

D E T I

DEPARTMENT OF ENTERPRISE,
TRADE & INVESTMENT

An Equal Opportunities Organisation

**NORTHERN IRELAND
RESEARCH AND DEVELOPMENT
STATISTICS 2001**

NOVEMBER 2002

A National Statistics Publication



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EXECUTIVE SUMMARY

The DETI Research and Development Statistics 2001 report provides information on Research and Development (R&D) expenditure in businesses and, for the first time, in the Higher Education sector in Northern Ireland. The business results provide the Northern Ireland element of an annual UK survey carried out by the Office for National Statistics – NI figures are made available at the same time as the UK results are released. Key facts from the 2001 survey are included below and further detail is available in Sections 2 and 3.

KEY FACTS

Total expenditure

- Total expenditure on Research and Development in Northern Ireland was £264 million in 2001, of which £155 million (58%) was spent by businesses, £99 million (38%) by the Higher Education sector and the remainder was other government expenditure.

Business expenditure

- There was a 45% growth in real terms in Northern Ireland business R&D expenditure between 1999 and 2001;
- This is compared with 7.5% growth in real terms for the same period in the UK where R&D expenditure was £12,682 million;
- Northern Ireland was the highest of the 12 UK regions in terms of percentage growth in business R&D expenditure in real terms over the period 1999-2001;
- Between 1999 and 2001 R&D expenditure from business's own funds increased by 47% in real terms;
- Government funding of business R&D expenditure decreased from £11 million to £9 million between 1999 and 2001;
- In 2001, some 2,480 employees (5.5% of all employees in R&D companies) were involved in R&D. This represents a 13% increase in R&D staff compared to 1999;
- Average expenditure in cash terms per R&D employee was £62,500 in 2001, some 33% higher than in 1999 (employees calculated on a whole time equivalent basis);
- The ten biggest spending companies in 2001 accounted for 69% of total R&D.

SECTION 1

TOTAL EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2001

BACKGROUND

Performers and funders of research & development (R&D) are divided into four economic sectors: Business, Higher Education Institutions, Government and the Private Non-Profit sector.

This is the first report of what will be an annual survey of R&D expenditure in the Business sector (it replaces the previous triennial business survey) and Higher Education Institutions in Northern Ireland. Further detailed results from these surveys are contained in Sections 2 and 3 respectively of this Statistics Bulletin.

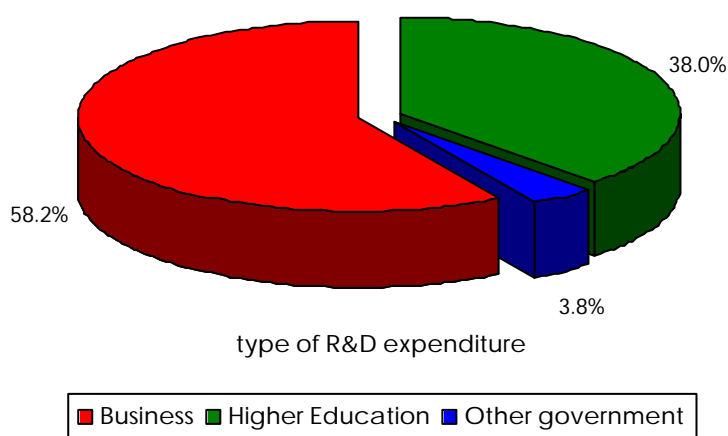
The Office for National Statistics (ONS) also conducts an annual survey of Government R&D, which is addressed to all Government departments, including those in Northern Ireland. The latest detailed results are available on the Office for Science and Technology's website at www.ost.gov.uk/setstats/index.htm.

Details of spend in the Private Non-Profit sector in Northern Ireland are not available. However, analysis by ONS shows that only around 1% of total R&D in the UK was carried out within this sector.

Table 1.1: Total Expenditure on R&D¹

	£million
Total expenditure on R&D	263.8
of which:	
Expenditure by businesses	155.0
Expenditure by Higher Education ²	98.8
Other expenditure by Government ³	10.0

**Figure 1.1:
Main Split
of R&D Expenditure**



¹ Figures contained within all tables in this Bulletin may not add due to rounding.

² To avoid double counting, this figure excludes £1.5m of expenditure on R&D by businesses that was undertaken by universities or higher education establishments.

³ 2000/01 Forward Look expenditure by NI Departments (see Notes to Editors, note 5) excluding grants to businesses to conduct R&D and funding to higher education institutions. The figure does not include expenditure by higher education establishments as this is detailed separately.

SECTION 2

BUSINESS EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2001

NORTHERN IRELAND BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT DURING 2001

Table 2.1 below details the headline results from the 2001 Business Expenditure on Research & Development (BERD) survey. The table shows that in 2001, total expenditure (in cash terms) on R&D by Northern Ireland businesses was an estimated £155 million.

Total BERD consists of intramural expenditure (i.e. R&D carried out within the company) and extramural expenditure (i.e. R&D funded by firms in Northern Ireland but undertaken by other firms in the UK and abroad). The vast majority of total BERD was intramural expenditure (£149.9m or 96.7%) with £5.1m or 3.3% being extramural expenditure. Of this £5.1m of extramural expenditure in Northern Ireland, some £1.5m was undertaken by the Higher Education sector.

Over 88% of funding for R&D in 2001 came from the companies' own resources (£137.1m) while government provided a further 5.6% (or £8.6m) and the remainder came from overseas (5% or £7.7m) and other sources (1% or £1.6m).

Table 2.1: Business Expenditure on R&D - 2001

	Total Expenditure by Business (£million)	As % of Total Expenditure
Total Expenditure	155.0	100.0
Intramural Expenditure ⁴	149.9	96.7
of which:		
Current Expenditure	138.8	89.5
Capital Expenditure	11.1	7.2
Extramural Expenditure ⁵	5.1	3.3
of which:		
Undertaken by Higher Education	1.5	1.0
Source of funding:		
Business	137.1	88.4
Government	8.6	5.6
Overseas	7.7	5.0
Other ⁶	1.6	1.0

Total employment on R&D in businesses for 2001 was 2,480 (based on whole time equivalent figures⁷).

