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Research Income of Physics Cost Centres in UK Higher Education Institutions

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Contents

Definitions	2
Summary	3
1: Introduction	4
1.1: Cost centres and units of assessment	4
1.2: Research income	4
1.3: Full economic costing	5
2: External research income of UK HEIs	6
2.1: The total external research income of HEIs	6
2.2: The total external research income of physics cost centres in HEIs	7
2.3: Comparison of the external research income of selected cost centres in HEIs	8
3: Quality-related research income of UK HEIs	12
3.1: Quality-related income of English HEIs	12
3.2: Quality-related income of Scottish HEIs	13
3.3: Quality-related income of Welsh HEIs	16
4: Total research income of UK HEIs	17
5: Conclusions	19
Appendix A: External research income in detail 2007/08 to 2009/10	20
Appendix B: Sources of external research income	22
Appendix C: List of tables	24
Appendix D: List of figures	26

Definitions

Category A staff	The number of research-active staff who were employed by and on the payroll of the submitting HEI at the census date for each research assessment exercise.
Cost centres	Cost centres are a set of “subjects” used for the reporting of management data.
Dual support system	The system of state funding for research whereby some funding is provided by the funding councils (QR research income) to support a foundation for strategic and applied work, and funding is also provided by the research councils who fund individual research project costs and the indirect costs associated with each project.
External research income	Research income from sources other than the funding councils, including income from the research councils.
fEC	Full economic costing of research. A system whereby HEIs charge the full cost of research including all of the overheads.
HEFCE	Higher Education Funding Council for England.
HEFCW	Higher Education Funding Council for Wales.
HEI	Higher Education Institution.
SFC	Scottish Funding Council.
Total research income	Total research income for all sources, i.e. the sum of QR income and external research income.
QR	Quality-related research income. Income from the funding councils, which is dependent on the result of research assessment that is allocated to HEIs as part of their block grant. This income also includes some additional elements.
UoA	Unit of assessment. A set of “subjects” under which HEIs may submit their research for research assessment.

Summary

- Between 2004/05 and 2009/10 external research income received by UK HEIs increased by 53% from £2823 m to £4321 m. Income from the research councils over the same period increased by 73%.
- The proportion of funding from UK industry and commerce has fallen from a peak of 8.7% of total income in 2006/07 to 6.5% in 2009/10.
- Research income in UK physics cost centres rose by 52% between 2004/05 and 2009/10 to £413 m and over the same period of time the research income received by all cost centres rose by 46%.
- In comparison to the overall picture in the UK, physics departments are much more reliant on external research income. Between 2004/05 and 2009/10 the proportion of total research income in physics cost centres from external sources increased from 74% to 79%.
- The external research income of the physics cost centre in UK HEIs grew from £165 m to £277 m between 2004/05 and 2009/10 – an increase of 67%.
- 80% of the external research income for physics cost centres comes from the research councils. Of all cost centres, physics is most dependent on research council funding: in comparison 67% of mathematics' external research income, 61% of chemistry's, 54% of electrical, electronic and computer engineering's (EECE) and 39% of biosciences' is derived from the research councils.
- 47 HEIs were in receipt of external research income for physics in 2009/10. The top 20 HEIs attracted over 80% of external research income and eight HEIs attracted over 50% of external research income.
- The external research income in physics per permanent academic member of staff varies around the average value of £171,000.
- In England, the quality-related (QR) research funding for physics between 2004/05 and 2011/12 rose by 26% to £61.3 m, for mathematics by 35% to £55.1 m, for biosciences by 29% to £110 m, for EECE by 13% to £29.4 m and for chemistry by 1% to £48.1 m. Overall, the total QR funding nominally allocated to all academic cost centres rose by 35% to £1487 m.
- Physics' share of QR funding in England has remained fairly steady over the last 13 years: from 4.37% in 1999/2000 to 4.12% in 2011/12. Mathematics' share was 3.58% in 1999/2000 and 3.70% in 2011/12. Chemistry's share fell from 4.42% in 1999/2000 to 3.24% in 2011/12, and EECE's share fell from 3.10% in 1999/2000 to 1.98% in 2011/12. Biosciences' share fell from 8.02% in 1999/2000 to 7.39% in 2011/12.
- QR funding in Scotland and Wales varies more than in England as far fewer HEIs receive funding. Funding for physics in Scotland rose by 38% between 2004/05 to 2010/11 to £10.7 m. In Wales, funding fell by 5% over the same period to £1.8 m.
- In 2009/10, 87% of research income in physics came from UK public sources: the proportion across all cost centres was 68%.

1: Introduction

1. Assignment of departments to academic cost centres 2001/02, HEFCE, 2001 (www.hefce.ac.uk/pubs/hefce/2002/02_25.htm).

2. Much of this section is adapted from Guide to funding: How HEFCE allocates its funds (www.hefce.ac.uk/pubs/hefce/2010/10_24/).

3. It did not prove possible to identify DELNI QR allocations to individual UoAs, although the total annual QR allocations were found.

This report presents data on the research income of UK Higher Education Institutions' (HEIs) physics cost centres. The data sources are the Higher Education Statistics Agency (HESA), the central source for the collection and dissemination of statistics about publicly funded UK higher education, and the UK funding councils: Higher Education Funding Council for England (HEFCE), Scottish Funding Council (SFC), Higher Education Funding Council for Wales (HEFCW), and the Department for Education and Learning Northern Ireland (DELNI).

1.1: Cost centres and units of assessment

HESA requires external research income data to be returned with income assigned to cost centres and is reported by HESA on the basis of cost centres. The list of cost centres includes physics, chemistry, mathematics, biosciences, and electrical, electronic and computer engineering (EECE), which are discussed in this report. HEIs are required to map their constituent departments/schools to cost centres, and they can apportion departments across a number of cost centres.

