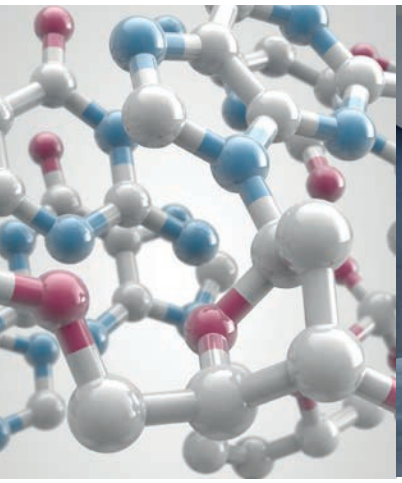
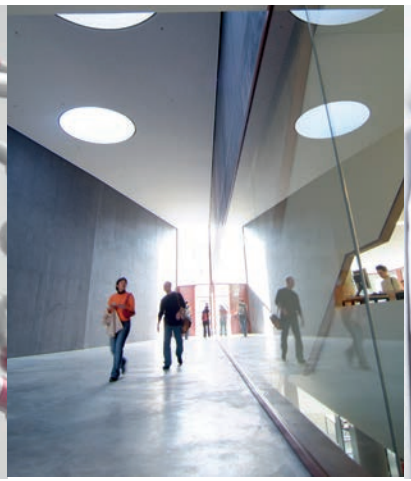
ROYAL SOCIETY OF CHEMISTRY

IOP Institute of Physics

The Finances of Chemistry and Physics Departments in UK Universities: Third Review

Summary Report

Acknowledgements

We would like to thank all those who gave up their time in the chemistry and physics departments and the staff in central finance and planning departments in the sample universities for their assistance in providing the data that underpin this study.

We would also wish to thank the Institute of Physics and the Royal Society of Chemistry for commissioning this study.

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April 2015

For Institute of Physics and Royal Society of Chemistry

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Date May 2015

Contents

Executive summary

This study is the third review of the finances of UK university chemistry and physics departments, commissioned by the Royal Society of Chemistry and Institute of Physics. The aim was to revisit the financial position of chemistry and physics departments against a backdrop of changes to public funding arrangements, most notably the new tuition fee regime (of up to £9,000) for English universities introduced from September 2012. This research is based on 2012/13 data from a sample of chemistry and physics departments. The previous report was published in 2010 and based on 2007/08 data; comparisons below refer to the 2010 report.

The study demonstrates that:

- numbers of undergraduate and postgraduate research students have increased significantly;
- comparing the income generated and Transparent Approach to Costing (TRAC)-derived costs for each activity, most UK university chemistry and physics departments continue to run deficits in their two main activities of teaching and research, and operate at a **substantial deficit overall**;
- for the 10 chemistry and 10 physics departments for which full income and TRAC-derived cost data were available, the overall deficits were 24.1% and 20.8% of income, respectively;
- early signs suggest that, in England, both chemistry and physics are withstanding the perturbations caused by the introduction of the new maximum tuition fees, but this should be monitored;
- chemistry and physics departments rely heavily on public sources of funding for teaching and research, making them particularly sensitive to changes in public funding regimes;
- the additional funding English departments receive from HEFCE for strategically important and vulnerable subjects (SIVS) is vital to help improve their financial position; however, since the the SIVS funding is capped, the amount of funding departments receive per student has been eroded as student numbers have increased;
- departments in the sample from outside England are also in deficit, particularly since they have not benefited from the increased teaching income generated by the introduction of the higher tuition fees charged in England.

The headline financial position is stable for chemistry departments and has deteriorated for physics since 2007/08, and a number of factors in the wider policy and funding landscape mean that the departments' ability to provide world-class research and teaching may be affected.

Chemistry and physics departments are strategically important. They make an essential contribution to our economy and wider society. They perform world-leading research[1], deliver world-class education and training, and maintain strong links to local, national and international businesses. It is essential that appropriate investment is made to support and sustain them.

[1] *Research Excellence Framework 2014: Overview report by Main Panel B and Sub-Panels 7-15, January 2015, http://www.ref.ac.uk/media/ref/content/expanel/member/Main%20Panel%20B%20overview%20report.pdf.*

1. Background and introduction

This study is the second follow-up to separate studies undertaken in 2005 (using data for academic year 2002/03) and 2006 (using data for 2003/04), respectively, of the finances of chemistry departments in UK universities[2] and of the finances of physics departments in English universities[3]. The first follow-up study, carried out in 2009, collected data relating to the academic year 2007/08[4]. This study analysed data from 2012/13.

The objective of this study was to re-check the financial position of chemistry and physics departments in the light of recent changes in public funding arrangements and to compare the 2012/13 position to that in 2007/08.

The study relates to the academic year 2012/13 and was carried out against the backdrop of a new funding regime for Home and EU full-time and part-time undergraduates beginning their courses at English universities from September 2012. Under this new regime, English universities can charge maximum fees of £9,000 per annum but different arrangements are in place in respect of the support that students from the different UK nations receive. English-domiciled students pay the fee levied and are eligible for publicly funded loans repayable after graduation on an income contingent basis through the tax system. Changes were also made to the funding arrangements for Home[5] and EU undergraduates entering universities in Wales and Northern Ireland from September 2012, however, Scottish-domiciled students are not expected to pay any upfront fees.

Reductions in funding council teaching grants in respect of students paying the higher fees were also introduced in 2012/13. For example, in England HEFCE pays a teaching grant to institutions that includes an element for new regime students studying qualifications in "high-cost subjects", which include chemistry and physics.

Methodology

The data for this study were collected through a questionnaire similar to that used in the earlier studies and included:

- cost drivers (student load [full-time equivalents (FTE)], staff [FTE] and space);
- teaching and research income by source;
- budgetary approach and figures;
- costs derived from the universities' Transparent Approach to Costing (TRAC); and
- the allocation of academic staff time to principal activities.

It was agreed from the outset that there should be the maximum possible overlap between the sample institutions in this follow-up study and those in the 2009 study.

Fourteen universities which had both chemistry and physics departments were identified for inclusion in the sample – 10 English universities and four universities in the other three nations of the UK. All 14 universities were invited to participate; 12 of which were also in the 2009 study. Subsequently, 12 chemistry and physics departments provided data, but not all datasets were complete and in some cases it was not possible to isolate the data specifically for chemistry or physics, respectively.

Ten datasets for both chemistry and physics from 2012/13 and 2007/08 could be used to compare student and staff numbers, as well as space and income data.