^{4, 5, 6 & 7} For definitions see Notes to Editors, note 5

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SOME HISTORICAL COMPARISONS

The last comprehensive benchmark survey carried out by DETI related to expenditure in 1999. Table 2.2 below makes comparisons with the position at that time and with earlier surveys. To allow comparability of current with previous results, all figures relate to Total Business Expenditure - i.e. civil and defence expenditure by business on R&D (including grants given by government). Higher Education spending and other direct expenditure by Government are excluded.

Table 2.2: 2001 Results Compared with 1999 and 1996 (figures in millions)

	Cash Terms			Real Terms (2001 prices) ⁸			% Change Real Terms (1999-2001)
	2001	1999	1996	2001	1999	1996	
Total Expenditure	155.0	102.7	94.7	155.0	107.2	107.3	44.6
Intramural	149.9	97.2	89.9	149.9	101.5	101.8	47.7
Extramural	5.1	5.5	4.8	5.1	5.7	5.4	-11.3
Source of funding:							
Funded by Government	8.6	10.6	17.4	8.6	11.1	19.7	-22.0
Funded from own funds	137.1	89.4	72.5	137.1	93.3	82.1	46.9
Other	9.3	2.7	4.8	9.3	2.8	5.4	228.6

Key Findings

Between 1999 and 2001 total business expenditure on R&D increased by 45% in **real** terms with intramural expenditure rising by some 48%; government funding has decreased by 22% whilst business's own expenditure has increased by 47%.

The ten biggest R&D spenders in 2001 accounted for 69% of total R&D expenditure compared with 59% in 1999 and 57% in 1996. Five companies have appeared in the top ten in each of the four DETI surveys (i.e. 1993, 1996, 1999 and 2001) with two further companies appearing in the top ten three times out of the four surveys.

In cash terms:

In 2001, nineteen companies spent more than £1 million on R&D (compared with twenty companies in 1999, sixteen in 1996 and nine in 1993).

Average expenditure was £62,500 per R&D employee in 2001, some 33% higher than the figure for 1999 (employees are on a whole time equivalent basis).

In 2001, 2,480 employees (on a whole time equivalent basis) were engaged in R&D work - 5.5% of all employees of companies involved in R&D. Comparable figures for 1999 were 2,190 employees or 4.8% of all employees of R&D companies (1996: 2,020 employees or just under 4%).

⁸ GDP deflator used to convert cash terms to real terms – 88.3 (1996), 95.8(1999) and 100.0 (2001).

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SECTORAL BREAKDOWNS

Figure 2.1: Total R&D Expenditure in 2001 by Sector (SIC92 basis)

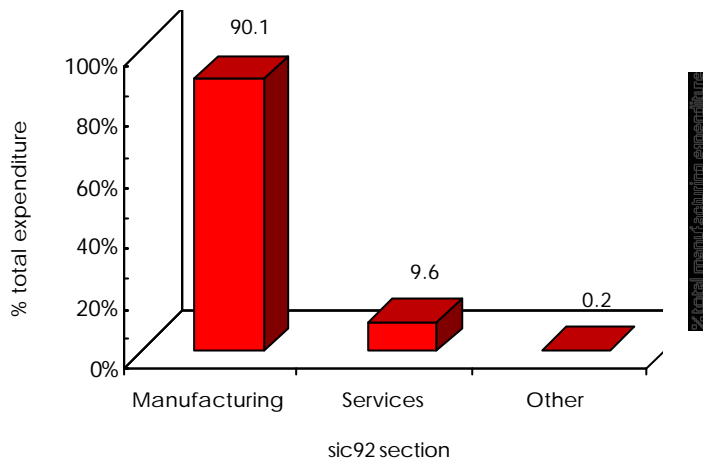
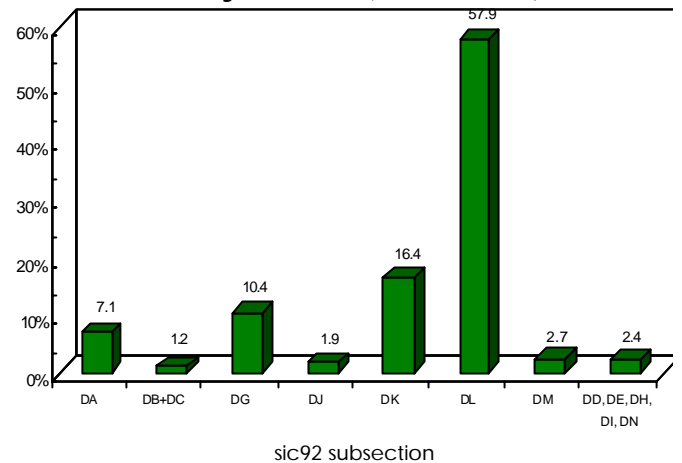


Figure 2.2: Manufacturing R&D Expenditure in 2001 by Division (SIC92 basis)⁹



In 2001, the majority of R&D was carried out within the manufacturing sector (90%) with the remaining 10% carried out in services and the 'other' industries category. These are similar proportions as in previous years.

The Electrical and Optical Equipment division (DL) accounted for some 58% of all manufacturing R&D (see Figure 2.2) with the Machinery & Equipment division (DK) accounting for over 16% and Chemicals (DG) a further 10%.

Figure 2.3 highlights that more than three-quarters of R&D spending within the manufacturing sector (77%) was accounted for by companies involved in Engineering & Allied Industries (DK, DL & DM).

Figure 2.3: Manufacturing Expenditure by SIC92 Subsection

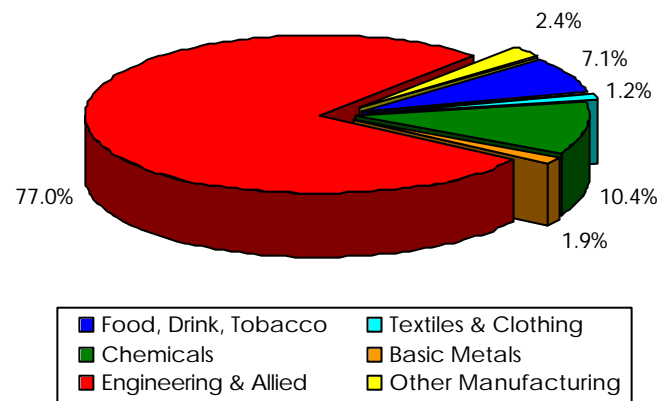
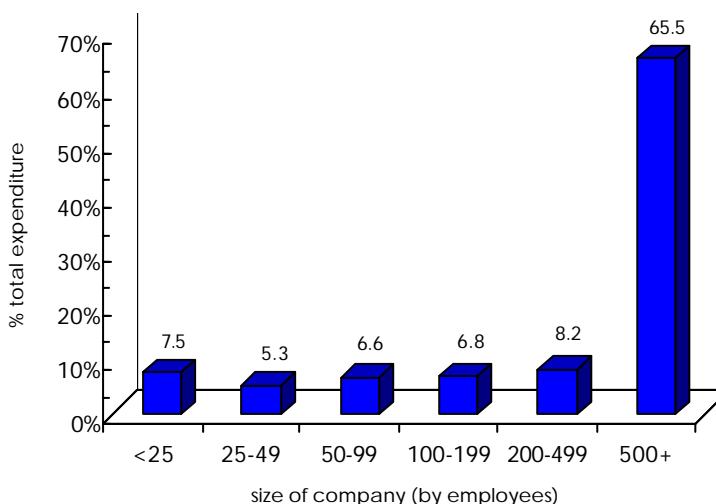