Cost centres vary greatly in their breadth of coverage, for example, biosciences covers a large range of university departments including, life and health sciences, biomedical science, cancer research, biochemistry, and sports science. Full details of the mapping between departments and cost centres are available on the HEFCE website.¹

Quality-related (QR) research funds distributed by the funding councils are calculated based on units of assessment (UoAs). Funding councils publish the sums generated by individual UoAs in HEIs, although the funds are transferred to HEIs as part of their annual recurrent block grant. There were 69 UoAs before the 2001 Research Assessment Exercise (RAE). For the RAE 2001 the biochemistry UoA was combined with the biological sciences UoA. 68 UoAs were used until the RAE 2008. A number of amendments were made to the UoAs for the RAE 2008 resulting in a total of 67. Mappings are published of UoAs to cost centres.

The physics, chemistry, biological sciences and the electrical and electronic engineering UoAs map directly to the physics, chemistry, biosciences and EECE cost centres, respectively. The pure mathematics, applied mathematics, and statistics and operational research UoAs map to the mathematics cost centre.

In this report, in order to be comparable with external

research income, QR income is reported on the basis of cost centres rather than UoAs.

1.2: Research income

The "Dual Support System" for research income comprises funds for basic research supported by the funding councils providing a foundation for strategic and applied work, and income from the research councils who fund individual research project costs and the indirect costs associated with each project.

The annual external research income is based on the grant-derived monies spent in each year rather than being the values of grants awarded in that year.

Funding council monies comprise QR funding provided to HEIs to cover the costs of the research infrastructure, which includes permanent academic staff salaries, premises, central computing and library facilities. There are a number of different components used in calculating mainstream QR funding that are: volume measures; a quality measure; subject cost weightings; and London weighting. All funding councils do not necessarily follow the same methodology, for example, subject weightings may vary.²

Data in this report are reported on the basis of individual UoAs' allocations of QR funding aggregated as appropriate. Where totals of QR funding are reported, these include only the monies allocated to the UoAs and excludes the business research and the national research libraries elements. Sections are presented for QR income distributed by HEFCE, SFC and HEFCW, but not for the income distributed by DELNI.³

It should be noted that although the funding councils publish nominal allocations for individual UoAs within HEIs, the money is provided to HEIs as part of their block grant. It is for each HEI to decide how the funds they receive are allocated, although the use of the Transparent Approach to Costing (TRAC) methodologies (see section 1.3) means that HEIs are required to be transparent about how they spend their funds.

HEIs report their external research income each year to HESA on the basis of cost centres, and the income source. Until 2006/07, income was broken down into eight categories. From 2007/08, 14 categories have been used, which are listed in table 1.

In this report, external research income is reported on the basis of the eight categories used up to 2006/07. Data on the external research income from 2007/08 to 2009/10 broken down into the 14 categories are shown in appendix A.

1: Introduction

1.3: Full economic costing

The government's 1998 Spending Review granted additional funds for higher education, but required transparent costing at institutional level. This led to the introduction of the Transparency Review, which established the TRAC methodologies.

TRAC showed that all research was under-funded when full economic costings (fEC) were calculated. The upshot was that HEIs were required to take responsibility for their own financial sustainability, particularly in respect of research infrastructure. Consequently, the former Office of Science and Technology (OST) distributed additional funds that rose to £200 m from 2007/08. The aim of these extra funds was to ensure that a greater proportion of the cost of research was met. The funds were not to increase the volume of research being funded. The fEC methodology was fully embedded within HEIs by 2008/09.

Research council projects were awarded under an fEC basis from 1 September 2005 with equipment funded at 80% for the first £50,000 and 100% above £50,000. The research councils currently provide funding at 80% of the fEC for awarded grants; the HEI receiving the funding must agree to find the balance of fEC for the project from other resources.

As noted above, the additional funds were not intended to increase research volume. In fact there was some concern that the introduction of fEC would lead to a decrease in research council-funded volume.⁴ This report looks at external funding for research and not volume, nonetheless, some of the funding increases presented in section 2.1 are due to the introduction of fEC.

Table 1: External research income funding sources*

2007/08 onwards	Up to 2006/07
Research councils, The Royal Society, British Academy and The Royal Society of Edinburgh	Research councils
Non-EU-based charities (open competitive process)	Other overseas
Non-EU industry, commerce and public corporations	
Non-EU other	
Other sources	
UK-based charities (open competitive process)	UK charities
UK-based charities (other)	
UK central government bodies, local authorities, health and hospital authorities	UK public and health funding
UK industry, commerce and public corporations	UK industry and commerce
EU government bodies	EU government
EU-based charities (open competitive process)	EU other
EU industry, commerce and public corporations	
EU other	

**A full description of the research income sources is provided in appendix D.*

4. www.rsc.org/chemistryworld/News/2008/January/25010801.asp.

2: External research income of UK HEIs

2.1: The total external research income of HEIs

External research income received by academic cost centres in UK HEIs between 2004/05 and 2009/10 is shown in table 2 and figure 1. Between 2004/05 and 2009/10 total external research income increased by

53%. Income from the research councils is the largest proportion of the external income, and increased by 73% over the same period.