For both chemistry and physics, 10 datasets from 2012/13 (both including eight from English universities) were sufficiently complete, including full TRAC information, to use for the full financial analysis. Nine of these datasets could be compared with datasets from 2007/08 for both chemistry and physics.

Although the study is only sampling a relatively small number of departments (around 20% of the total number of UK chemistry and physics departments), the selection of departments included is such that the changes noted in the report are considered to be reasonably indicative of trends in the sector as a whole.

A full report containing more details of the methodology and findings, including the data for all 12 chemistry and physics departments that returned data for 2012/13, is also available[6].

Terminology

Throughout this report the term "average" is used to denote the arithmetic mean of the data for individual departments. When the term "overall deficit" is used it denotes the deficit for the group of departments under discussion. That is, the overall deficit is calculated by summing the individual departments' incomes and costs separately and comparing the two overall figures.

[2] *Brown, N, Nigel Brown Associates, Study of the Costs of Chemistry Departments in UK Universities: Summary Report, Royal Society of Chemistry, London, 2006.*
[3] *Brown, N, Nigel Brown Associates, Study of the Finances of Physics Departments in English Universities: A Summary Report, Institute of Physics, London, 2006.*
[4] *Follow-up Study of the Finances of Chemistry and Physics Departments in UK Universities, Institute of Physics, London, 2010.*
[5] *The term home student is used to refer to those who are eligible to pay university tuition fees at a lower rate than overseas students. In general, British and other European Union citizens qualify for home student status. The level of overseas student fees is set by the institution.*
[6] *The Finances of Chemistry and Physics Departments in UK Universities: Third Review, Royal Society of Chemistry, London, 2015.*

2. Cost drivers

Unless otherwise stated (for example, when referring only to the English departments common to both studies), all comparisons in this section refer to the 10 chemistry and 10 physics departments common to both the 2007/08 and 2012/13 samples, for which full data were available.

2.1 Student numbers

Undergraduates

Since 2007/08, departments experienced an increase of 30% (from an average of 347 to 451) and 33% (from an average of 329 to 437) in the number of Home and EU undergraduate FTEs in chemistry and physics, respectively, although the relative growth has not been uniform across the departments. The growth in overseas undergraduate FTEs was 77%, from an average of 19.1 to 33.9, and 80%, from an average of 12.4 to 22.3, in the chemistry and physics departments, respectively.

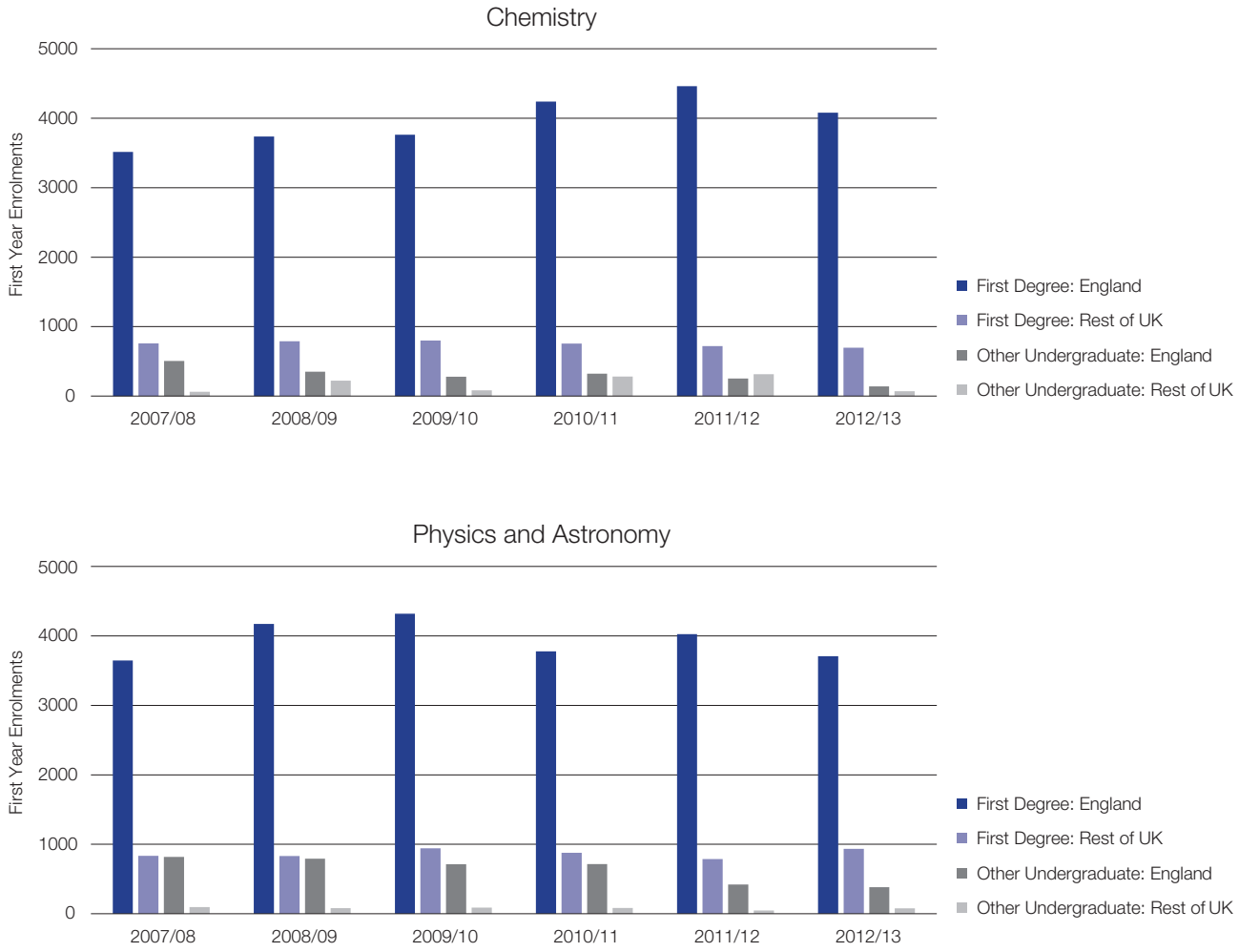
For the chemistry departments, the increase is in line with proportional increases in the chemistry Home and EU undergraduate FTEs nationally across the same period. For the physics departments, the increase is above the proportional increases in physics (and astronomy) Home and EU undergraduate FTEs nationally. The national figures (for all UK chemistry and physics departments) are shown in Figure 1. The dip in enrolments between 2011/12 and 2012/13 reflects a general reduction in new entrants across all undergraduate subjects following the introduction of the new funding regime in England.

