

# Northern Ireland Research and Development Headline Statistics 2015



Date: 17 November 2016  
Geographical Area: Northern Ireland  
Theme: Business Statistics  
Frequency: Annual



## Key points

- In 2015 £749.6m was spent on R&D by Businesses, Higher Education and Government in Northern Ireland (NI). This is an increase of £143.7m (24%) in cash terms compared to the previous year, with about 90% (£129.5m) of the increase accounted for by private sector businesses. This is the highest level of total R&D spending on record for the survey.
- Of the £749.6 million spent on total R&D, £540.0 million (72%) was spent by Businesses, £192.9 million (26%) by the Higher Education sector and the remainder (£16.7 million or 2%) was Government expenditure.
- The increase in total expenditure was primarily due to an increase of £129.5m (32% over the year) in Business expenditure. There was also an increase of £15.2m in Higher Education expenditure (9%) but a fall of £1.0m (6%) in Government expenditure.
- Of the twelve United Kingdom (UK) regions, Northern Ireland reported the largest annual increase in (in-house) R&D expenditure over the year (40%).
- The ten biggest spending companies accounted for 46% of the total R&D spend in Northern Ireland in 2015, higher than in 2014 (42%).
- There was an 8% increase in the number of local and externally owned companies engaged in R&D over the year. Externally owned companies accounted for 65% of Business R&D expenditure compared to 35% by locally owned companies. R&D spend by locally owned companies reported an annual increase of 27%.
- R&D expenditure by Small and Medium-sized companies (SMEs) increased by £62.8m (33%) from 2014 to 2015. Over the five year period SME expenditure has increased by 91% (£121.0m) to £254.4m.

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## National Statistics

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# 1. Summary & commentary

## 1.1 Introduction

This release provides information on the level of R&D activity in NI. R&D activity is defined as research or technological development with an appreciable element of novelty or innovation in line with international criteria (the Frascati manual). R&D activity contributes to the development of new technologies, products and processes and is a key driver of productivity growth. The NI R&D surveys cover the Business Sector, Higher Education and Other Government financed activities. It provides important indicators of the extent to which Northern Ireland companies and higher education establishments are investing in the activities that underlie future economic development.

## 1.2 Total expenditure on R&D in cash terms

Total expenditure on R&D in NI in cash terms was £749.6 million(m) in 2015, of which £540.0m (72%) was spent by Businesses, £192.9m (26%) by the Higher Education sector and the remainder, £16.7m (2%) was Government expenditure (Table 1).

There was an increase of £143.7m (24%) in cash terms in NI total R&D expenditure between 2014 and 2015. This was primarily due to an increase of £129.5m (32% over the year) in Business expenditure, to £540.0m in 2015. There was also an increase of £15.2m in Higher Education expenditure (9%) and a decrease of £1.0m (6%) in Government expenditure in 2015.

Over the last two years total R&D spending in cash terms in NI has risen by £106.5m (17%).

**Table 1: Total NI R&D expenditure in cash terms (£million)**

|  | 2015          | 2014          | 2013          |
|--|---------------|---------------|---------------|
| Expenditure by Businesses                    | £540.0        | £410.5        | £479.3        |
| Expenditure by Higher Education <sup>1</sup> | £192.9        | £177.7        | £147.0        |
| Other Expenditure by Government              | £16.7         | £17.7         | £16.8         |
| <b>Total Expenditure on R&amp;D</b>          | <b>£749.6</b> | <b>£605.9</b> | <b>£643.1</b> |

<sup>1</sup>To avoid double counting, this figure excludes £0.9m in 2015, £1.3m in 2014 and £1.3m in 2013 of expenditure on R&D by businesses that was undertaken by universities or higher education establishments.