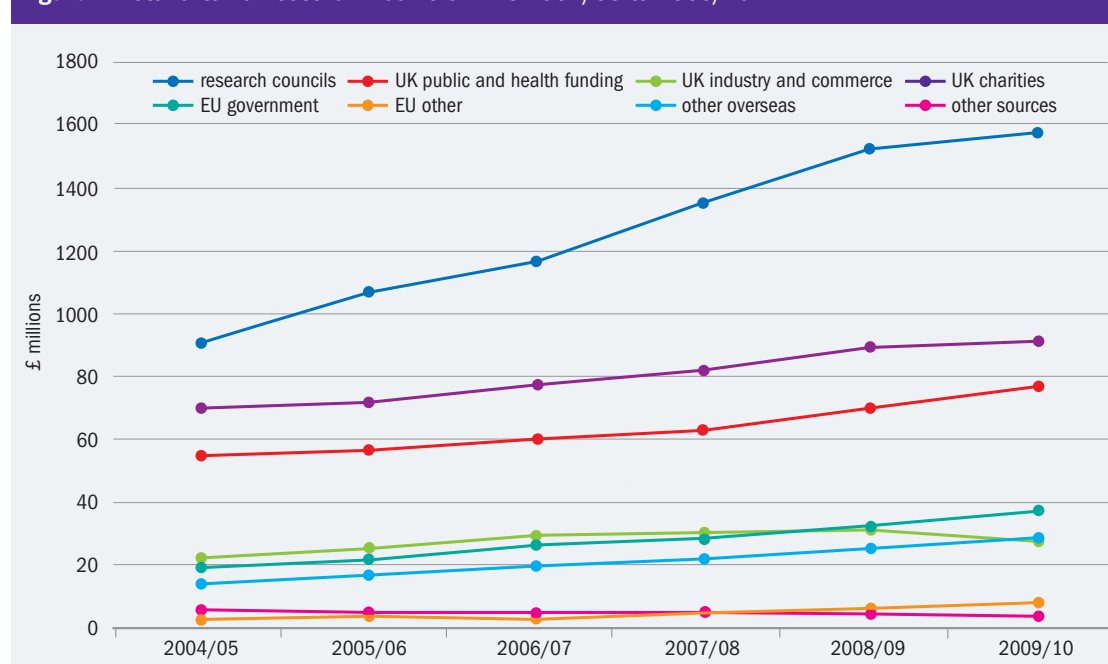
Table 3 shows the proportion of total funding from each income source. Public funding via the research councils and public and health funding represent over

Table 2: Total external research income of HEIs 2004/05 to 2009/10

Income source	External research income by year (£000s)						% increase 2004/05 to 2009/10
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	
Research councils	911,441	1,064,418	1,169,471	1,349,265	1,521,895	1,577,317	73
UK public and health funding	550,605	568,661	604,536	629,341	698,443	771,302	40
UK industry and commerce	228,027	254,453	295,915	295,547	311,751	279,292	22
UK charities	697,542	720,400	773,861	824,058	894,331	915,278	31
EU government	197,516	217,364	260,923	277,541	322,871	374,258	89
EU other	33,388	40,173	46,624	51,716	66,531	76,107	128
Other overseas	144,953	171,235	200,964	216,453	255,284	287,395	98
Other sources	59,584	55,833	58,253	51,762	49,192	40,723	-32
Total	2,823,056	3,092,537	3,410,547	3,695,683	4,120,298	4,321,672	53

Source: HESA research grants and contracts income.

Figure 1: Total external research income of HEIs 2004/05 to 2009/10



Source: HESA research grants and contracts income.

2: External research income of UK HEIs

Table 3: The percentage share of total external research income by source in HEIs 2004/05 to 2009/10

Income source	Distribution of external research income between sources by year						Change in share of research income between 2004/05 and 2009/10
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	
Research councils	32.3%	34.4%	34.3%	36.5%	36.9%	36.5%	4.2%
UK public and health funding	19.5%	18.4%	17.7%	17.0%	17.0%	17.8%	-1.7%
UK industry and commerce	8.1%	8.2%	8.7%	8.0%	7.6%	6.5%	-1.6%
UK charities	24.7%	23.3%	22.7%	22.3%	21.7%	21.2%	-3.5%
EU government	7.0%	7.0%	7.7%	7.5%	7.8%	8.7%	1.7%
EU other	1.2%	1.3%	1.4%	1.4%	1.6%	1.8%	0.6%
Other overseas	5.1%	5.5%	5.9%	5.9%	6.2%	6.7%	1.6%
Other sources	2.1%	1.8%	1.7%	1.4%	1.2%	0.9%	-1.2%

Source: HESA research grants and contracts income.

Table 4: The total external research income in the physics cost centre by income source 2004/05 to 2009/10

Income source	External research income in physics by year (£000s)						% increase 2004/05 to 2009/10
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	
Research councils	126,628	145,436	158,512	189,085	211,461	220,697	74
UK public and health funding	9950	8923	10,386	9834	13,165	11,799	19
UK industry and commerce	5767	6101	6600	6487	6761	5881	2
UK charities	4548	5369	4702	5234	5010	5640	24
EU government	12,060	14,428	20,106	19,287	23,524	23,771	97
EU other	1194	1209	1514	1661	2377	2134	79
Other overseas	2723	3858	3,840	4004	5251	5600	106
Other sources	2400	1016	1213	1124	1804	1161	-52
Total	165,270	186,340	206,873	236,716	269,353	276,683	67

Source: HESA research grants and contracts income.

50% of the total. UK charities provide over 20% of income. In addition, funding from UK industry and commerce, EU government, and other overseas sources all represent significant sources of income.

Interestingly, the proportion of funding from UK industry and commerce has fallen from a peak of 8.7% in 2006/07 to 6.5% in 2009/10. In monetary terms the funding peaked at £312 m in 2008/09 but fell to £279 m in 2009/10. This probably reflects the effects of the economic downturn, and, although understandable, it is a concern that external research funding for HEIs by UK industry and commerce is falling.

2.2: The total external research income of physics cost centres in HEIs

Table 4 shows the external research income of the physics cost centre in UK HEIs between 2004/05 and 2009/10. During that period, total external research income for physics grew from £165 m to £277 m, which is an increase of 67%.