Increases in student numbers 2007/08 - 2012/13.

Postgraduates

FTEs for postgraduate taught courses in both physics and chemistry departments are low compared with many other subjects, with a high proportion of these students from outside the EU. Four year undergraduate integrated masters courses, leading to MChem or MPhys qualifications, are common in both chemistry and physics so, for most UK students, there is little drive to complete a taught masters programme on top of an existing undergraduate masters unless they intend to change disciplines. Increasing the number of taught postgraduate FTEs, in particular from outside the EU, might represent a potential source of income for chemistry and physics departments.

In the chemistry departments there was an increase of 17%, from an average of 99.6 to 116.1, in the Home and EU postgraduate research student FTEs between 2007/08 and 2012/13; whilst the physics departments experienced an increase of 29%, from an average of 57.1 to 73.6, in Home and EU postgraduate research student FTEs. The growth in overseas postgraduate research FTEs was 9% and 34% in the chemistry and physics departments, respectively.



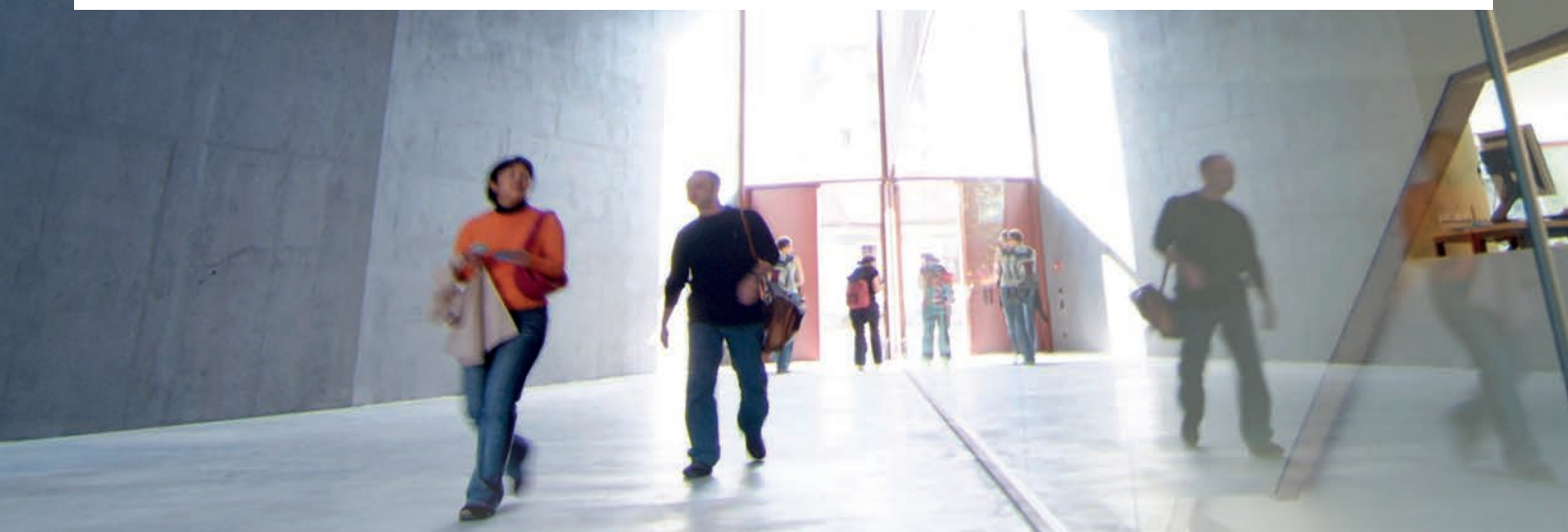


Figure 1: First year enrolment** 2007/08 to 2012/13 into all UK Chemistry and Physics and Astronomy undergraduate courses in England and the rest of the UK.

Source: HESA Student Data.

* First year enrolment is estimated by using a headcount of students registered in principal subjects chemistry or physics and astronomy for 0.5 or more FTE. There will be some double counting of students who are registered 0.5 FTE physics and 0.5 FTE astronomy.

** Other undergraduates include those on courses leading to a variety of qualifications including, for example, professional qualifications, certificates or diplomas, and also include those on courses leading to unspecified qualifications.

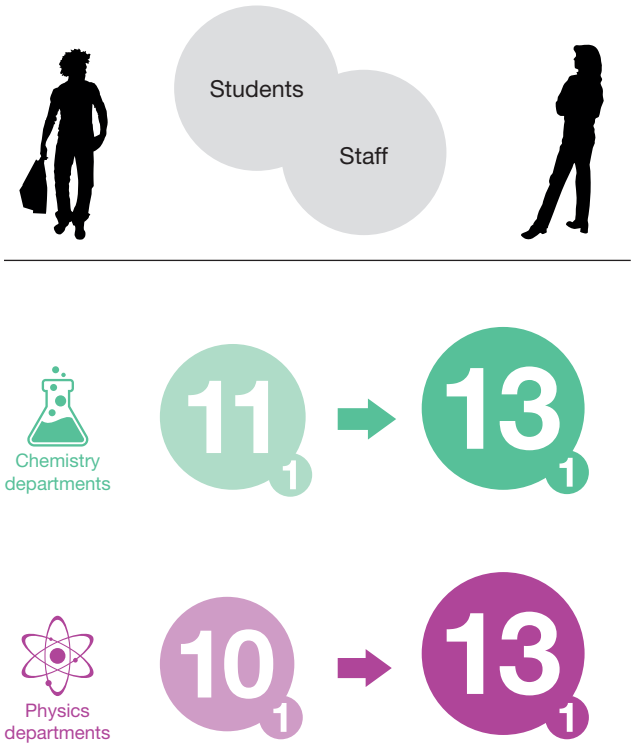
2.2 Academic and other staff

Between 2007/08 and 2012/13, the average FTE permanent academic staff (largely funded through departmental budgets) in the chemistry departments increased by 16%, from 41.7 in 2007/08 to 48.5 in 2012/13, while the average number of FTE research staff (largely supported by external grants and contracts) fell by 5%, from 59.5 to 55.0. For the 10 physics departments, the average number of FTE permanent academic posts increased by 4%, from 40.3 to 41.9, while the average number FTE research staff increased by 8% from 44.7 to 48.1 between 2007/08 and 2012/13.