Figure 2.4: Total R&D Expenditure in 2001 by Company Size



Companies with 500 or more employees accounted for almost two-thirds of business R&D expenditure in 2001, although they represented less than 9% of R&D companies.

Smaller firms (i.e. those with less than 50 employees) represented 53% of R&D companies and accounted for 13% of total business R&D expenditure while R&D expenditure by medium-sized companies (i.e. those firms with between 50 and 499 employees) accounted for 22% of the total. Large companies therefore carry out the majority of R&D.

⁹ For a description of subsection headings see Notes to Editors note 6.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – INTRAMURAL EXPENDITURE

Intramural expenditure, i.e. spending carried out within the company, accounted for around 97% of all total expenditure in 2001 (i.e. £149.9 million). The majority of both intramural and extramural expenditure was in the manufacturing sector.

Table 2.3: Intramural and Extramural Expenditure by Sector

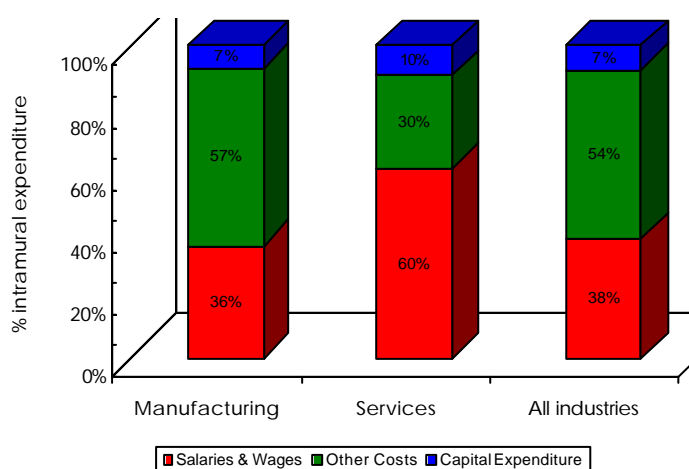
	Intramural as % of Total Expenditure	Extramural as % of Total Expenditure
Manufacturing	87.5	2.6
Services	9.0	0.6
All Industries ¹⁰	96.7	3.3

The two components of intramural expenditure are current expenditure (salaries & wages and other costs) and capital expenditure (land & buildings and plant & machinery).

Table 2.4: Breakdown of Intramural Expenditure by Sector (£m)

	Manufacturing		Services		All industries	
	£m	%	£m	%	£m	%
Current Expenditure:						
Salaries & Wages	49.1	36%	8.4	60%	57.7	38%
Other Costs	76.8	57%	4.2	30%	81.1	54%
Capital Expenditure:						
Land & Buildings	0.7	1%	0.1	1%	0.9	1%
Plant & Machinery	9.0	7%	1.2	9%	10.2	7%
Intramural Expenditure	135.6	100%	14.0	100%	149.9	100%

Figure 2.5: Intramural Expenditure by Sector



Current expenditure makes up almost 93% of intramural expenditure. Table 2.4 and Figure 2.5 highlight that there were differences between sectors in the categories of intramural R&D spend.

In the manufacturing sector, salaries and wages accounted for just over one-third of intramural expenditure, whilst in the services sector the corresponding figure was more than three-fifths. The proportion of intramural expenditure accounted for by capital expenditure was fairly similar between sectors, with 7% in manufacturing compared to 10% in services.

¹⁰ All industries include manufacturing, service sector industries plus a range of other industries. For full details of the other industries covered see Notes to Editors note 6.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – CURRENT EXPENDITURE

As Figure 2.6 below shows, there is a distinct difference in the level of salaries & wages per head between companies of different size (based on whole time equivalent figures).

Figure 2.6: Salaries & Wages per Head



Salaries and wages per head for large companies (500+ employees) is £26,000 per head, while for small and medium companies the figure is £20,000 and £21,500 respectively.

Analysis shows that, in large companies, a greater proportion of scientists are employed (82% compared to 54% for small and 68% for medium-sized firms). It is likely that scientists earn more than other operatives involved in R&D, which would account for the differences in average wages.

Current expenditure can also be looked at in terms of the type of research carried out. Experimental development accounts for 70% of current expenditure with applied research and basic research accounting for 29% and 2% respectively.