Table 5 shows the distribution of external research income between sources. Physics is particularly dependent on research council funding (80%). In fact, 84% of external research funding for physics comes from public UK sources. This is in line with the con-

2: External research income of UK HEIs

5. Follow-up Study of the Finances of Chemistry and Physics Departments in UK Universities, Institute of Physics and Royal Society of Chemistry, 2010 (www.iop.org/publications/iop/2010/page_44092.html).

6. Study of the Costs of Chemistry Departments in UK Universities: Summary Report, Royal Society of Chemistry, 2006 (www.rsc.org/scienceandtechnology/policy/documents/2006/Index.asp).

7. Study of the Finances of Physics Departments in English Universities: A Summary, Institute of Physics, 2006 (www.iop.org/publications/iop/archive/page_38237.html).

Table 5: The percentage share of total external research income by source in the physics cost centre between different sources 2004/05 to 2009/10

Income source	Share of external research income between sources by year						Change in share of research income between 2004/05 and 2009/10
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	
Research councils	76.6%	78.0%	76.6%	79.9%	78.5%	79.8%	3.2%
UK public and health funding	6.0%	4.8%	5.0%	4.2%	4.9%	4.3%	-1.7%
UK industry and commerce	3.5%	3.3%	3.2%	2.7%	2.5%	2.1%	-1.4%
UK charities	2.8%	2.9%	2.3%	2.2%	1.9%	2.0%	-0.8%
EU government	7.3%	7.7%	9.7%	8.1%	8.7%	8.6%	1.3%
EU other	0.7%	0.6%	0.7%	0.7%	0.9%	0.8%	0.1%
Other overseas	1.6%	2.1%	1.9%	1.7%	1.9%	2.0%	0.4%
Other sources	1.5%	0.5%	0.6%	0.5%	0.7%	0.4%	-1.1%

Source: HESA research grants and contracts income.

Table 6: The external research income in selected cost centres by income source 2009/10

Income source	External research income (£000s)				
	Physics	Mathematics	Chemistry	EECE	Biosciences
Research councils	220,697	50,894	107,994	79,824	227,355
UK public and health funding	11,799	3333	12,732	18,044	49,164
UK industry and commerce	5881	3256	11,889	16,045	31,247
UK charities	5640	5367	12,645	2548	180,910
EU government	23,771	6740	18,295	25,319	52,349
EU other	2134	498	3013	2657	10,281
Other overseas	5600	5417	7773	3242	26,543
Other sources	1161	235	1608	1373	1929
Total	276,683	75,740	175,949	149,052	579,778

Source: HESA research grants and contracts income.

clusions drawn by Nigel Brown Associates in work examining the finances of chemistry and physics departments in UK universities.^{5,6,7} A relatively small proportion of external research income comes from UK industry and commerce, and that proportion has fallen between 2004/05 and 2009/10 from 3.5% to 2.1%.

2.3: Comparison of the external research income of selected cost centres in HEIs

Table 6 presents the external research income of selected cost centres for 2009/10. Of the cost centres under consideration biosciences attracts the most external research income (£580 m), followed by physics

(£277 m), and chemistry (£176 m). The external research income per permanent member of academic staff is shown in table 7.

Of the subjects under consideration, physics has the highest level of external research income per permanent member of academic staff (£170,000) followed by chemistry (£164,000), biosciences (£126,000), EECE (£74,000) and mathematics (£34,000).

Table 8 shows the distribution of external research income between sources. As noted above, physics is particularly dependent on research council funding (80%). Mathematics receives 67% of its external research income from the research councils, chemistry

2: External research income of UK HEIs

Table 7: The external research income in selected cost centres per member of permanent academic staff* by income source 2009/10

Income source	External research income per member of academic staff (£)				
	Physics	Mathematics	Chemistry	EECE	Biosciences
Research councils	135,814	22,620	100,929	39,615	49,371
UK public and health funding	7261	1481	11,899	8955	10,676
UK industry and commerce	3619	1447	11,111	7963	6785
UK charities	3471	2385	11,818	1265	39,286
EU government	14,628	2996	17,098	12,565	11,368
EU other	1313	221	2816	1319	2233
Other overseas	3446	2408	7264	1609	5764
Other sources	714	104	1503	681	419
Total	170,266	33,662	164,438	73,971	125,902

* Permanent academic staff numbers are the numbers of lecturers, senior lecturers, readers and professors in the respective cost centres in 2009/10.

Source: HESA research grants and contracts income; HESA staff data.

Table 8: The distribution of total external research income in selected cost centres between different sources 2009/10

Income source	Distribution of external research income in selected cost centres between sources 2009/10				
	Physics	Mathematics	Chemistry	EECE	Biosciences
Research councils	79.8%	67.2%	61.4%	53.6%	39.2%
UK public and health funding	4.3%	4.4%	7.2%	12.1%	8.5%
UK industry and commerce	2.1%	4.3%	6.8%	10.8%	5.4%
UK charities	2.0%	7.1%	7.2%	1.7%	31.2%
EU government	8.6%	8.9%	10.4%	17.0%	9.0%
EU other	0.8%	0.7%	1.7%	1.8%	1.8%
Other overseas	2.0%	7.2%	4.4%	2.2%	4.6%
Other sources	0.4%	0.3%	0.9%	0.9%	0.3%

Source: HESA research grants and contracts income.

61% and EECE 54%. Biosciences attracts 39% of external research income from the research councils, whilst 31% of biosciences external research income comes from UK charities, which is a significantly greater proportion than the other cost centres under consideration.

Table 9 ranks all of the cost centres based on the proportion of external research income that comes from the research councils. Four of the five cost centres considered above, appear in the top six, and physics and mathematics take the top two places, with chemistry appearing fourth and EECE appearing sixth. These data emphasise how important research council funding is to the health of the research base in physics,

mathematics and chemistry, and also underline how these cost centres are particularly sensitive to changes in the level of research council funding.