Between 2007/08 and 2012/13, the average ratio of numbers of students to numbers of permanent academic staff[7] (SSR) increased from 10.8 to 12.8 for the chemistry departments and from 9.5 to 13.1 for the physics departments.

The average number of technician posts in the chemistry departments was 22.0 in both 2007/08 and in 2012/13, and in the physics departments was 15.8 in 2007/08 and 16.1 in 2012/13. This indicates that the number of technicians in chemistry departments remains stable, and that in physics departments the number has stabilised following significant reductions in the years leading up to 2007/08 (between 2003/04 and 2007/08 there was a decline of 13% in permanent technician posts in physics departments common to both of those studies).

Increase of average ratio of students to permanent academic staff 2007/08 - 2012/13.



2.3 Departmental space

For each FTE member of academic staff on departmental budgets, the chemistry departments had an average space per FTE of 189.6 m^2 in 2007/08 and of 181.9 m^2 in 2012/13. Considering all academic and research staff, the respective figures were 81.1 m^2 and 85.8 m^2. The corresponding figures for the physics departments were 142.8 m^2 and 164.7 m^2 for the space per permanent academic staff member and 73.9 m^2 and 81.4 m^2 for all academic and research staff in 2007/08 and 2012/13, respectively.

As observed in the earlier studies, chemistry departments have a higher space requirement than physics departments. This difference reflects three factors: the lower requirement for teaching laboratory space in physics than in chemistry, reflecting the yet more stringent health and safety requirements associated with much practical chemistry teaching (notably fume hoods); the higher proportion of research in physics than in chemistry not requiring laboratory space (e.g. theoretical physics); and the higher proportion of research in physics than in chemistry that is undertaken in external national and international research facilities (particularly astronomy, particle physics and nuclear physics). Consequently, chemistry academic staff need to bring in more income than physics academic staff to cover the costs of the additional space.

[7] *Based on the FTE of all taught students (Home, EU and overseas undergraduate and postgraduate) divided by, in 2007/08, total FTE of academic staff on permanent contracts excluding research fellows and post-doctoral fellows or, in 2012/13, divided by permanent academic staff with teaching responsibilities funded through the departmental budget.*

2.4 Departmental income

Teaching income

The principal sources of publicly funded income for teaching are:

- the funding councils' teaching block grant, which in England in 2012/13 included money for old regime undergraduate students and new regime undergraduate students studying high-cost subjects;
- separate additional funding from HEFCE for strategically important and vulnerable subjects (SIVS) in England; and
- tuition fee income from Home and EU students eligible for public support.

The average public funding per FTE Home and EU taught undergraduate and postgraduate student for the eight English chemistry departments was £9,005 in 2012/13 and £8,240 in 2007/08. The corresponding figures for the eight English physics departments were £8,885 for 2012/13 and £8,768 for 2007/08. Although these represent increases in cash terms, in real terms the average funding per FTE has fallen.[8]

The principal source of non-publicly funded teaching income for both chemistry and physics departments is overseas (non-EU) student fees for taught programmes together with fee income from any Home or EU students not eligible for public support (usually because they have previously received public support for undergraduate study in England). In 2012/13, income from non-publicly funded undergraduate and postgraduate taught students was around 14.1% of total teaching income for the chemistry departments in the sample and around 9.1% for the physics departments.

The average total funding per FTE taught undergraduate and postgraduate student for the eight English chemistry departments was £9,465 in 2012/13 and £8,662 in 2007/08. The corresponding figures for the eight English physics departments were £9,025 for 2012/13 and £9,034 for 2007/08.

Cash-terms changes in average total funding per FTE taught undergraduate and postgraduate students between 2007/08 and 2012/13.

[8] *In real terms the mean public funding per FTE Home and EU taught undergraduate and postgraduate student fell by 7% between 2007/08 and 2012/13 for English chemistry departments and fell by 14% for the English physics departments. A figure of 17.4% increase in the retail prices index (RPI) between 2007/08 and 2012/13 has been used. (Source: Bank of England.)*

Research income

Income that supports research activities in higher education institutions (HEIs) includes:

- the main funding councils quality related (QR) grant allocated on the basis of performance in the most recent Research Assessment Exercise (RAE)/Research Excellent Framework (REF) with a factor to reflect differential costs of disciplines;
- other funding council subsidiary QR grants – predominantly in England – which include the Research Degree Supervision Fund, Charity Support Funding and Business Research Support;
- research grant and contract income from public sources, predominantly from the UK research councils;
- Home and EU postgraduate research student fees;
- other support for postgraduate research supervision and training, including Centres for Doctoral Training (CDTs);
- research grant and contract income from non-public sources; and
- overseas postgraduate research student fees.

Figure 2 compares the level of total research income generated per FTE permanent member of academic staff in 2007/08 and 2012/13. Six out of 10 chemistry departments increased their total research income per FTE permanent academic staff member, along with eight out of 10 physics departments[9].

On average, physics departments earn less research income per FTE permanent academic staff member than chemistry departments. This partly reflects the higher proportion of theoretical work undertaken in physics departments.

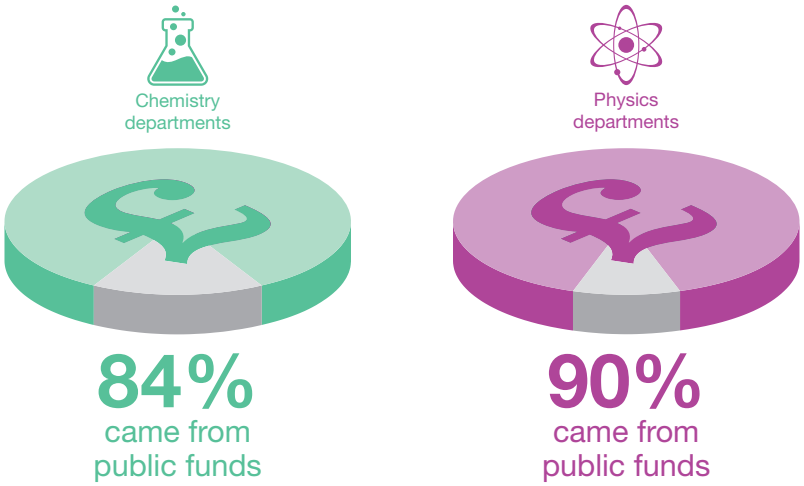
The data confirm the heavy dependence of the chemistry and physics departments on public sources to support their research activities: 84% of the total research income in the chemistry departments and 90% in the physics departments. This is in line with the national picture across all chemistry and physics departments[10]. The heavy dependence of chemistry and physics departments on public sources of funding make them particular vulnerable to changes in the economic climate and to changes in the government's funding of research.

