

November 2018

Northern Ireland Research and Development Headline Statistics 2017

Geographical Area: Northern Ireland
Theme: Business Statistics
Frequency: Annual

Key points

- In 2017, £759.2 million (m) was spent on Research & Development (R&D) by Businesses, Higher Education and Government in Northern Ireland (NI). This represents an increase of £23.3m (3.2%) in cash terms compared to the previous year. Over the year, all three types of R&D spend, Business, Higher Education and Government, increased by £18.9m, £2.0m and £2.4m, respectively from 2016 to 2017.
- Of the £759.2m spent on total R&D, £542.8m (71.5%) was spent by Businesses, £195.8m (25.8%) by the Higher Education sector and the remainder (£20.5m or 2.7%) was Government expenditure.
- The increase in total expenditure was due to increases in spend by Businesses £18.9m (3.6% over the year), Higher Education Institutions (£2.0m, 1.0%) and Government Departments (£2.4m, 13.2%).
- Of the twelve United Kingdom (UK) regions, Northern Ireland reported the sixth largest annual increase in (in-house) R&D expenditure over the year (6.4%).
- The ten biggest spending companies accounted for 36.9% of the total R&D spend in Northern Ireland in 2017, lower than in 2016 (38.8%).
- There was a 20.3% increase (from 748 in 2016 to 900 in 2017) in the number of local and externally owned companies engaged in R&D over the year. Externally owned companies accounted for 56.9% of R&D expenditure compared to 43.1% of locally owned companies in 2017. R&D spend by locally owned companies reported an annual increase of 10.6% in cash terms.
- R&D expenditure by Small and Medium-sized companies (SMEs) increased by 16.5% (£43.0m) from 2016 to 2017. In cash terms, since 2012 SME expenditure has increased by 75.3% (£130.7m) from £173.7m to £304.4m.

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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 Northern Ireland (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 survey covers the Business Sector, Higher Education and Other Government financed activities. It provides important indicators of the extent to which Northern Ireland companies, higher education establishments and government departments 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 £759.2 million (m) in 2017. Of this, £542.8m (71.5%) was carried out by Businesses, £195.8m (25.8%) by the Higher Education sector and £20.5m (2.7%) was Government expenditure (Table 1).

There was an increase of £23.3m (3.2%) in cash terms in NI total R&D expenditure between 2016 and 2017. Specifically, Business R&D spend rose by £18.9m (3.6%), with Higher Education and Government R&D spend increasing by £2.0m (1.0%) and £2.4m (13.2%) respectively from 2016 to 2017.

Table 1: Total NI R&D Expenditure in Cash Terms 2015-2017 (£m)

	2015	2016	2017
Expenditure by Business	£539.1	£523.9	£542.8
Expenditure by Higher Education ¹	£192.9	£193.8	£195.8
Other Expenditure by Government	£16.7	£18.1	£20.5
Total Expenditure on R&D	£748.7	£735.8	£759.2

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¹To avoid double counting, this figure excludes £0.76m in 2017, £0.95m in 2016 and £0.9m in 2015 of expenditure on R&D by business that was undertaken by higher education establishments.

*Total figures may not sum due to rounding.