Figure 2 shows a plot of the external research income and the number of permanent academic staff in physics cost centres. As might be expected there is a good correlation between the research income and the number of staff. The plot also indicates that there is a minimum number of staff, around 20–25, above which research income increases broadly in line with the number of academic staff.

2: External research income of UK HEIs

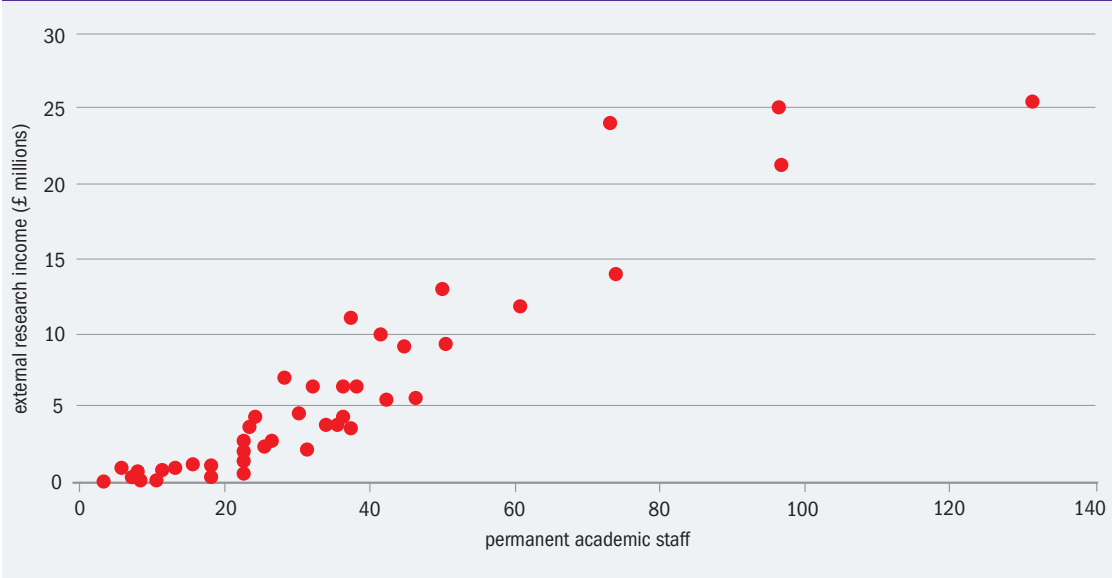
Source: HESA research grants and contracts income.

Table 9: The proportion of total external research income from the research councils by cost centre 2009/10

Cost centre	Proportion of external income from the research councils
Physics	79.8%
Mathematics	67.2%
French, Spanish and German modern languages	63.5%
Chemistry	61.4%
Chemical engineering	54.9%
EECE	53.6%
Language-based studies	52.7%
IT and systems sciences, computer software engineering	51.5%
Earth marine and environmental sciences	51.3%
Civil engineering	49.5%
Design and creative arts	48.9%
Mineral metallurgy and materials engineering	46.2%
Geography	46.1%
Psychology and behavioural sciences	45.4%
Architecture built environment and planning	43.3%
Veterinary science	41.7%
Biosciences	39.2%
Anatomy and physiology	39.2%
Social studies	38.3%
Mechanical aero and production engineering	37.6%
Librarianship communication and media studies	36.2%
General engineering	34.5%
Business and management studies	30.6%
Pharmacy	26.7%
Archaeology	26.7%
Education	22.0%
Sports science and leisure studies	21.8%
Clinical dentistry	19.4%
Clinical medicine	17.8%
Agriculture and forestry	15.7%
Health and community studies	13.1%
Nursing and paramedical studies	7.6%
Catering and hospitality management	7.1%
Continuing education	3.9%

2: External research income of UK HEIs

Figure 2: Plot of total external research income against the number of permanent academic staff for individual physics cost centres 2009/10



Source: HESA research grants and contracts income, and staff data.

3: Quality-related research income of UK HEIs

3.1: Quality-related income of English HEIs

Table 10 presents data on the QR income allocated to selected cost centres in England by HEFCE from 2004/05 to 2011/12. Overall, QR funding nominally allocated to academic cost centres has risen by 35%. Considering individual cost centres, the funding for physics has risen by 26%, for mathematics 35%, for biosciences 29% and for EECE 14%. The funding for chemistry rose by only 1% between 2004/05 and 2011/12.

It should be noted that in England the number of departments in each of the selected cost centres has fallen between 2004/05 and 2009/10 (see table 11), which might be because departments have either closed or merged, or most probably have been submitted to different UoAs in the RAE 2008 compared to the RAE 2001.

Table 12 presents the number of category A staff in each of the selected cost centres and the total number submitted. Despite the fewer number of departments submitting to the RAE 2008 than to the RAE 2001 in the selected cost centres, the number of category A

staff submitted increased. This suggests that there has been a concentration of research active staff into fewer departments. One of the strategic aims of research assessment was to concentrate research and these data would suggest that this has happened. It is also possible that the changes in the way in which the RAE 2008 was run compared to the RAE 2001 encouraged departments to submit larger numbers of category A staff.

Data are presented in table 13 for the amount of QR income per number of category A staff in the selected cost centres. Care should be taken in interpreting these data given the significant increases in the number of category A staff submitted to the RAE 2008: the QR income per category A staff fell significantly between 2008/09 and 2009/10.