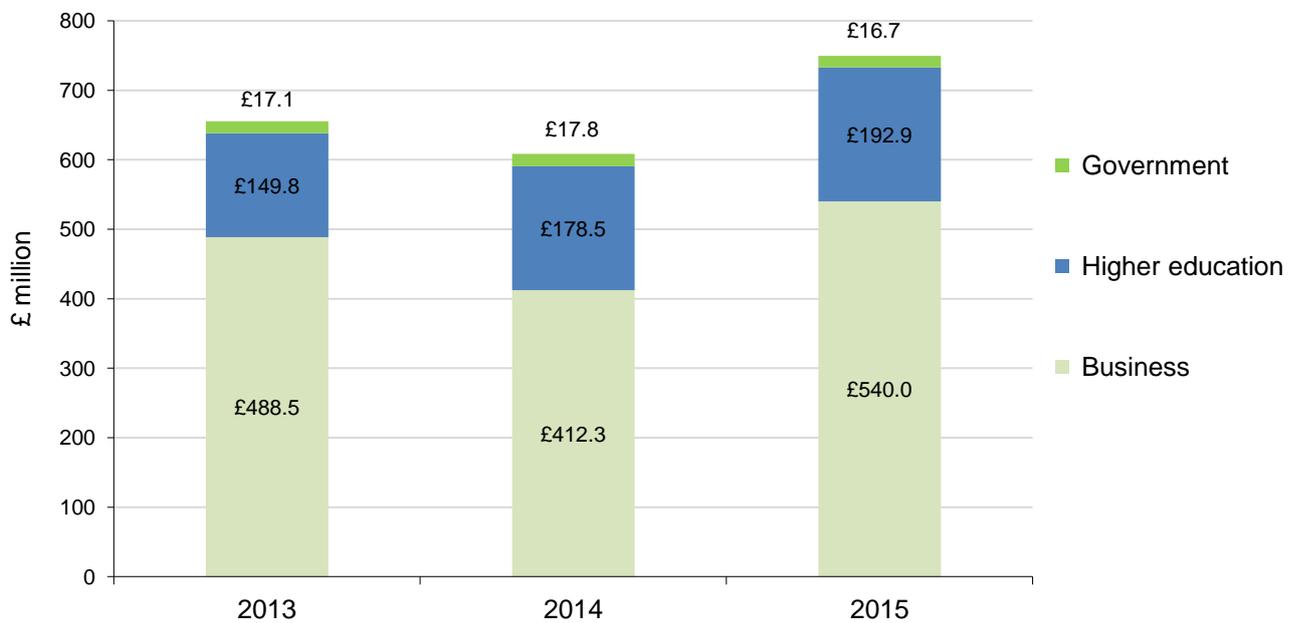
### 1.3 Total Expenditure on R&D in real terms

In addition to the measure of R&D activity in cash terms provided in the key points section and in section 1.2, it is also of interest to examine change in spend in real terms. This takes out the effect of price changes over time through the use of deflators, enabling a more consistent measure of investment in R&D activity.

In real terms, total expenditure increased by £141.0m or 23% from £608.5m in 2014 to £749.6m in 2015. It was 34% above the level of such expenditure in 2010.

In 2015 the Northern Ireland Business sector again accounted for a much greater share of total R&D expenditure (72%) than the Higher Education sector (26%). In 2014 the figures were 68% and 29% respectively.

**Figure 1: Total NI R&D expenditure in real terms 2013 - 2015 (£million)**



On a real terms basis Business R&D expenditure increased by 31% over the year (£127.7m) and increased by 46% (£171.0m) over the five year period from 2010 to 2015.

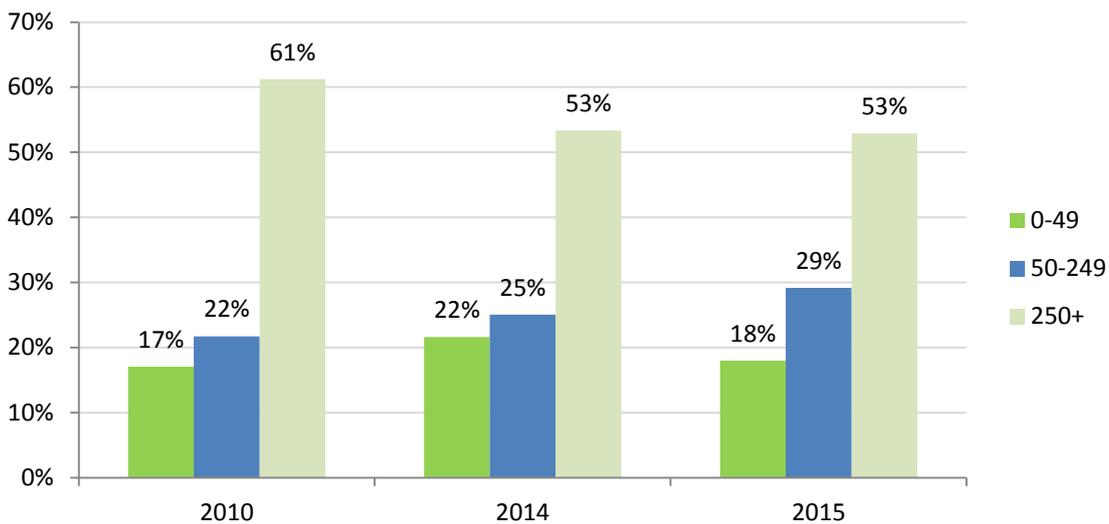
In real terms, expenditure by Higher Education increased by £14.4m (8%) and Government expenditure decreased by £1.1m (6%) over the year. Since 2010, Higher Education R&D expenditure has increased by £19.3m (11%) while Government spending is at the same level (£16.7m) in real terms.