Figure 2.7: Type of Research by Company Size

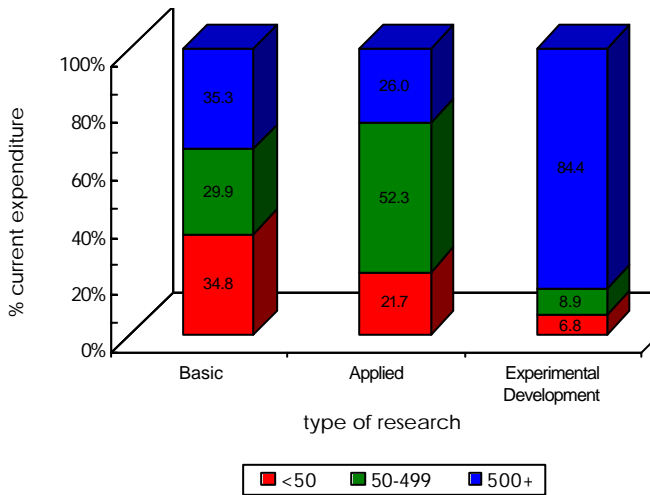


Table 2.5: Type of Research by Sector as % of All Research

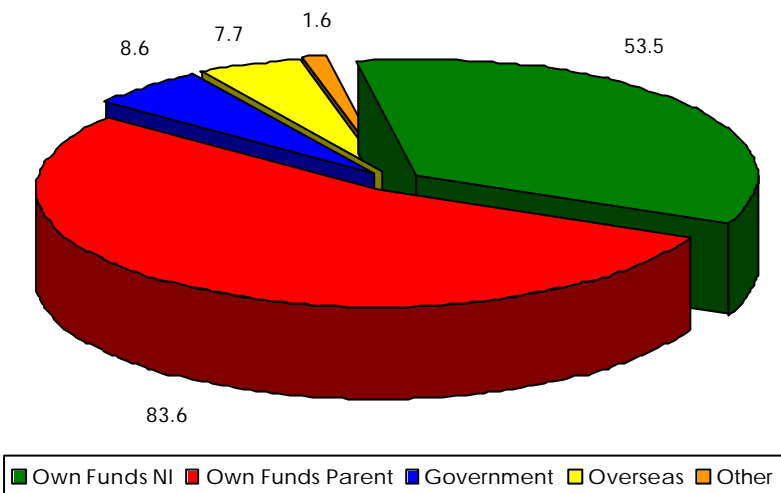
	Manufacturing	Services	All Industries
Basic	1.4	0.5	1.9
Applied	23.6	4.9	28.5
Experimental Development	65.7	3.7	69.6
All Research	90.7	9.1	100.0

Figure 2.7 shows that spending on basic research is split evenly across the three company size groups, the majority of applied research is carried out by medium-sized companies (i.e. those firms with between 50 and 499 employees) and large companies (500+ employees) are dominant in terms of spend on experimental development. A detailed breakdown of the type of research carried out by both industry and company size is given in Annex 1. This annex shows that experimental development research undertaken by large manufacturing companies accounts for over half (52.3%) of total current expenditure by all businesses.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – SOURCES OF FUNDS

The funding of R&D (intramural and extramural) comes from a number of sources: the companies' own funds, from Government, overseas funding (e.g. EU) and other businesses or research councils.

Figure 2.8: Sources of R&D Funding (£m)



The majority of funding (88%) came from companies' own funds, with 6% from Government, 5% from overseas and 1% from other sources.

Table 2.6: Percentage of R&D Funding by Source split by Company Size

	<50	50-499	500+	All
Own Funds NI	53.9	55.1	23.9	34.5
Own Funds Parent	24.2	35.1	66.0	53.9
Government	11.7	8.4	3.4	5.6
Overseas	3.6	0.6	6.7	5.0
Other	6.6	0.8	0.0	1.0
Total	100.0	100.0	100.0	100.0

Table 2.6 shows that, while companies with less than 500 employees reported that the majority of R&D expenditure came from their own funds, larger businesses (i.e. 500+ employees) declared that almost two-thirds (66%) of R&D funding was provided by a parent company.

The proportion of funding supplied by government declined as the size of business increased, with small businesses reporting that some 12% of funding came from government, while medium-sized businesses stated that around 8% of funding came from government and large businesses sourced only 3.4% of R&D spend from government.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – GOVERNMENT FUNDING ANALYSIS

As Figure 2.9 below shows, the Industrial Research and Technology Unit (IRTU) provided the vast majority of government funds (74%). The Department of Trade and Industry (DTI) accounted for 13%, the Local Enterprise Development Unit (LEDU) for 2% while 'other' government sources accounted for the remaining 11%.

Figure 2.9: Government Funding (£m) by Type

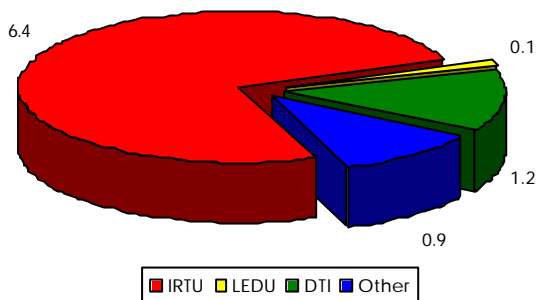


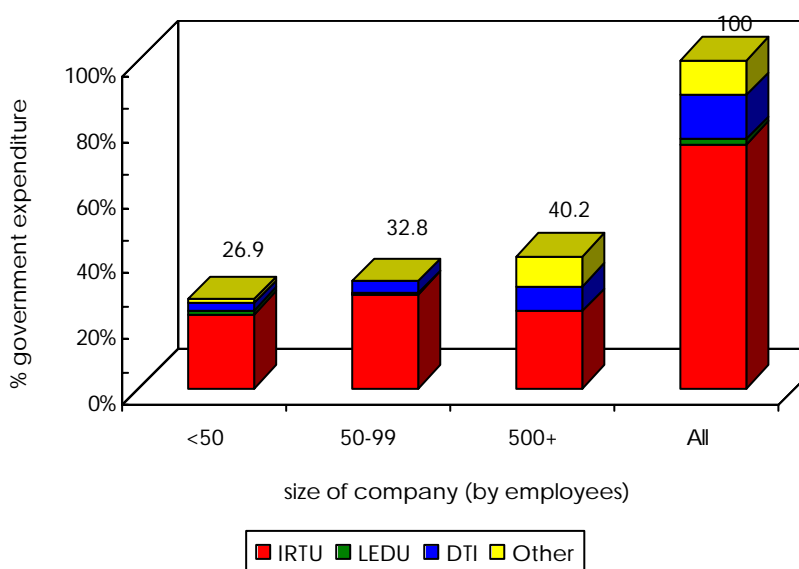
Table 2.7: Government Funding by Sector

	Manufacturing		Services		All Industries	
	£m	%	£m	%	£m	%
IRTU	5.0	71.9	1.5	84.7	6.4	74.4
LEDU	0.1	0.9	0.1	4.1	0.1	1.5
DTI	1.0	14.9	0.1	7.2	1.2	13.4
Other	0.8	12.3	0.1	4.0	0.9	10.7
All	6.9	100.0	1.7	100.0	8.6	100.0

As Table 2.7 shows, manufacturing firms accounted for the vast majority of government funding for R&D (£6.9m of £8.6m total) although this is unsurprising given that the majority of R&D is carried out by manufacturing firms. Overall, IRTU¹¹ provided three-quarters of all government R&D funding within the business sector in 2001. There were differences between sectors with some 72% of government funding within the manufacturing sector attributed to IRTU and almost 85% within the services sector.