Total income

Total income (teaching, research and other income[11]) for the chemistry departments in 2012/13 ranged from £10.2m to £23.8m and increased overall by 28% between 2007/08 and 2012/13 (equivalent to around 9% when inflation is taken into account).[12]

Total income in the physics departments in 2012/13 ranged from £6.2m to £28.4m and increased overall by 24% between 2007/08 and 2012/13 (equivalent to around 7% when inflation is taken into account).

Dependence of chemistry and physics departments on public sources to support research activities.



[9] *Note: research income excludes grants of time on external national and international research facilities (such as telescopes, CERN, neutron sources, synchrotrons, central laser facility, national supercomputers), so in reality the income per FTE in chemistry and, even more so, physics departments in particular does not reflect the full range of research activity supported.*

[10] *Research income of physics in UK higher education institutions: Update, Institute of Physics, London, 2014, http://www.iop.org/publications/iop/2014/file_62694.pdf.*

[11] *Details of other departmental income were collected. Departments reported a variety of sources of other income including consultancy income, higher education innovation income, endowments and donations, rental income, etc.*

[12] *A figure of 17.4% increase in the retail prices index (RPI) between 2007/08 and 2012/13 has been used. (Source: Bank of England.)*

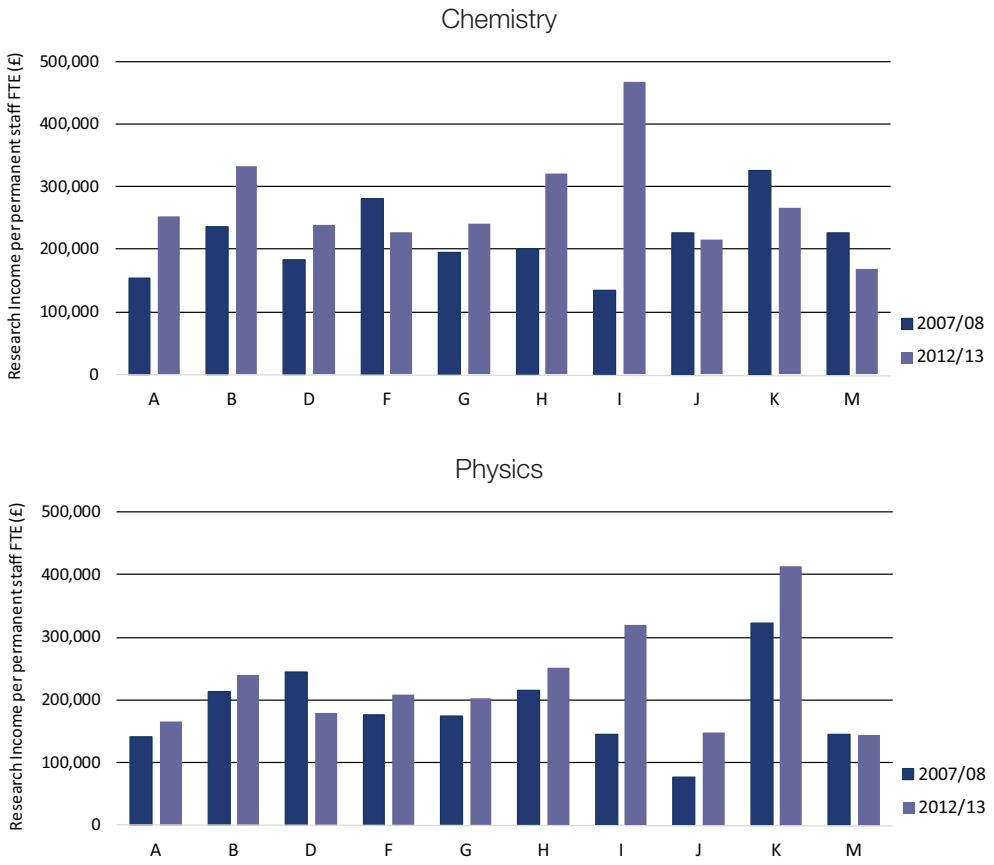


Figure 2: Comparison of total research income (£) per FTE member of permanent academic staff between 2007/08 and 2012/13 for 10 chemistry departments and 10 physics departments common to both studies.
Source: Institutional Data.

3. Departmental financial position

To assess the overall financial position, a comparison was made of the income generated by each department for each activity and TRAC-derived costs.[13] Surpluses and deficits are then calculated as the difference between the income and TRAC-derived costs and are generally reported as the percentage of income.

Unless otherwise stated, this section refers to the 10 chemistry and physics departments (eight of which are based in English institutions) that provided 2012/13 datasets that were sufficiently complete, including full TRAC-based costs. Please note that only nine of these datasets were from departments common to the 2007/08 study for both chemistry and physics. The number of departments used for each comparison is stated accordingly.

3.1 Division of costs between activities: the allocation of academic staff time

TRAC divides costs between activities (teaching, research, other and support) according to the allocation of academic staff time to those activities (as the principal income generators), based on data collected from individual academic staff.[14]

For chemistry departments in 2012/13, the proportion of staff time allocated to teaching activities is greater than the proportion of income which teaching represents, with the differences lying in the range of 2 to 15%. The same pattern is observed for physics departments in 2012/13, with the differences lying in the range of 1 to 17%.

[13] *TRAC-derived costs are based on full economic costs. The principle behind full economic costs is that the full economic cost of a project should be accounted for, which includes an attribution of the cost of academic staff time and the institution's facilities, estates and indirect costs. The TRAC-derived costs thus include two modifications under full economic costing which are an "infrastructure adjustment" to account for the true capital costs to an institution of maintaining the asset base and the "return for financing and investment" (RFI), which is intended to ensure that institutions take account of the economic cost of capital. (This covers the financing costs of institutions, including the existing costs of borrowing and the opportunity cost of institutional cash used for financing; it also provides funds for the rationalisation and development of institutions' business capability and capacity.) In 2012/13, the infrastructure adjustment accounted for 3.1% of expenditure and the RFI represented 5.0% of expenditure.*

[14] *Despite efforts there remain some questions about the basis of the way that the time allocation data are collected.*

3.2 Financial position: teaching

Table 1 and table 2 present the total teaching income and TRAC-based teaching costs for each of the chemistry and physics departments, respectively, for which full income and cost data were available in 2012/13.