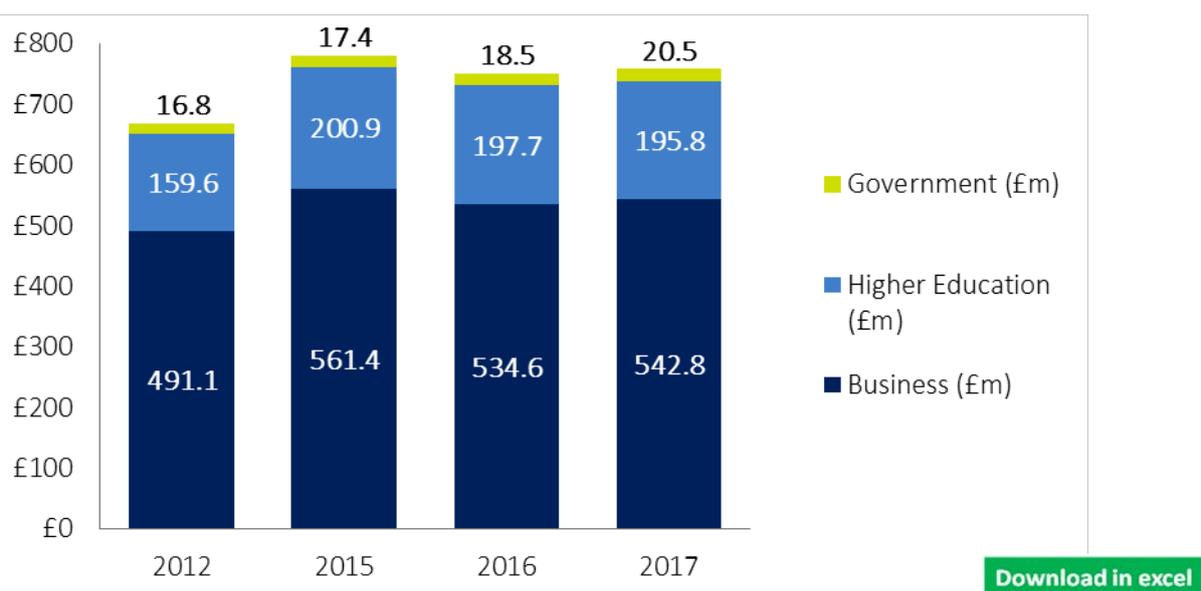
1.3 Total Expenditure on R&D in Real Terms

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 terms², total expenditure increased by £8.4m or 1.1% from £750.8m in 2016 to £759.2m in 2017. In 2017, R&D expenditure was £20.5m or 2.6% below the level of such expenditure in 2015, and £91.7m or 13.7% above the level of expenditure in 2012.

In 2017, the Northern Ireland Business sector accounted for a much greater share of total R&D expenditure (71.5%) than the Higher Education sector (25.8%). In real terms, the 2016 figures were 71.2% and 26.3% respectively. Government R&D expenditure accounted for 2.7% and 2.5% of total R&D expenditure in 2017 and 2016 respectively.

Figure 1: Total NI Expenditure in Real Terms 2012, 2015-2017 (£m)



On a real terms basis Business R&D expenditure increased by 1.5% since 2016 (£8.3m), Government expenditure increased by £2.0m (11.0%) and expenditure by Higher Education decreased over the year by £1.9m (1.0%). Since 2015, Business expenditure decreased by £18.6m (3.3%), Higher Education R&D expenditure decreased by £5.0m (2.5%) and Government spending increased by £3.2m (18.2%), in real terms.

Analysis of company spend throughout the remainder of the report is detailed in cash terms.