**Detailed analysis of company spend throughout the remainder of the survey is undertaken in cash terms.**

## 1.4 Business R&D: Company size

Companies with 250 or more employees accounted for 53% of business R&D expenditure (BERD) in 2015, although they represented only 7% of all R&D performing companies. Small firms (i.e. those with less than 50 employees) represented 71% of R&D performing companies and accounted for 18% of total business R&D expenditure.

**Figure 2: Percentage of total BERD expenditure by company size 2010, 2014 - 2015 (by total employees)**



R&D expenditure by Small and Medium-sized companies (SMEs)<sup>1</sup> accounted for 47% (£254.4m) of the total business expenditure in 2015. Total SME expenditure increased in cash terms by £62.8m (33%) from 2014 to 2015. Over the five year period SME expenditure has increased by 91% (£121.0m) to £254.4m. The contribution of large companies (250 or more employees) to total R&D business expenditure saw no change over the year (53% in 2014 and 2015).

**Figure 3: Total BERD expenditure by SMEs and large companies 2010, 2014-2015 (by total employees, £million)**



<sup>1</sup> The European Commission definition of Small Medium Enterprises (SME) used is defined as being enterprises with less than 250 employees and large companies as being enterprises with more than 250 employees.

## 1.5 Business R&D: Ownership and scale of expenditure

The total number of NI companies spending on R&D has increased – from 659 in 2014 to 714 in 2015.

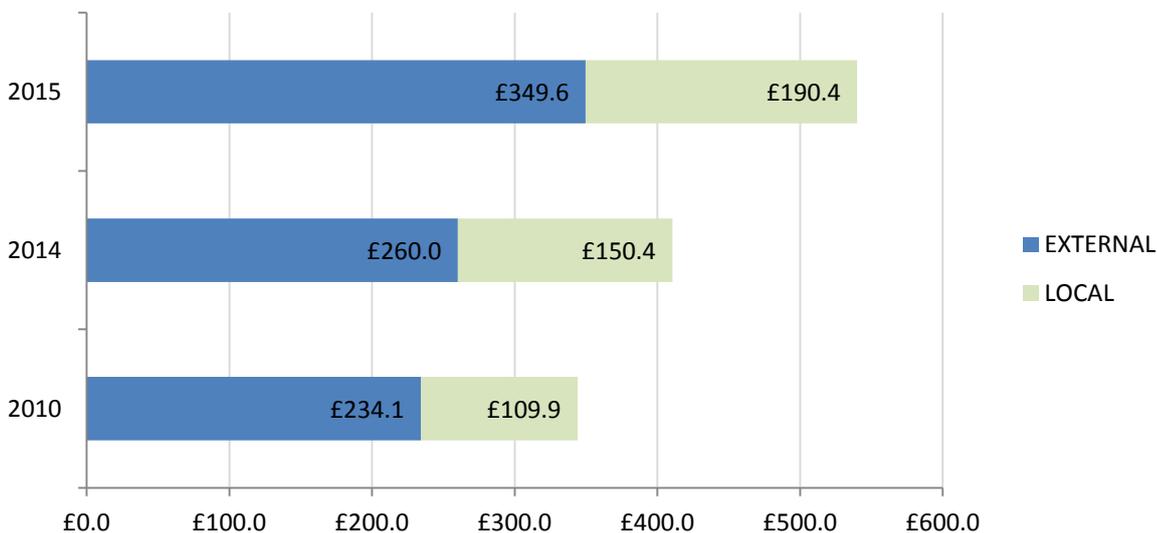
Northern Ireland is dependent on a relatively small number of companies for a significant proportion of R&D expenditure. The ten biggest spending companies accounted for 46% (£251.1m) of the total R&D spend in Northern Ireland in 2015. This figure is higher than the proportion in 2014 (42% or £172.9m).