In the 10 chemistry departments for which reliable TRAC-based costs were available, the cost per FTE taught undergraduate and postgraduate student ranged from £9,215 to £13,922. In the eight departments in English universities, the average cost per FTE was £10,867.

In England, the chemistry departments had deficits on teaching activities that ranged from 4% to almost 60% of total teaching income. Outside England, one department showed a large teaching deficit and one department showed a surplus of 12% on teaching activity. For the eight chemistry departments in English universities, the overall deficit on teaching activities remained essentially flat, declining slightly (from 16.6% of income in 2007/08 to 14.0% of income in 2012/13).

Table 1: Total teaching income and costs for the 10 chemistry departments for which full income and cost data were available 2012/13.

University		Teaching income (£000s)	Teaching costs (£000s)	Surplus/ deficit (£000s)	% of income
English universities	A	3,540	4,299	-759	-21.4
	B	6,083	6,587	-504	-8.3
	D	4,119	6,566	-2,447	-59.4
	F	5,201	5,401	-200	-3.8
	G	3,930	4,221	-291	-7.4
	H	5,474	5,784	-310	-5.7
	I	4,032	4,641	-609	-15.1
	J	6,202	6,479	-277	-4.5
Universities in other countries of the UK	K	5,018	6,261	-1,243	-24.8
	N	4,661	4,091	570	12.2

Source: Institutional Data.

Table 2: Total teaching income and costs for the 10 physics departments for which full income and cost data were available 2012/13.

University		Teaching income (£000s)	Teaching costs (£000s)	Surplus/ deficit (£000s)	% of income
English universities	A	2,609	3,126	-517	-19.8
	B	4,847	5,788	-941	-19.4
	D	3,378	4,813	-1,435	-42.5
	F	5,273	5,206	67	1.3
	G	4,025	3,728	297	7.4
	H	5,756	5,176	580	10.1
	I	5,557	4,966	591	10.6
	J	4,039	4,740	-701	-17.4
Universities in other countries of the UK	K	4,793	7,008	-2,215	-46.2
	N	3,999	4,352	-353	-8.8

Source: Institutional Data.

In the 10 physics departments for which reliable TRAC-based costs were available, the cost per FTE taught undergraduate and postgraduate student ranged from £8,374 to £13,411. On average, the cost per FTE was £9,839 in the English departments.

In 2012/13, in England, four physics departments had surpluses on teaching activity, ranging between 1% and 11%, and the other four had deficits ranging between 17% and 43%. Outside England, the two departments showed teaching deficits in 2012/13 of 9% to 46%. For the eight physics departments in English universities, the overall deficit on teaching activities increased from 0.3% of income in 2007/08 to 5.8% of income in 2012/13.

3.3 Financial position: research

Table 3 and table 4 present the total research income and TRAC-based research costs for each of the 10 chemistry and 10 physics departments, respectively, for which full income and cost data were available in 2012/13.

In 2012/13, the 10 chemistry departments showed a wide variation in their deficits on research activity, ranging from 3% to 47%. The overall deficit in 2012/13 on research activity was 29.1% of income.

Comparing the nine chemistry departments for which full income and cost data were available in both 2007/08 and 2012/13, the overall deficit on research activity across the departments narrowed from 33.1% of income in 2007/08 to 29.4% in 2012/13. Focussing on the eight English departments alone, the deficit was 34.6% in 2007/08 and 31.4% in 2012/13.

The 10 physics departments showed a similarly wide variation in 2012/13 in their financial position with regard to research activity, ranging from a surplus of 2.8% to a deficit of 45.2%. The overall deficit in 2012/13 on research activity was 23.3% of income.

The overall deficit on research activity for the set of nine physics departments for which full income and cost data were available in both 2007/08 and 2012/13 was 20.5% in 2007/08 and 25.6 % in 2012/13. Focussing on the eight English departments alone, the deficit was 20.1% in 2007/08 and 28.4% in 2012/13.

Average overall deficit on research activity in chemistry and physics departments.

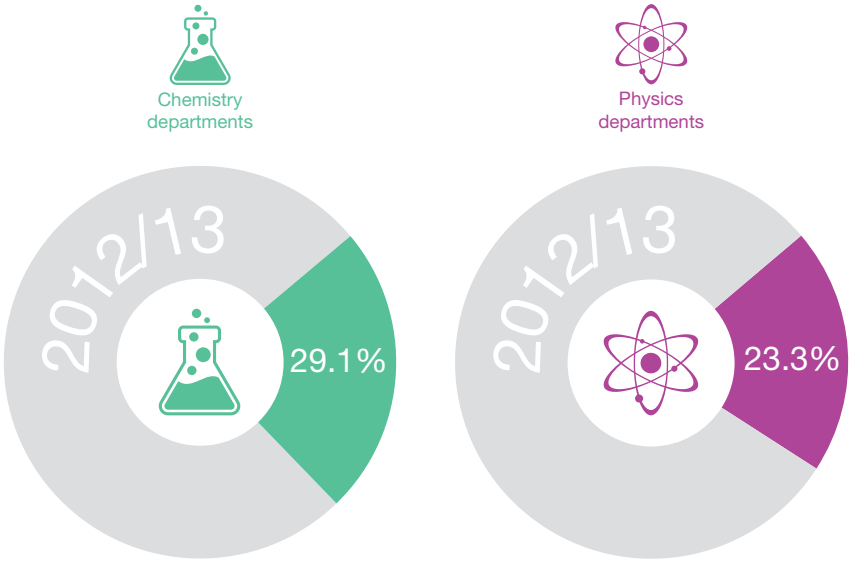


Table 3: Total research income and costs for the 10 chemistry departments for which full income and cost data were available in 2012/13.

University		Research income (£000s)	Research costs (£000s)	Surplus/ deficit (£000s)	% of income
English universities	A	8,115	9,975	-1,860	-22.9
	B	16,944	22,709	-5,765	-34.0
	D	9,571	12,428	-2,857	-29.9
	F	11,244	15,939	-4,695	-41.8
	G	10,584	15,572	-4,988	-47.1
	H	16,395	18,531	-2,136	-13.0
	I	13,829	18,900	-5,071	-36.7
	J	11,305	14,716	-3,411	-30.2
Universities in other countries of the UK	K	11,480	12,853	-1,373	-12.0
	N	7,629	9,604	-1,975	-25.9

Source: Institutional Data.