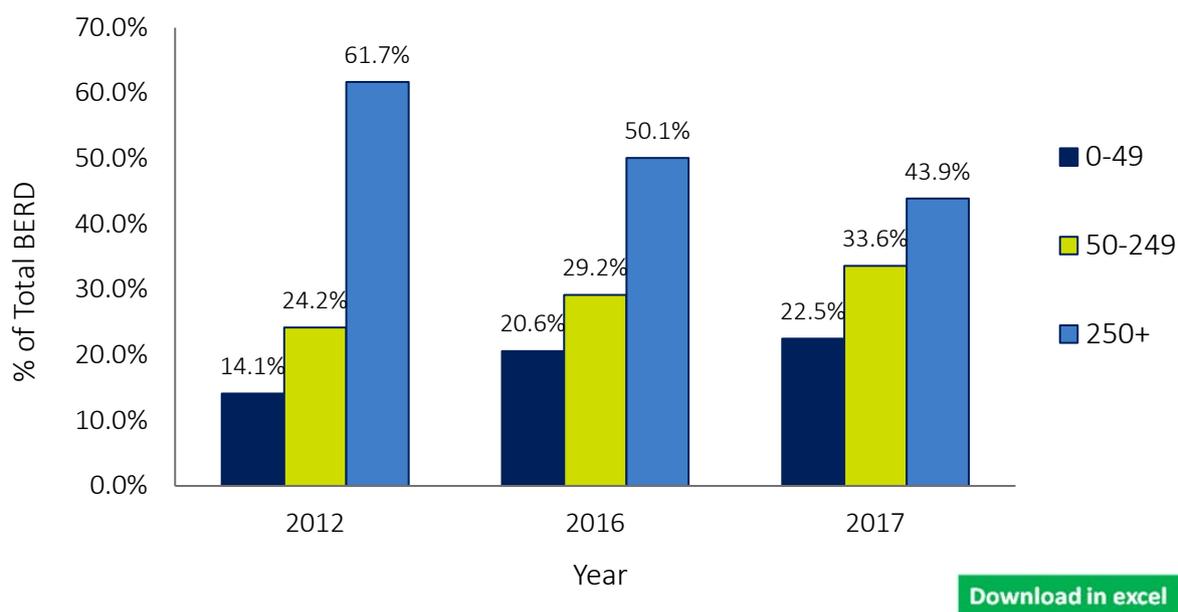
²GDP deflator used to convert cash terms to real terms: e.g. 2010 (89.16), 2011 (90.87), 2012 (92.28), 2013 (94.01), 2014 (95.62), 2015 (96.03), 2016 (98.01), 2017 = 100.00.

*Total figures may not sum due to rounding.

1.4 Business R&D: Company Size

Companies with 250 or more employees accounted for 43.9% of business R&D expenditure (BERD) in 2017, although they represented only 6.8% of all R&D performing companies. Small firms (i.e. those with less than 50 employees) represented 72.4% of R&D performing companies and accounted for 22.5% of total business R&D expenditure.

Figure 2: Percentage of Total BERD Expenditure by Company Size 2012, 2016 – 2017 (by Total Employees, % of Spend)

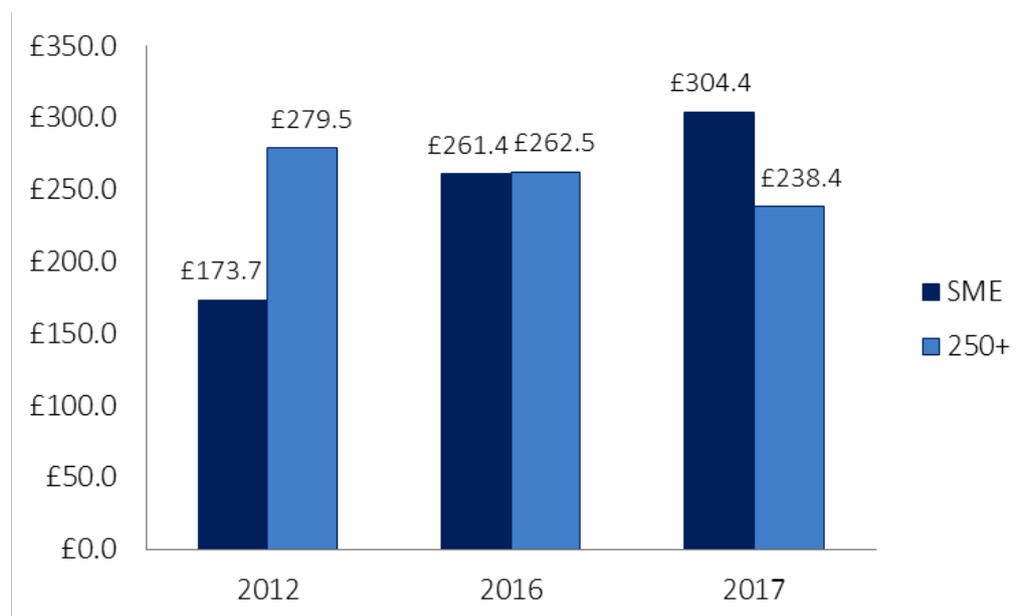


R&D expenditure by Small and Medium-sized companies (SMEs)³ accounted for 56.1% (£304.4m) of the total business expenditure in 2017. Total SME expenditure rose by £43.0m (16.5%) from 2016 to 2017. Since 2012, SME expenditure has increased by 75.3% (£130.7m) in cash terms, from £173.7m in 2012 to £304.4m in 2017. The contribution of large companies (250 or more employees) to total R&D business expenditure saw a decrease over the year (50.1% in 2016 and 43.9% in 2017).

