 24.7 (e) | 14.5 (p) | 5.3 (p) | – | 6.1 (p) | 121.6 |

***Source: OECD databank (June 2005)***

*Notes:*
*1 Amounts are converted to £ sterling using the purchasing power parities (ppp) developed by the OECD.*
*2 Data for Japan are adjusted by OECD.*
*3 Excludes most or all capital expenditure.*
*(a) = break in series with previous year*
*(p) = provisional*
*(e) = estimate*

Table 19

## International comparison of Government funding of R&D in 2003 by socio-economic objective (percentage distribution)[1]

Per cent

| | UK | Germany (p) | France (p) | Italy (p) | Japan[2] | Canada | USA[3] |
|---|---|---|---|---|---|---|---|
| Agriculture, forestry and fishing | 3.3 | 1.9 | 2.0 | 1.9 | 3.3 | 7.8 | 2.1 |
| Industrial development | 5.2 | 12.3 | 6.4 | 10.2 | 7.2 | 13.0 | 0.4 |
| Energy | 0.3 | 3.0 | 4.0 | 3.6 | 17.2 | 4.0 | 1.1 |
| Infrastructure | 1.4 | 1.8 | 0.5 | 0.4 | 4.1 | 3.1 | 1.5 |
| Environmental protection | 1.8 | 3.3 | 3.0 | 2.3 | 0.9 | 4.5 | 0.5 |
| Health | 13.7 | 4.2 | 5.1 | 7.0 | 4.0 | 16.4 | 22.7 |
| Social development and services | 3.2 | 4.9 | 0.8 | 4.4 | 0.7 | 3.2 | 1.2 |
| Earth and atmosphere | 2.1 | 1.7 | 0.9 | 1.9 | 1.7 | 2.8 | 0.8 |
| Advancement of knowledge | 35.2 | 54.8 | 44.7 | 57.0 | 49.7 | 34.9 | 5.8 |
| Civil space | 1.6 | 5.0 | 8.2 | 7.3 | 6.7 | 5.5 | 7.9 |
| Defence | 31.9 | 6.5 | 22.8 | 4.0 | 4.5 | 3.6 | 56.1 |
| Not elsewhere classified | 0.5 | 0.6 | 1.6 | – | – | 1.2 | – |
| ***Per cent*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** | ***100.0*** |
| **Total £ million[4]** | **8,407** | **11,140** | **11,410** | **6,436** | **16,213** | **3,893** | **73,199** |

***Source: OECD databank (June 2005)***

*Notes:*
*1 Data for Italy are for 2001.*
*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*