Table 4: Total research income and costs for the 10 physics departments for which full income and cost data were available in 2012/13.

University		Research income (£000s)	Research costs (£000s)	Surplus/ deficit (£000s)	% of income
English universities	A	4,271	5,525	-1,254	-29.4
	B	9,329	11,336	-2,007	-21.5
	D	6,227	7,729	-1,502	-24.1
	F	10,761	14,130	-3,369	-31.3
	G	5,929	8,608	-2,679	-45.2
	H	13,890	16,631	-2,741	-19.7
	I	15,022	19,994	-4,972	-33.1
	J	5,328	6,911	-1,583	-29.7
Universities in other countries of the UK	K	22,163	25,879	-3,716	-16.8
	N	8,336	8,101	235	2.8

Source: Institutional Data.

4. Analysis and conclusions

Unless otherwise stated, this section refers to the 10 chemistry and physics departments that provided 2012/13 datasets that were sufficiently complete, including full TRAC information, to use for the full financial analysis (eight of which are based in English institutions). Please note that only nine of these datasets were from departments common to the 2007/08 study for both chemistry and physics. The number of departments used for each comparison is stated accordingly. Table 5 and table 6 present the total income TRAC-based costs for 2012/13 covering all activities (teaching, research and other activities[15]) for the chemistry and physics departments, respectively, for which full income and cost data were available.

Table 5: Total income and TRAC-based costs for all activities for the 10 chemistry departments for which full income and cost data were available in 2012/13.

University		Total income (£000s)	Total costs (£000s)	Surplus/ deficit (£000s)	% of income
English universities	A	11,844	14,430	-2,586	-21.8
	B	23,760	29,377	-5,617	-23.6
	D	14,369	19,371	-5,002	-34.8
	F	17,181	21,986	-4,805	-28.0
	G	15,088	20,747	-5,659	-37.5
	H	22,210	24,554	-2,344	-10.6
	I	17,970	23,908	-5,938	-33.0
	J	18,080	21,494	-3,414	-18.9
Universities in other countries of the UK	K	16,732	20,501	-3,769	-22.5
	N	13,894	15,929	-2,035	-14.6

Source: Institutional Data.

Table 6: Total income and TRAC-based costs for all activities for the sample physics departments for which full income and cost data were available in 2012/13.

University		Total Income (£000s)	Total Costs (£000s)	Surplus/ Deficit (£000s)	% of Income
English universities	A	7,724	8,833	-1,109	-14.4
	B	14,525	17,085	-2,560	-17.6
	D	10,002	12,754	-2,752	-27.5
	F	16,583	19,670	-3,087	-18.6
	G	10,001	12,541	-2,540	-25.4
	H	19,682	22,117	-2,435	-12.4
	I	20,747	25,376	-4,629	-22.3
	J	9,603	11,754	-2,151	-22.4
Universities in other countries of the UK	K	28,433	38,019	-9,586	-33.7
	N	12,409	12,688	-279	-2.2

Source: Institutional Data.

[15] *"Other Activities" include, for example, consultancy, full cost training, hiring out equipment to other users, materials testing and analysis.*

Research incomes and costs are, in general, larger than teaching incomes and costs; therefore, the deficits in total income and costs are largely driven by deficits in departments' research activity.

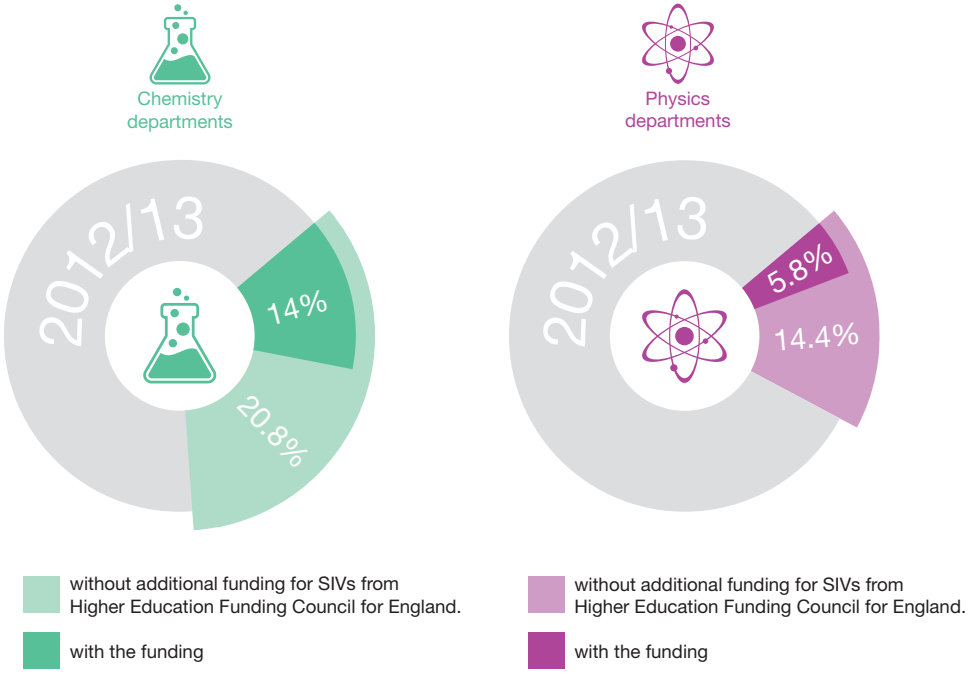
The 10 chemistry departments show a range of deficits across all activities on the basis of TRAC-based costs incorporating the full economic cost adjustments in 2012/13 from 10.6% to 37.5% of income. The overall deficit for these departments was 24.1%

The overall deficit across the nine chemistry departments in the sample, for which full income and cost data were available in both 2007/08 and 2012/13, was 24.9% in 2012/13 and 25.9% in 2007/08. The financial position appears to be the same as that in 2007/08, so on a full economic cost basis, the deficits in chemistry departments were still substantial in 2012/13.

The deficits across all activities for the 10 physics departments in 2012/13 range between 2.2% and 33.7%. The overall deficit for these departments was 20.8%.

The overall deficit for the nine physics departments, for which full income and cost data were available in both 2007/08 and 2012/13, was 22.5% in 2012/13 and 13.6% in 2007/08. The financial position of the physics departments has therefore deteriorated slightly between 2007/08 and 2012/13, reflecting the increased deficits attributable to both teaching and research activities.