Table 14 and figure 3 illustrate each of the selected cost centres' share of total HEFCE QR research funding nominally allocated to academic cost centres. Physics' share varies little over the 13 years for which data are presented: from 4.37% in 1999/2000 to 4.12% in 2011/12. Similarly, mathematics' share was 3.58% in

Table 10: HEFCE QR research income in selected cost centres 2004/05 to 2011/12

Cost centre	HEFCE QR income by year (£000s)								
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	% change
Physics	48,683	56,900	60,679	61,075	61,075	62,299	63,821	61,364	26.0
Mathematics	40,855	49,113	52,391	53,210	52,331	55,926	57,361	55,106	34.9
Chemistry	47,579	50,687	52,442	49,146	52,486	49,604	50,022	48,148	1.2
EECE	25,923	27,858	29,556	27,124	28,745	30,160	30,663	29,420	13.5
Biosciences	85,008	94,596	101,778	103,939	104,143	112,333	113,126	109,970	29.4
Total (m)	1098	1267	1358	1361	1397	1514	1532	1487	35.4

Source: HEFCE.

Table 11: Number of HEIs receiving HEFCE QR income in selected cost centres 2004/05 to 2011/12

Cost centre	Number of HEIs receiving HEFCE QR income							
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Physics	39	39	37	37	34	31	31	31
Mathematics	114	114	104	104	93	93	93	93
Chemistry	32	32	31	31	27	24	24	24
EECE	31	31	31	31	25	28	28	28
Biosciences	53	53	53	53	48	41	41	41

Source: HEFCE.

3: Quality-related research income of UK HEIs

1999/2000 and 3.70% in 2011/12. Chemistry's share fell from 4.42% in 1999/2000 to 3.24% in 2011/12, and EECE's share fell from 3.10% in 1999/2000 to 1.98% in 2011/12. Biosciences' share also fell from 8.02% in 1999/2000 to 7.39% in 2011/12.

Figure 4 shows the ratio of QR research income in selected cost centres to that in 1999/2000. Of the cost centres under consideration, only mathematics has consistently increased its funding by more than the overall proportionate increase in funding. Although physics did better than the overall increase until the RAE 2008, it has now fallen behind the overall increase. Chemistry, biosciences and EECE have all done worse than the overall increase in QR funding, as was clear from the data on cost centres' share of QR funding.

Table 12: Number of category A staff in selected cost centres submitted to the Research Assessment Exercises in 2001 and 2008

Cost centre	Number of category A staff submitted to Research Assessment Exercises	
	RAE 2001	RAE 2008
Physics	1002	1245
Mathematics	1081	1508
Chemistry	780	892
EECE	512	606
Biosciences	1272	1631
All cost centres	26,108	36,813

Source: HEFCE.

3.2: Quality-related income of Scottish HEIs

Table 15 presents data on the QR income allocated to selected cost centres in Scotland by SFC from 2004/05 to 2010/11. Overall, QR funding nominally allocated to academic cost centres has risen by 40%. Considering individual cost centres, the funding for physics has risen by 38% but for mathematics it has fallen by 2%. The funding for chemistry has risen by 67%, for biosciences by 35% and that for EECE has fallen by

16%. The larger fluctuations in Scotland compared to England are probably as there many fewer individual HEIs under consideration.

Data in figure 5 show the selected cost centres' share of overall QR research income in Scotland. It is notable how there were significant changes in 2009/10 following the RAE 2008, a point that is underlined in figure 6 that illustrates the ratio of QR research income in selected cost centres to that in 2002/03.

Table 13: HEFCE QR research income per number of category A staff in selected cost centres 2004/05 to 2011/12

Cost centre	HEFCE QR income by year (£000s)							
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Physics	48.6	56.8	60.6	61.0	61.0	50.0	51.3	49.3
Mathematics	37.8	45.4	48.5	49.2	48.4	37.1	38.0	36.5
Chemistry	61.0	65.0	67.2	63.0	67.3	55.6	56.1	54.0
EECE	50.7	54.5	57.8	53.0	56.2	49.8	50.6	48.6
Biosciences	66.8	74.4	80.0	81.7	81.9	68.9	69.4	67.4
Total	42.1	48.6	52.0	52.1	53.6	41.1	41.6	40.4

Source: HEFCE.

Table 14: Selected cost centres' share of HEFCE QR research income 1999/2000 to 2011/12

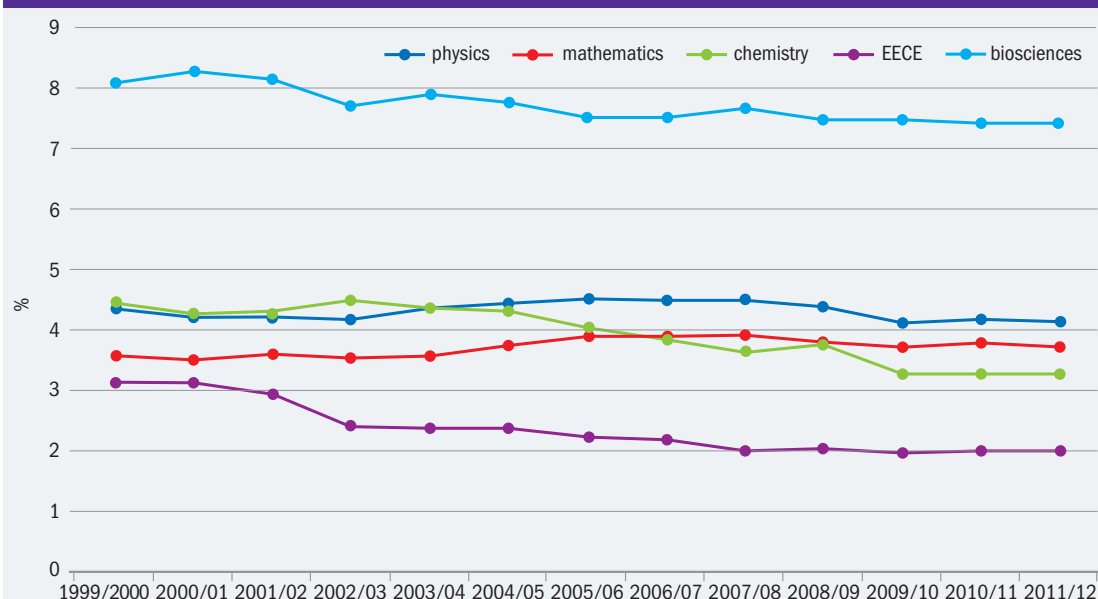
Cost centre	Share of HEFCE QR research income by year					Change in share between 1999/2000 and 2011/12
	1999/2000	2002/03	2005/06	2008/09	2011/12	
Physics	4.37%	4.15%	4.49%	4.37%	4.12%	-0.25%
Mathematics	3.58%	3.53%	3.87%	3.74%	3.70%	0.12%
Chemistry	4.42%	4.48%	4.00%	3.75%	3.24%	-1.18%
EECE	3.10%	2.42%	2.20%	2.06%	1.98%	-1.12%
Biosciences	8.02%	7.67%	7.46%	7.45%	7.39%	-0.63%