³ 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.

*Total figures may not sum due to rounding.

Figure 3: Total BERD Expenditure by SMEs and Large Companies 2012, 2016-2017 (by Total Employees, £m)



1.5 Business R&D: Ownership and Scale of Expenditure

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The number of NI companies reporting R&D spend increased from 748 in 2016 to 900 in 2017.

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 36.9% (£200.2m) of the total R&D spend in Northern Ireland in 2017. Both proportionally and in cash terms, this figure is lower than in 2016 (38.8%, £203.5m).

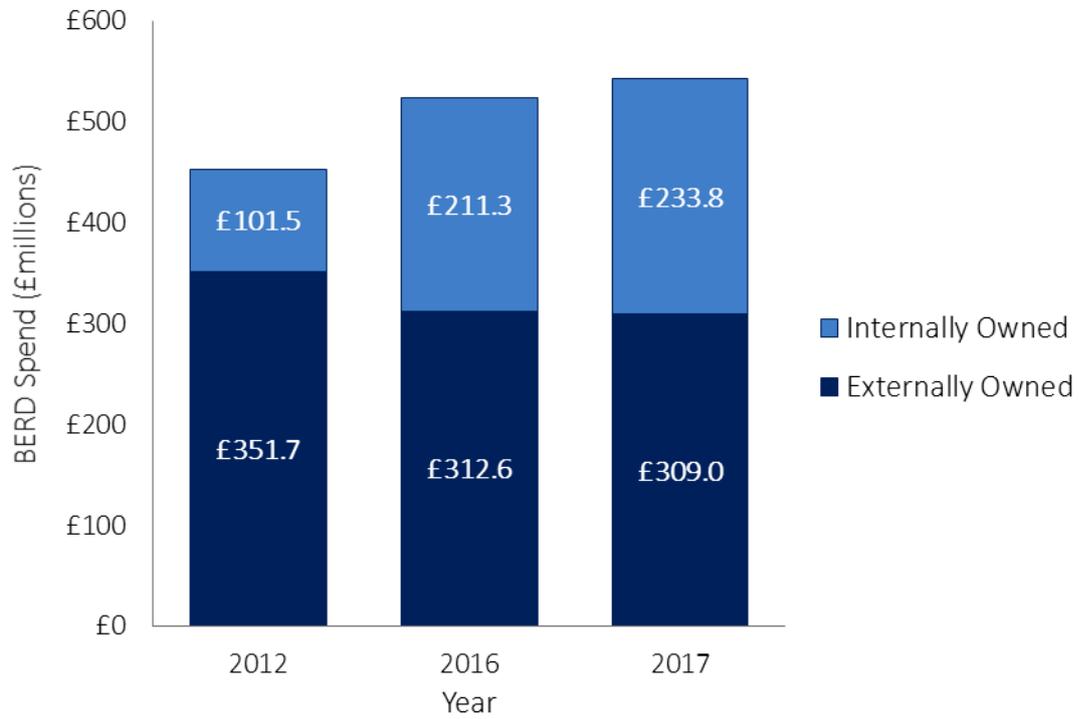
It should be noted that variations may occur in NI R&D data from year to year due to the influence of one or two large scale projects, either starting or finishing. It is likely this contributed to the fluctuation in Business R&D expenditure over the year.

In 2017, 83.4% of businesses that engaged in R&D expenditure were locally owned (751 businesses). The expenditure of such locally owned companies increased by 10.6% (£22.5m) over the year, from £211.3m in 2016 to £233.8m in 2017. Compared to 2012, locally owned companies share of business expenditure increased from 22.4% to 43.1%.