A size range split indicates that IRTU provided 84% of small business funding, 87% of medium-sized business and 58% of large company funding. A notable proportion of funding for large firms was attributed to the DTI (20%).

Figure 2.10: Government Funding by Company Size



IRTU was the main provider of government funding for R&D across all size bands. Funding from the DTI and other government sources was more important to the larger firms (those with 500+ employees).

¹¹ Invest Northern Ireland was established in April 2002 and, among its responsibilities, it exercises broadly the functions previously carried out by IRTU and LEDU.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – EMPLOYMENT ON R&D

In 2001, companies surveyed reported a total of 2,630 employees working on R&D, approximately 5.8% of all employees in companies carrying out R&D. [The whole time equivalent figure¹² for the same period was 2,480 or 5.5%].

Figure 2.11: Total R&D Employment - Full-time, Part-time and Whole Time Equivalent

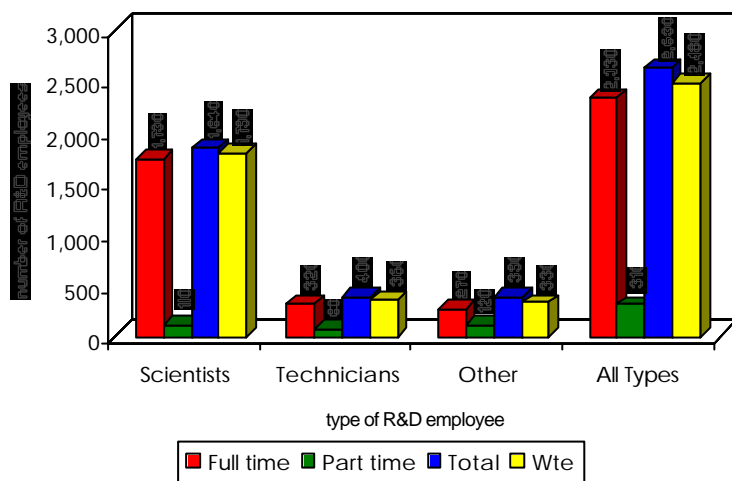
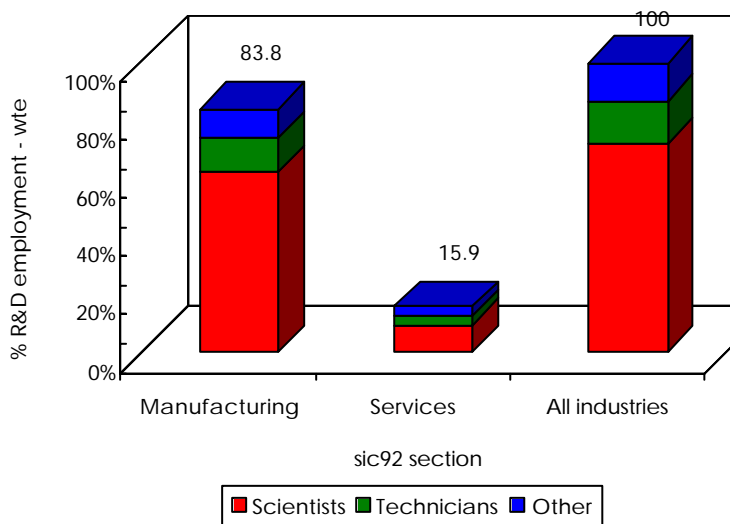


Table 2.8: Number of R&D Employees by Type

	Full time	Part time	Total
Scientists	1,730	110	1,840
Technicians	320	80	400
Other	270	120	390
All Types	2,330	310	2,630

Approximately 88% of all R&D employees were full-time. By type of R&D employee, scientists accounted for 70%, technicians for 15% and other employees (e.g. professional, administrative, clerical and industrial) for 15% of all R&D employees. Comparable whole time equivalent figures show that 1,790 employees were scientists (72%), 360 employees were technicians (15%) and the number of other employees was 330 (13%).

Figure 2.12: R&D Employment (whole time equivalent) by Sector

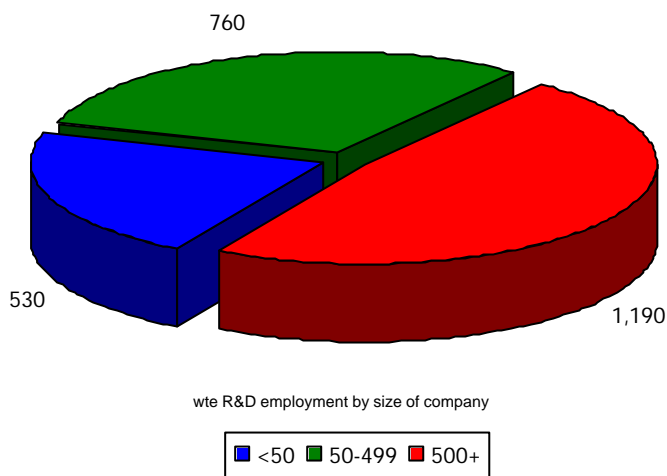


On a whole time equivalent basis there were 2,080 employees in manufacturing and 400 in the service sector. Within manufacturing, scientists accounted for 74% of R&D employees with the level of technicians at 13% and other employees at 12%. Within the service sector scientists made up 61% of R&D employees, technicians 20% and other employees 19%.

¹² For an explanation of how whole time equivalent employment figures are calculated see Notes to Editors note 5.

BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT – EMPLOYMENT ON R&D

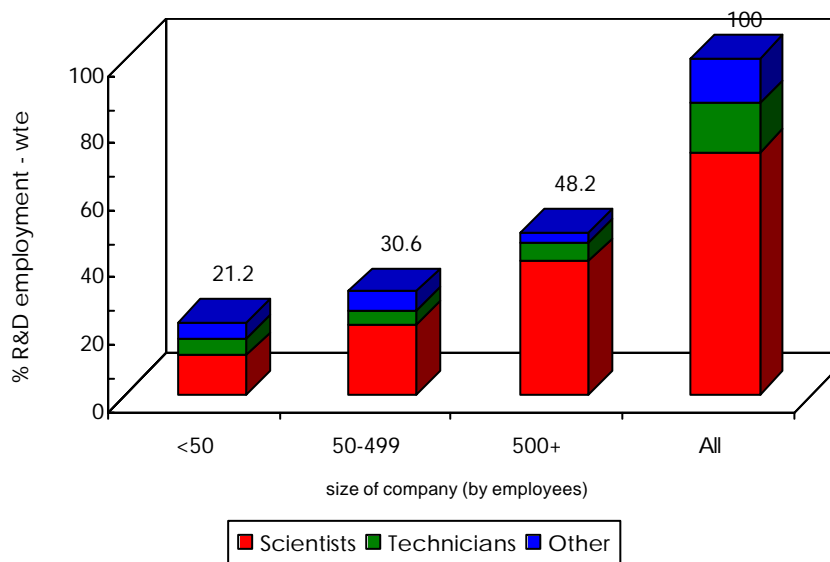
Figure 2.13: R&D Employment (whole time equivalent) by Company Size



Using whole time equivalent employment figures, Figure 2.13 shows that total R&D employment is split across companies of different sizes as expected. That is, the greater proportion of R&D employees are in the larger companies (48%).

There is a difference in the type of employee to be found in companies of different sizes. Over four-fifths (82%) of R&D employees in large firms are scientists, compared with 54% in small firms and 68% in medium-sized firms. Small firms employ a larger proportion of technicians (25%) compared to medium-sized and large companies (13% and 11% respectively). Large companies employ fewer persons in the 'other' category (6%) than either small or medium-sized companies (approximately 20%).

Figure 2.14: R&D Employment (whole time equivalent) by Type of Employee and Company Size



BUSINESS EXPENDITURE ON RESEARCH & DEVELOPMENT - NOTES TO EDITORS

1. The survey of Northern Ireland Civil and Defence Expenditure on Research and Development during 2001 was undertaken by Statistics Research Branch of the Department of Enterprise, Trade and Investment (DETI). The sample and survey results only cover 'business enterprises' as defined in the 'Frascati' manual. This excludes government organisations, higher education establishments and charities.

R&D surveys pose special problems for survey design – R&D takes place in only a small proportion of businesses but a comprehensive list of these businesses does not exist. A simple random sample of the business population would not be suitable for an R&D survey because many of the sample businesses would not undertake R&D and many significant R&D performers would be missed in such a sample.

The solution is to implement a stratified sample design. The stratification variable was the known level of R&D performance of the businesses. This information was gained from previous surveys (mainly the 2000 survey carried out by ONS and the 1999 survey by DETI) and extra information from various sources such as IRTU and filter questions on other surveys. For the purposes of the 2001 survey, businesses were stratified into 4 groups:

- (i) Businesses responding to the 2000 ONS survey who returned or had estimated a total R&D expenditure value greater than zero; and companies newly identified to ONS as R&D spenders.
- (ii) Businesses responding to the 1999 DETI survey who returned or had estimated a total R&D expenditure value greater than zero; businesses reporting positively to R&D filter questions in other ONS/DETI surveys; and other identified potential R&D performers (principally, those companies who had received assistance from IRTU during 2000 or 2001).
- (iii) Companies who have been identified as 'not R&D performers' when selected for past surveys.
- (iv) The remainder of Northern Ireland businesses.

This businesses making up strata (i) and (ii) formed a register of R&D performers and the sample for the 2001 survey was derived from this register. Indeed, each of these businesses was issued a questionnaire – in effect, therefore, a 'census' of R&D performers was carried out. Strata (iii) and (iv) were not included as they were assumed to have zero R&D expenditure.

In 2001, 620 forms were sent out to businesses believed to be performing R&D. Completed forms were returned by 568 businesses representing a response rate of 92 per cent. Estimates were made for the R&D activity of non-responding businesses.

2. This is the fourth business R&D survey - it was carried out triennially between 1993 and 1999, but is now collected on an annual basis (from 2001 onwards). Prior to 2001, the Office for National Statistics (ONS) published regional intramural R&D estimates – including figures for Northern Ireland - from an annual UK-wide survey. The ONS Survey, as it related to Northern Ireland, was based on a relatively small sample of companies and was not detailed enough for DETI requirements. DETI therefore conducted its own benchmark survey every three years. In those years when both a UK-wide and a separate DETI survey were conducted, two estimates of intramural business R&D expenditure for Northern Ireland were therefore available. However, from 2001 onwards data from the DETI survey will be passed to ONS colleagues and intramural R&D figures for Northern Ireland from both sources will be equal.

3. The definition of R&D adopted for the purposes of the NI inquiry is the same as that used by ONS for the equivalent GB survey:

"The guiding line to distinguish between research and technological development activity (R&TD) from non-research activity is the presence or absence of an appreciable element of novelty or innovation. If the activity departs from routine and breaks new ground it should be included; if it follows an established pattern it should be excluded".

The NI questionnaire follows the same structure and includes the same questions as the GB questionnaire, although there were some modifications to tailor the questions asked for use in NI. [The sources of funding question for the NI survey, for example, specifically identified IRTU as one of the government sources.]

4. The survey covers expenditure in the year ending December 2001, although companies were given the option of supplying data for the business year ending on any date between 6 April 2001 to 5 April 2002.

It is worth noting that a number of NI companies are part of National and International companies. Many of them concentrate their R&D on particular sites, not necessarily in NI, although all of their plants, including those in NI, will share in the benefits of research. Variations may occur in NI R&D data from year to year due to the influence of one or two large-scale projects.

5. **Definition of Terms**

- a) **Type of R&D Expenditure**

Total Expenditure on R&D - This covers civil expenditure by businesses, defence expenditure by businesses and other expenditure by Government. Due to disclosure rules, it is not possible to obtain a split between civil and defence R&D expenditure, for the 2001 survey.

Other Expenditure by Government - The ONS also collect annual data on Government-funded Science, Engineering and Technology for the UK as a whole and publish this in the 'Forward Look' document. By utilising Forward Look data in conjunction with the results from the DETI survey, it has been possible to compile a more complete picture of total expenditure on R&D in NI. Forward Look figures will include financial assistance to businesses by Government as well as expenditure on R&D conducted within Government Departments. The figure shown in Table 1, expenditure by businesses and other expenditure by Government, should complement each other; i.e. there should be no double counting.

Intramural R&D - This is R&D carried out within the company.

Extramural R&D - This is R&D funded by plant(s) in Northern Ireland but undertaken by other firms or organisations in the UK and abroad.