It should be noted that variations may occur in NI R&D data from year to year due to the influence of one or two large scale projects, either starting or finishing. It is likely this contributed to the increase in Business R&D expenditure over the year.

In 2015, 83% of businesses that engage in R&D expenditure were locally owned (592 businesses). The expenditure of such locally owned companies increased by 27% (£40.0m) over the year, from £150.4m in 2014 to £190.4m in 2015. Over the five year period, their share of business expenditure has also increased from 32% in 2010 to 35% in 2015.

During the year, 17% of businesses that engage in R&D expenditure were externally owned (122 businesses). These companies accounted for 65% (or £349.6m) of Business R&D expenditure in 2015, compared to 63% in 2014. The expenditure of such externally owned businesses increased by 34% (£89.5m) over the year, from £260.0m in 2014 to £349.6m in 2015.

**Figure 4: Total BERD expenditure by local and externally owned companies 2010, 2014-2015 (£million)**



## 1.6 In-house Business R&D: UK and regional comparisons

Spending carried out within NI companies (in-house), accounted for 93% (£501.5m) of total business expenditure in 2015, 5% higher than that in 2014 (£358.3m in-house expenditure).

**Table 2: In-house R&D expenditure by UK businesses by country or region, 2014 – 2015 (£m)**

| Region                 | Expenditure (£million) |        | % Change 2014-2015 |
|------------------------|------------------------|--------|--------------------|
|                        | 2015                   | 2014   |                    |
| UK                     | 20,885                 | 19,819 | 5                  |
| England                | 19,151                 | 18,201 | 5                  |
| North East             | 306                    | 282    | 9                  |
| North West             | 2,113                  | 1,913  | 10                 |
| Yorkshire & the Humber | 779                    | 700    | 11                 |
| East Midlands          | 1,515                  | 1,473  | 3                  |
| West Midlands          | 2,166                  | 1,924  | 13                 |
| South West             | 1,472                  | 1,561  | -6                 |
| East of England        | 4,178                  | 4,071  | 3                  |
| London                 | 1,912                  | 1,723  | 11                 |
| South East             | 4,709                  | 4,554  | 3                  |
| Wales                  | 362                    | 386    | -6                 |
| Scotland               | 871                    | 874    | 0                  |
| Northern Ireland       | 501                    | 358    | 40                 |

Of the 12 UK regions, nine showed an increase in in-house business R&D expenditure in cash terms over the year to 2015. Northern Ireland increased by 40%, which was the highest percentage increase across all the UK regions. The change in R&D expenditure in NI is the result of several factors, including companies beginning new projects, resulting staff increases and spending on new equipment and materials. This can have a large impact on annual NI R&D estimates, particularly where larger companies have commenced a significant R&D project.

In the UK as a whole such expenditure increased by 5%. Changes varied from an increase of 40% in NI to a decrease of 6% in Wales.

## 1.7 R&D Investment rate

Regional Gross Value Added (GVA) for 2014 released by the Office for National Statistics (ONS) on the 9th December 2015 shows that Northern Ireland 2015 in-house R&D as a proportion of GVA was 1.5% and was the fifth highest of the twelve UK regions. A higher proportion was recorded in the East of England (3.0%), the South East (2.0%) the West Midlands (1.9%) and the East Midlands (1.6%). Northern Ireland in-house R&D as a proportion of GVA is higher than the UK average rate (1.3%). Regional GVA figures for 2015 are expected to be released by the ONS in December 2016.