Source: HEFCE.

3: Quality-related research income of UK HEIs

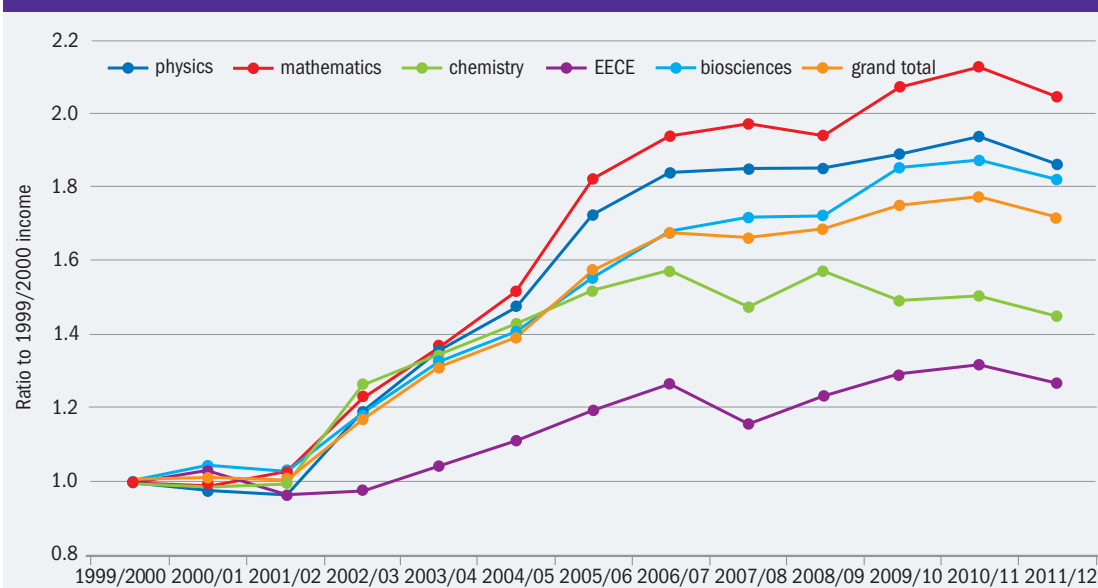
Source: HEFCE.

Figure 3: Selected cost centres' share of HEFCE QR income 1999/2000 to 2011/12



Source: HEFCE.

Figure 4: Ratio of HEFCE QR income to that in 1999/2000 for selected cost centres 2000/2001 to 2011/12



Source: SFC.

Table 15: SFC QR income in selected cost centres 2004/05 to 2011/12

Cost centre	SFC QR income by year (£000s)							% change
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	
Physics	7718	8055	8766	9125	9561	10,625	10,685	38.4
Mathematics	6147	6451	7044	7319	7702	6020	6020	-2.1
Chemistry	5782	6012	6584	6907	7205	9639	9639	66.7
EECE	5486	5757	6291	6539	6877	4625	4625	-15.7
Biosciences	16,248	17,066	20,409	22,891	24,026	21,933	21,933	35.0
Total	149,277	155,797	175,743	188,673	197,543	207,531	208,403	39.6

3: Quality-related research income of UK HEIs

Figure 5: Selected cost centres' share of SFC QR income 2001/02 to 2010/11

Source: SFC.

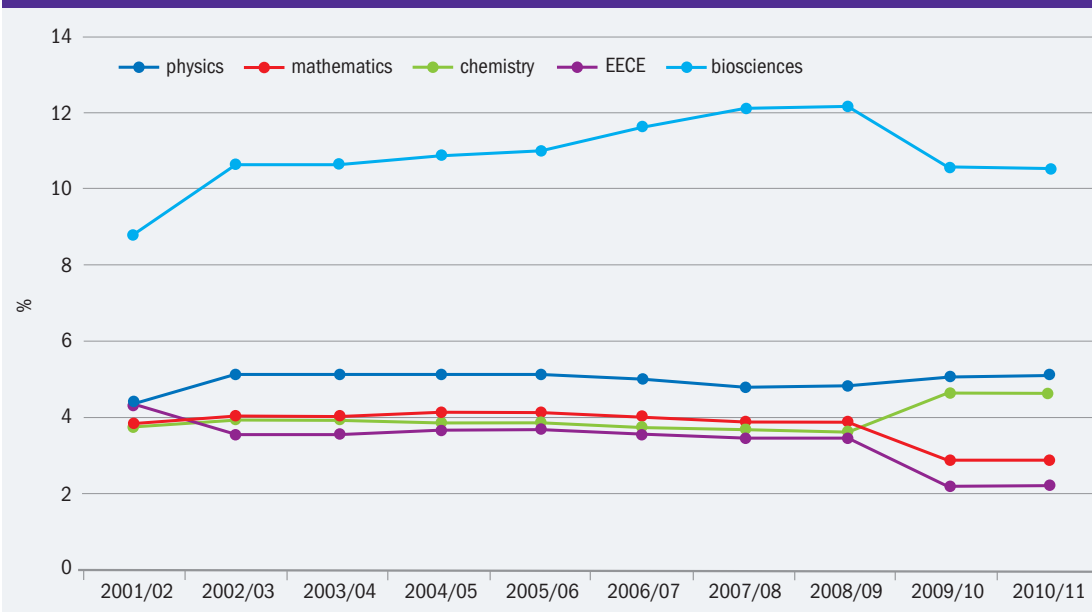


Figure 6: Ratio of SFC QR income to that in 2001/02 for selected cost centres 2002/03 to 2010/11

Source: SFC.