Average overall deficit on teaching activities in English chemistry and physics departments



Departments operate different financial structures

The comparison of these findings on surpluses/deficits with departmental budgetary information is complicated by a number of factors:

- Some departments are within a faculty structure and are set targets to generate a surplus against total income to provide a contribution to central costs. These contribution targets are set by the faculty based on the overall faculty contribution set by the university.
- Even for many of those departments operating with fully devolved budgets, the financial requirement is to meet a target contribution to the university's central costs rather than a surplus/deficit target.
- Only one university in the sample operates with anything approaching a full economic cost basis for its resource allocation and budgetary systems.

Bearing these factors in mind, nearly every department in the sample was either in deficit in 2012/13 or had a shortfall against its target contribution to central costs.

It is also worth noting in this context that all the costs used in TRAC do not appear in university accounts. HEFCE is still pushing universities to ensure that they do bear sustainability in mind to avoid the situation found at the time of the Dearing report,[16] which was that universities had a capital deficit. At the time, this situation necessitated initiatives like JIF and SRIF in order to make good the lack of investment in infrastructure.[17]

Summary of headline financial position

In summary, the overall financial position, as measured by the balance between departmental income and TRAC-based costs of chemistry and physics departments, was similar in 2012/13 for the chemistry departments and had deteriorated in the physics departments compared to 2007/08. There had been some modest overall improvement in the position of research and teaching activities in chemistry departments, but the position of both teaching and research activities in physics departments had deteriorated since 2007/08.

Teaching issues

The signs are that, in England, both chemistry and physics are withstanding the perturbations caused by the introduction of the new maximum fees of £9,000. However, the new system was not fully implemented in 2012/13 and there is clearly a need to continue to monitor its effects.

Despite the recent relative stability, the prospects for the future financial position of departments with respect to teaching remain uncertain for a number of reasons, some of which are specific to English universities, including:

- Although SIVS funding continues, between 2007/08 and 2012/13 the amount of additional funding per taught student FTE fell in cash terms by around £300 in chemistry and £370 in physics. In chemistry, the eight English departments had an overall teaching deficit of 14.0% in 2012/13. Without the SIVS funding that deficit would have been 20.8%. Similarly for physics, the eight English departments had an average deficit of 5.8% in 2012/13. Without the SIVS funding that deficit would have been 14.4%.
- The increased transparency brought about by the introduction of the new fees regime, alongside increasing pressure for universities to provide 'value for money' for students,[18] will almost certainly make it more difficult for universities to cross-subsidise teaching deficits in laboratory-based subjects like chemistry and physics using surpluses generated elsewhere.
- Any significant increase in the proportion of undergraduates opting to take three year bachelors courses rather than four year integrated masters courses, as a consequence of higher fees, will reduce the overall student load and hence will reduce teaching income if additional students cannot be recruited.
- The announcement of government-backed student loans of up to £10,000 in England, available to all people under the age of 30 undertaking postgraduate taught masters degrees from 2016/17, may increase demand for such courses.
- The cap on student numbers in England is to be lifted from 2015/16 onwards. The effect on numbers in chemistry and physics is unknown, but to ensure that HEIs provide places in the subjects most needed in the economy, the Government will provide extra funding for STEM students of £50m per academic year from 2015/16.

[16] *The Dearing Report: Higher Education in the learning society, Her Majesty's Stationery Office, London, 1997.*
[17] *JIF is the Joint Infrastructure Fund and was set up in 1998 to address the deterioration in university infrastructure funding identified by the Dearing Committee. SRIF is the Science Research Investment Fund and was a major investment in the physical infrastructure of research which ran over three rounds between 2002/03 and 2007/08.*
[18] *'Student expectations and perceptions of higher education', Kings Learning Institute, 2013; '2013 Student Academic Experience Survey', Higher Education Policy Institute and Which?, 2013*

Research issues

While all of the chemistry departments and all but two of the physics departments for which full TRAC data were available showed deficits on their research activities in 2012/13, it does appear that the level of the research deficits has stabilised.[19] A number of factors could change this current, relatively stable position including:

- Chemistry and physics departments' heavy dependence on public sources of funding for teaching and research means that they are particularly sensitive to changes in public funding regimes. Whilst public funding for research has been protected to some extent, the flat cash settlement for non-capital funding from 2010 equates to a real terms cut of over £1bn,[20] and the future levels of public investment are uncertain.
- As with teaching, research costs are sensitive to pressures for real increases in salaries and the possibility that increased employers' contributions to the Universities Superannuation Scheme may be required.

Departments outside of England

This study collected limited data from chemistry and physics departments in other countries of the UK outside England. However, the indications are that departments outside England are also in deficit, particularly since they have not benefited from the increased teaching income generated by the introduction of the higher tuition fees charged in England or from the additional SIVS money provided by HEFCE. In Scotland, in particular, the lower fees paid for Scottish-domiciled students by the Student Awards Agency for Scotland means that teaching income is much more dependent on state funding than in the rest of the UK. In Wales too, there is a high dependency on state funding for teaching; in addition, the Welsh Assembly Government pays a significant proportion of the fees for Welsh students attending English universities, which reduces the teaching income available for Welsh HEIs.

Final word

In conclusion, most chemistry and physics departments still run at substantial deficits in their main activities of teaching and research. The data suggest that some departments have made efficiency savings since the earlier report; this best practice should be shared throughout the sector. However, these savings have not been enough to significantly affect the deficit so it is imperative that public investment in research is maintained and teaching income is protected. The additional HEFCE funding for SIVS is a vital income stream for these laboratory-based subjects. UK chemistry and physics departments make an essential contribution to society and the economy and must be sustained.

For more information on the valuable contribution UK university chemistry and physics departments make to the economy and wider society, please refer to the "Under-funded and under pressure: the finances of UK university chemistry and physics departments" briefing that accompanies this report.

[19] It should be noted that research councils (and other research sponsors, such as the EU) do not pay the full economic costs of the research they support, although the contribution they make to overheads has increased since 2007/08. Research councils currently pay 80% of the full economic costs and consequently chemistry and physics departments' relatively high dependence on public sources of research funding means that this shortfall affects chemistry and physics more than many other subject areas. In addition, research councils only fund 50% of the cost of major research items secured through grants, which adds further pressure.

[20] http://www.rsc.org/globalassets/04-campaigning-outreach/campaigning/campaign-for-government-science-support/science-funding-briefing.pdf

This report was prepared for the Institute of Physics and the Royal Society of Chemistry by Sean McWhinnie of Oxford Research and Policy and Nigel Brown of Nigel Brown Associates.

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