**Table 3: In-house R&D expenditure by UK businesses as a proportion of GVA**

| Region                 | Total GVA <sup>1</sup><br>£m | In-house BERD<br>£m | BERD as % GVA |
|------------------------|------------------------------|---------------------|---------------|
|                        | 2014                         | 2015                |               |
| UK                     | 1,618,346                    | 20,885              | 1.3%          |
| England                | 1,377,851                    | 19,151              | 1.4%          |
| North East             | 47,702                       | 306                 | 0.6%          |
| North West             | 149,869                      | 2,113               | 1.4%          |
| Yorkshire & the Humber | 106,467                      | 779                 | 0.7%          |
| East Midlands          | 95,178                       | 1,515               | 1.6%          |
| West Midlands          | 114,755                      | 2,166               | 1.9%          |
| South West             | 121,070                      | 1,472               | 1.2%          |
| East of England        | 138,801                      | 4,178               | 3.0%          |
| London                 | 364,310                      | 1,912               | 0.5%          |
| South East             | 239,698                      | 4,709               | 2.0%          |
| Wales                  | 54,336                       | 362                 | 0.7%          |
| Scotland               | 123,543                      | 871                 | 0.7%          |
| Northern Ireland       | 34,384                       | 501                 | 1.5%          |

<sup>1</sup>Source: Office for National Statistics, NUTS1 regional GVA

UK Business Expenditure on Research and Development (BERD) results are released on 17<sup>th</sup> November 2016 and can be found at the following link:

<http://www.ons.gov.uk/businessindustryandtrade/business/businessinnovation>

## 2. Background notes

The survey of NI BERD during 2015 was undertaken by the Northern Ireland Statistics and Research Agency (NISRA). The sample and survey results only cover business enterprises as defined in the Frascati manual. This excludes government organisations, higher education establishments and charities.

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&D) 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 survey covers expenditure in the year ending December 2015, although companies were given the option of supplying data for a business year ending on any date between 6 April 2016 and 5 April 2015.

It is worth noting that a number of NI companies are part of national and international companies. Many concentrate their R&D at 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.**

### 2.1 Survey Design

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 2014 survey) and extra information from various sources such as the Office for National Statistics (ONS), Invest NI and filter questions on the Annual Business Inquiry and Community Innovation Survey. For the purposes of the 2015 survey, businesses were stratified into 4 groups:

- (i) Businesses responding to the 2014 survey who returned or had estimated a total R&D expenditure value greater than zero;
- (ii) Businesses reporting positively to the R&D filter question in the Annual Business Inquiry and Community Innovation Survey; other identified potential R&D performers (principally, those companies who had received assistance from Invest NI during 2015); and companies newly identified to ONS as R&D spenders;

- (iii) Companies who have been identified as ‘not R&D performers’ when selected for past surveys;
- (iv) The remainder of Northern Ireland businesses.

The businesses making up strata (i) and (ii) formed a register of R&D performers and the sample for the 2015 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.

## 2.2 Survey response rate

For the 2015 survey 1,388 forms were sent out to businesses believed to be performing R&D. Completed forms were returned by 1,101 businesses representing a response rate of 80%. The total number of companies spending on R&D is relatively small – 714 in 2015 (up from 659 in 2014). Estimates were made for the R&D activity of non-responding businesses. Estimates for Invest NI companies were based on the value of offers made to promote R&D investment, the amount remaining to be claimed against these offers, the frequency of claims and the contribution of Invest NI’s assistance to total planned R&D expenditure. Estimates for Invest NI companies make up 17% of the total non-respondent companies. The remaining 83% - non Invest NI estimates - were based on historical information and other administrative surveys within the Economic and Labour Market Statistics Branch.

Overall, estimates make up 8% of total BERD spend for 2015 (compared to 9% in 2014). Estimates for Invest NI and non Invest NI companies each account for 4% of total BERD spend in 2015.

These results are provisional and are subject to revision should additional information become available. As part of this release, business, government and higher education estimates of R&D performance for 2013 and 2014 have been revised to take account of late returns and misreporting.

**Table 4: Size of revisions to previously published data**

|  | 2013            |               |                  | 2014            |               |                  |
|--|-----------------|---------------|------------------|-----------------|---------------|------------------|
|  | Published<br>£m | Revised<br>£m | Difference<br>£m | Published<br>£m | Revised<br>£m | Difference<br>£m |
| Expenditure by Businesses                    | £472.6          | £479.3        | £6.7             | £403.5          | £410.5        | £6.9             |
| Expenditure by Higher Education <sup>1</sup> | £147.0          | £147.0        | £0.0             | £177.7          | £177.7        | £0.0             |
| Other Expenditure by Government              | £16.3           | £16.8         | £0.5             | £21.1           | £17.7         | -£3.4            |
| <b>Total Expenditure on R&amp;D</b>          | <b>£635.9</b>   | <b>£643.1</b> | <b>£7.2</b>      | <b>£602.3</b>   | <b>£605.9</b> | <b>£3.6</b>      |