During the year, 16.6% of businesses that engage in R&D expenditure were externally owned (149 businesses). These companies accounted for 56.9% (£309.0m) of Business R&D expenditure in 2017. The expenditure of externally owned businesses decreased by 1.1% (£3.6m) over the year, from £312.6m in 2016 to £309.0m in 2017.

*Total figures may not sum due to rounding.

Figure 4: Total BERD Expenditure by Local and Externally Owned Companies 2012, 2016-2017 (£m)



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1.6 In-House Business R&D: UK and Regional Comparisons

Table 2: In-House Expenditure by UK Businesses by Country or Region, 2016-2017 (£m)

Region	Expenditure (£million) ⁴		% Change 2016-2017
	2016	2017	
UK	22,587	23,685	4.9
England	20,592	21,469	4.3
North East	308	384	24.7
North West	2,377	2,174	-8.5
South East	4,730	4,860	2.7
South West	1,516	1,652	9.0
East of England	4,519	4,677	3.5
East Midlands	1,676	1,521	-9.2
West Midlands	2,345	2,467	5.2
Yorkshire & the Humber	771	938	21.7
London	2,348	2,796	19.1
Wales	440	457	3.9
Scotland	1,075	1,247	16.0
Northern Ireland	481	512	6.4

⁴Source: Office for National Statistics[Download in excel](#)

Of the twelve UK regions, ten showed an increase in in-house business R&D expenditure in cash terms over the year to 2017. Northern Ireland increased by £31m (6.4%) from £481m in 2016 to £512m in 2017, which was the sixth largest 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 estimates, particularly where larger companies have commenced a significant R&D project.

In the UK as a whole, such expenditure increased by 4.9%. Regional changes varied from a decrease of -9.2% in the East Midlands, to an increase of 24.7% in the North East.

1.7 R&D Investment Rate

Regional Gross Value Added (GVA) for 2016, released by the Office for National Statistics (ONS) in December 2017 shows that Northern Ireland 2017 in-house R&D as a proportion of GVA was 1.4% and the joint fifth highest of the twelve UK regions. A higher proportion was recorded in the East of England (3.2%), the South East (1.9%), the West Midlands (1.9%) and the East Midlands (1.5%). Northern Ireland in-house R&D as a proportion of GVA is equal to the UK average rate (1.4%). Regional GVA figures for 2017 are expected to be released by the ONS in December 2017.

Table 3: In-House R&D Expenditure by UK Business as a Proportion of GVA (£m)

Region	Total GVA ⁵ £m	In-house BERD £m	BERD as % GVA
	2016	2017	
UK	1,747,647	23,685	1.4%
England	1,498,221	21,469	1.4%
North East	50,675	384	0.8%
North West	166,542	2,174	1.3%
South East	258,902	4,860	1.9%
South West	127,372	1,652	1.3%
East of England	147,382	4,677	3.2%
East Midlands	100,087	1,521	1.5%
West Midlands	126,589	2,467	1.9%
Yorkshire & the Humber	112,194	938	0.8%
London	408,479	2,796	0.7%
Wales	59,585	457	0.8%
Scotland	134,038	1,247	0.9%
Northern Ireland	37,237	512	1.4%

⁵Source: Office for National Statistics, NUTS1 regional GVA

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UK Business Expenditure on Research and Development (BERD) results were released on 21st November 2018 and can be found at the following link:

<https://www.ons.gov.uk/researchanddevelopmentexpenditure>

2 Background notes

The survey of NI BERD during 2017 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 2017, although companies were given the option of supplying data for a business year ending on any date between 6 April 2017 and 5 April 2018.