Capital Expenditure - Includes companies' expenditure on land, buildings, plant and machinery (including vehicles). Capital expenditure on R&D is particularly subject to distortions and is likely to fluctuate significantly from year to year as a small number of projects could cause this percentage to increase or decrease sharply. For example, some R&D projects may have a duration of several years but involve heavy capital outlay in the formative years of the research. The erratic nature of R&D capital expenditure may partly explain differences in capital expenditure

among companies of different sizes. Only by looking at underlying trends over several years will it be possible to see if some sectors or companies of differing sizes are more likely to require more expenditure of a capital nature.

b) **Type of Research**

Basic Research - work undertaken primarily for the advancement of scientific knowledge without a specific practical application in view.

Applied Research - Research undertaken with a general or a particular application in view.

Experimental Development - covers 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. This includes the prototype or pilot plant stage, design and drawing required during R&TD and innovation work done on contracts with outside organisations, Government departments and public bodies.

c) **Sources of Funding**

Business - Funds from individual plants within NI or from parent or other companies within the group.

Government - Funds from IRTU (including IFI), LEDU, DTI and other government sources.

Overseas - This includes EU Funds as well as other funds from outside the UK. EU funds are those from the European Commission's Structural or Framework Funds.

Other Funds - Funds from private individuals, private non-profit making bodies, higher education establishments, research councils and any other sources.

d) **Employment on R&D**

Staff Types - Average employment on R&D splits into the following categories; scientists and engineers, technicians, laboratory assistants and draughtsmen etc., and other (including Professional, Administrative, Clerical and Industrial Employees).

Whole Time Equivalent Employment - This is calculated by dividing the number of part-time employees by 2 and adding to the number of full-time employees.

6. Results are shown mainly by industrial sector and company size (based on the number of employees). The sectoral analyses are based on the Standard Industrial Classification (or SIC (92) classification) of industries.

Manufacturing is defined to cover Section D, which is composed of the following subsections:

DA	Food, Drink & Tobacco
DB	Textiles & Textile Products
DC	Leather & Leather Products
DD	Wood & Wood Products
DE	Pulp, Paper & Paper Products; Publishing and Printing
DG	Chemicals, Chemical Products & Man-Made Fibres
DH	Rubber & Plastic Products

DI	Other Non-metallic Mineral Products
DJ	Basic Metals & Fabricated Metal Products
DK	Machinery & Equipment Not Elsewhere Classified
DL	Electrical & Optical Equipment
DM	Transport Equipment
DN	Other Manufacturing Not Elsewhere Classified

Where aggregation of subsections within manufacturing is required this would normally be as follows (for example, see Figure 2.3):

DA	Food, Drink & Tobacco
DB+DC	Textiles, Leather, Footwear & Clothing
DG	Chemicals & Chemical Products
DJ	Basic Metals & Fabricated Metal Products
DK,DL + DM	Engineering & Allied Industries
DD,DE,DH,DI,DN	Other Manufacturing

The Service Sector covers Sections G through to O, namely:

G	Wholesale & Retail Trades
H	Hotels & Restaurants
I	Transport, Storage & Communication
J	Financial Intermediation
K	Real Estate, Renting & Business Activities
L	Public Administration and Defence
M	Education
N	Health & Social Work
O	Other Community, Social & Personal Service Activities

The Other Industries category covers:

A	Agriculture, Hunting and Forestry
B	Fishing
C	Mining & Quarrying
E	Electricity, Gas & Water
F	Construction

7. Figures contained within all tables in this Bulletin may not add due to rounding. Percentages calculated on these rounded figures may differ from those that are detailed in the text.

SECTION 3

HIGHER EDUCATION EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2001

NORTHERN IRELAND HIGHER EDUCATION EXPENDITURE ON RESEARCH & DEVELOPMENT DURING 2001

Table 3.1 below details the headline results from the 2001 Higher Education Expenditure on Research & Development (HERD) survey.

Table 3.1: Higher Education Expenditure on R&D

	£million
HERD Expenditure ¹³	100.3
of which:	
Current Expenditure	89.5
Capital Expenditure	10.8
<u>Source of funding of R&D:</u>	
Government Block Grant	60.7
OST Research Councils ¹⁴	6.7
UK-based charities	9.0
UK Cent Gov/Local Auth/Health ¹⁵	12.0
UK Ind/Comm/Pub Corp ¹⁶	3.5
EU Government	3.9
EU Other	0.7
Other Overseas	1.4
Other Sources	2.4
	Number
HERD Employment ¹⁷	1,720
of which:	
Academic staff	730
TLAD's ¹⁸	680
Other ¹⁹	300

See Notes to Editors overleaf.

¹³ This includes £1.5 million of expenditure funded by Northern Ireland businesses. Therefore, net HERD was £98.8m. All university expenditure on R&D is intramural expenditure - i.e. R&D work carried out within the university. Figures given are in £millions and constituent parts may not add due to rounding.

¹⁴ Office of Science and Technology Research Councils.

¹⁵ Funding from UK Central Government, Local Authorities and Health Trusts/Hospitals.

¹⁶ Funding from UK industry/commerce/public corporations.

¹⁷ This is the number of full-time equivalents. Figures are rounded to the nearest 10 and constituent parts may not add due to rounding.

¹⁸ Technicians, Laboratory Assistants and Draughtsmen etc.

¹⁹ Includes Administrative, Clerical and Industrial Employees.

HIGHER EDUCATION EXPENDITURE ON RESEARCH & DEVELOPMENT - NOTES TO EDITORS

Table 3.1 details Higher Education Expenditure on R&D (HERD). The table gives combined results from the two main Northern Ireland universities - i.e. Queens University Belfast (QUB) and the University of Ulster (UU). The data collected refers to the academic year 2000/2001 ending 31/7/01. The universities have made data available for this period on the basis of Transparency Review data collected within each respective institution.

Transparency Review

The Transparency Review is a Government initiative, introduced with the Comprehensive Spending Review (CSR) in 1998. The CSR awarded £1.5bn of additional funding for Higher Education, but the Treasury made this conditional on the sector becoming more open about the way public funds are spent in universities and colleges.

A Steering Group was set up to implement the policy and their advice was referred to Government in the Transparency Review Report. This was endorsed in June 1999 and is now required policy for the sector. All institutions had to report transparently on the costs of their Teaching, Research, and other activities for 1999/2000 in July 2001 and each year thereafter. As a consequence, accurate and comparable R&D data for each university can now be obtained and this is presented in Table 3.1.