A summary quality report for R&D can be found at the following link:  
<https://www.economy-ni.gov.uk/publications/archive-publications-rd>

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

**Figure 3: Deciles of estimates as a percentage of 2015 BERD**

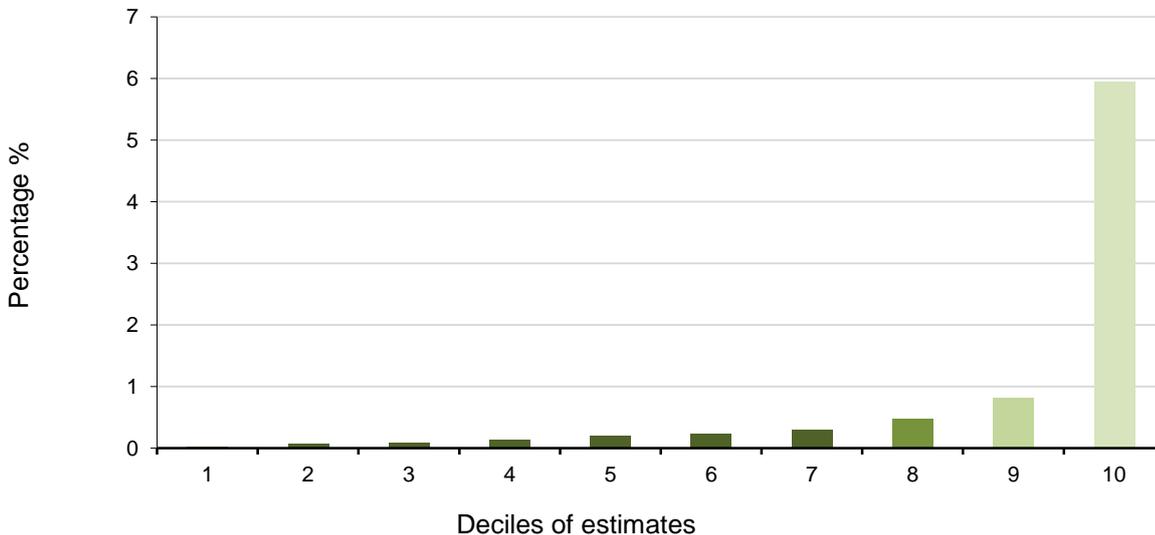


Figure 3 shows that all estimates made up 8% of total 2015 BERD spend. When estimates are ranked according to ascending size of spend, the last two deciles (i.e. the top 20% of companies) accounted for 82% of the total BERD estimated spend, indicating that most of the estimates were small in magnitude. The bulk of the value of the estimates has been accounted for by a relatively small number of companies.

## 2.3 Definition of Terms

### Type of R&D Expenditure

Total Expenditure on R&D - This covers expenditure by businesses, expenditure by higher education and other expenditure by Government.

Expenditure by Higher Education – NISRA carries out an annual survey of R&D expenditure in Higher Education Establishments in Northern Ireland. The figures shown in Table 1 provide combined results from the two Northern Ireland universities - i.e. Queen’s University Belfast (QUB) and the University of Ulster (UU). The data collected refers to the academic year i.e. 2014/2015 ending 31/7/2015. The universities have made data available for this period on the basis of Transparency Review data collected within each respective institution.

Other Expenditure by Government - The ONS collects annual data on total UK government expenditure on science, engineering and technology (SET). SET expenditure by the UK government includes expenditure by government departments, Research councils and Higher Education Funding Councils (HEFCs). It also includes expenditure on R&D conducted within Government Departments.

By utilising this data in conjunction with the results from the NISRA survey, it has been possible to compile a more complete picture of total expenditure on R&D in NI. The figures shown in Table 1, expenditure by businesses, higher education and other expenditure by Government complement each other; i.e. is no double counting.

The 2014 ONS Report is available at the following link:

<https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopment/expenditure/bulletins/ukgovernmentexpenditureonscienceengineeringandtechnology/2014>

In-house R&D - This is R&D carried out within the company and was previously referred to as intramural expenditure.

## **Next Publication**

Detailed analysis of the 2015 results including sectoral breakdowns and R&D employment estimates will be published online on 9<sup>th</sup> December 2016, and will be available at: <https://www.economy-ni.gov.uk/articles/research-and-development>

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