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 2016 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 Business Register and Employment Survey. For the purposes of the 2017 survey, businesses were stratified into 4 groups:

- (i) Businesses responding to the 2016 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 Business Register and Employment Survey; other identified potential R&D performers (principally, those companies who had received assistance from Invest NI during 2017); 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 2017 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 2017 survey 1,318 forms were sent out to business believed to be performing R&D. Completed forms were returned by 954 businesses representing a response rate of 72.4%. The total number of companies spending on R&D rose to 900 in 2017 (up from 748 in 2016). 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 1.6% of the total non-respondent companies. The remaining 98.4% - 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 16.3% of total BERD spend for 2017 (compared to 10.5% in 2016). Estimates for Invest NI companies account for 0.3% of total BERD spend in 2017, and estimates for non-Invest NI companies account for 16.0%.

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 2015 and 2016 have been revised to take account of late returns and misreporting.

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

Table 4: Size of Revisions to Previously Published Data, 2015 – 2016 (£m)

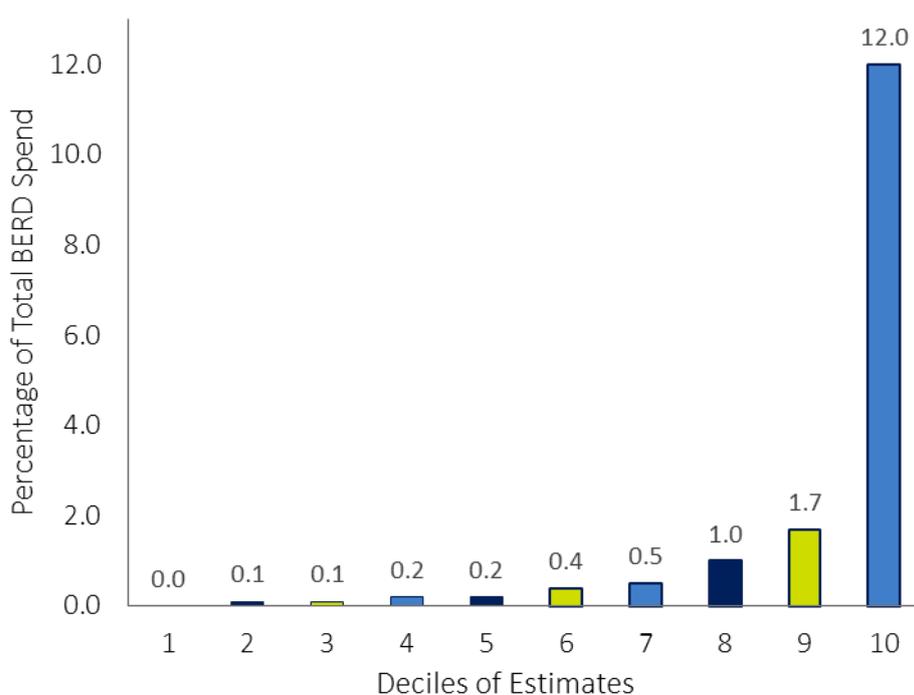
	2015			2016		
	Published £m	Revised £m	Difference £m	Published £m	Revised £m	Difference £m
Expenditure by Businesses	£540.0	£539.1	-£0.9	£523.8	£523.9	£0.1
Expenditure by Higher Education	£192.9	£192.9	£0.0	£193.8	£193.8	£0.0
Other Expenditure by Government	£16.7	£16.7	-£0.0	£21.7	£18.1	-£3.6
Total Expenditure R&D	£749.6	£748.7	-£0.9	£739.3	£735.8	-£3.5

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A summary quality report for R&D can be found at the following

link: <https://www.nisra.gov.uk/statistics/business-statistics/research-and-development#toc-1>

Figure 5: Deciles of Estimates as a Percentage of 2017 BERD



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Figure 5 shows that all estimates made up 16.3% of total 2017 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 84.8% 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. 2016/2017 ending 31/7/2017. 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 2017 ONS Report is available at the following link:

<https://www.ons.gov.uk/researchanddevelopmentexpenditure>

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

Next Publication

Analysis of the 2018 results will be published online on November 2019, and will be available at:

<https://www.nisra.gov.uk/statistics/business-statistics/research-and-development>

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