More detailed information on Transparency Review procedures in each of the local universities can be found at <http://www.qub.ac.uk/costing/> for QUB and at <http://www.ulst.ac.uk/finance/time/> for UU.

Total R&D Expenditure - Following consultation with the universities, it was agreed that all university expenditure on R&D is 'intramural' expenditure - i.e. R&D work carried out within the university.

Current Expenditure - Includes expenditure on salaries and wages and other costs (fuel, rent etc.).

Capital Expenditure - Includes expenditure on land, buildings, machinery and equipment. It should be noted that capital expenditure on R&D within universities is likely to fluctuate significantly from year to year. For example, an R&D project may have a duration of several years but involve heavy capital outlay in the formative years of the research.

Source of funding - this is split into nine separate categories as shown in table 3.1. For the purposes of this survey, the Government Block Grant was used as a 'balancing figure' with values for the other eight categories completed using data from the Transparency Review.

Employment on R&D - it is possible, using the results from the Transparency Review, to determine how much time members of staff spend on R&D. This has been converted to numbers of full-time equivalents in each of the three categories shown. Figures shown have been rounded to the nearest 10.

SECTION 4

ANNEXES TO BUSINESS EXPENDITURE ON RESEARCH AND DEVELOPMENT DURING 2001

ANNEX 1

Breakdown of Intramural Expenditure (Civil & Defence) 2001 £000's (rounded to nearest £100,000)

	Current Expenditure						Capital Expenditure			
	Salaries & Wages	Other Costs	Current Expenditure	Basic Research	Applied Research	Experimental Development	Land & Buildings	Plant & Machinery	Capital Expenditure	Total Intramural Expenditure
Manufacturing										
<50	5,500	2,400	7,900	200	4,000	3,700	100	1,100	1,200	9,100
50-499	12,700	12,700	25,400	800	18,500	6,200	200	1,300	1,500	27,000
500+	30,800	61,800	92,600	900	10,200	81,400	400	6,600	7,000	99,600
Total	49,100	76,800	125,900	2,000	32,700	91,200	700	9,000	9,700	135,600
Services										
<50	5,000	3,100	8,100	700	4,500	2,900	100	600	600	8,700
50+	3,500	1,000	4,500	0	2,200	2,300	100	700	700	5,300
Total	8,400	4,200	12,600	700	6,800	5,200	100	1,200	1,400	14,000
All Industries										
<50	10,500	5,500	16,000	900	8,600	6,500	200	1,600	1,800	17,800
50-499	16,300	13,800	30,100	800	20,700	8,600	300	2,000	2,300	32,300
500+	30,900	61,800	92,700	900	10,300	81,400	400	6,700	7,100	99,700
Total	57,700	81,100	138,800	2,700	39,600	96,500	900	10,200	11,100	149,900

ANNEX 2

Breakdown of Extramural Expenditure (Civil & Defence) 2001 £000's (rounded to nearest £100,000)

	Extramural Expenditure			
	Expenditure within NI	Expenditure within GB	Expenditure outside UK	Total Extramural Expenditure
Manufacturing				
<50	400	600	100	1,100
50-499	700	500	200	1,300
500+	800	800	0	1,700
Total	1,900	1,800	300	4,000
Services				
<50	600	100	300	1,000
50+	0	0	0	0
Total	600	100	300	1,000
All Industries				
<50	1,000	700	400	2,100
50-499	700	500	200	1,300
500+	800	800	0	1,700
Total	2,500	2,000	600	5,100

ANNEX 3

Breakdown of the Sources of R&D Funding 2001 £000's (rounded to nearest £100,000)

	Own funds		Government Funds				Overseas Funds			Other Funds			
	NI	Parent	IRTU	LEDU	DTI	Other	EU Structural	EU Framework	Other Funds Outside UK	Private Industry	Research Councils	Other Funds Within UK	Total R&D Funding
Manufacturing													
<50	5,500	3,300	1,100	0	100	0	0	0	0	100	0	0	10,200
50-499	14,600	11,200	1,800	0	300	0	200	0	0	0	0	100	28,200
500+	24,200	66,800	2,000	0	700	800	0	300	6,500	0	0	0	101,300
Total	44,300	81,300	5,000	100	1,000	800	200	400	6,500	100	0	100	139,700
Services													
<50	5,200	1,500	800	100	100	100	400	0	300	200	0	1,000	9,700
50+	3,800	700	700	0	0	0	0	0	0	0	0	200	5,300
Total	9,000	2,200	1,500	100	100	100	400	0	300	200	0	1,200	15,000
All Industries													
<50	10,700	4,800	1,900	100	200	100	500	0	300	300	0	1,000	19,900
50-499	18,500	11,800	2,500	0	300	0	200	0	0	0	0	200	33,600
500+	24,200	67,000	2,000	0	700	800	0	300	6,500	0	0	0	101,500
Total	53,500	83,600	6,400	100	1,200	900	600	400	6,700	300	0	1,300	155,000

ANNEX 4

**Breakdown of Employment on R&D 2001
(rounded to nearest 10)**

	Scientists				Technicians				Other				All Types			
	full time	part time	total	wte	full time	part time	total	wte	full time	part time	total	wte	full time	part time	total	wte
Manufacturing																
<50	160	20	180	170	50	20	60	50	40	40	70	60	240	80	320	280
50-499	380	20	400	390	80	30	110	90	100	50	140	120	560	100	650	610
500+	970	20	990	980	130	10	140	140	70	10	80	80	1,170	40	1,210	1,190
Total	1,520	60	1,580	1,550	250	60	310	280	210	90	300	250	1,970	210	2,180	2,080
Services																
<50	90	40	130	110	70	20	90	80	40	20	60	50	200	80	280	240
50+	120	10	130	130	0	0	0	0	20	0	20	20	150	10	160	150
Total	210	50	260	240	70	20	90	80	60	20	90	80	350	90	440	390
All Industries																
<50	250	60	320	290	110	30	150	130	80	60	140	110	450	160	610	530
50-499	510	30	530	520	80	30	110	100	120	50	170	140	710	110	810	760
500+	970	20	990	980	130	10	140	140	70	10	80	80	1,170	40	1,220	1,190
Total	1,730	110	1,840	1,790	320	80	400	360	270	120	390	330	2,330	310	2,630	2,480

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