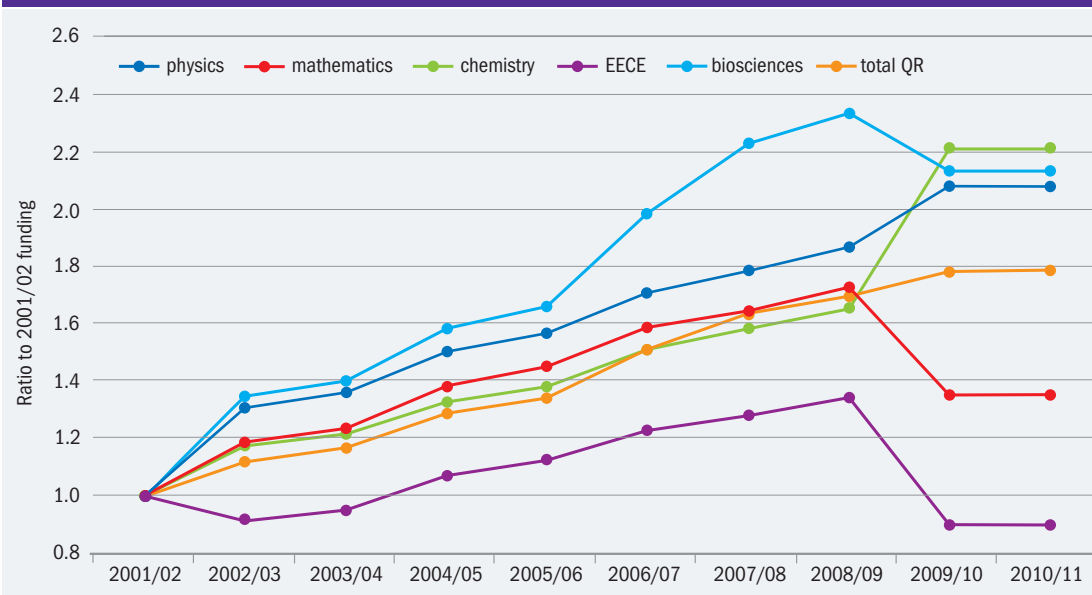


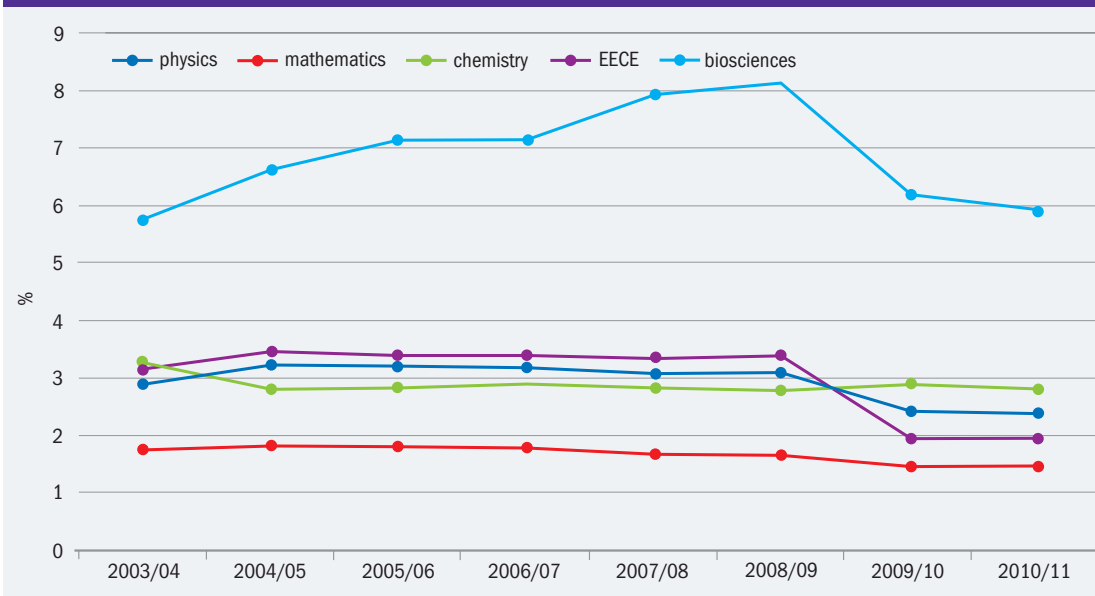
Table 16: HEFCW QR income in selected cost centres 2004/05 to 2011/12

Source: HEFCW.

Cost centre	HEFCW QR income by year (£000s)							% change
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	
Physics	1851	1906	1938	2018	2082	1800	1761	-4.9
Mathematics	1050	1083	1088	1106	1123	1088	1087	3.5
Chemistry	1627	1696	1779	1859	1876	2148	2088	28.3
EECE	1994	2018	2067	2185	2293	1482	1464	-26.6
Biosciences	3800	4238	4361	5204	5478	4640	4393	15.6
Total	57,393	59,428	60,890	65,509	67,311	74,462	73,901	28.8

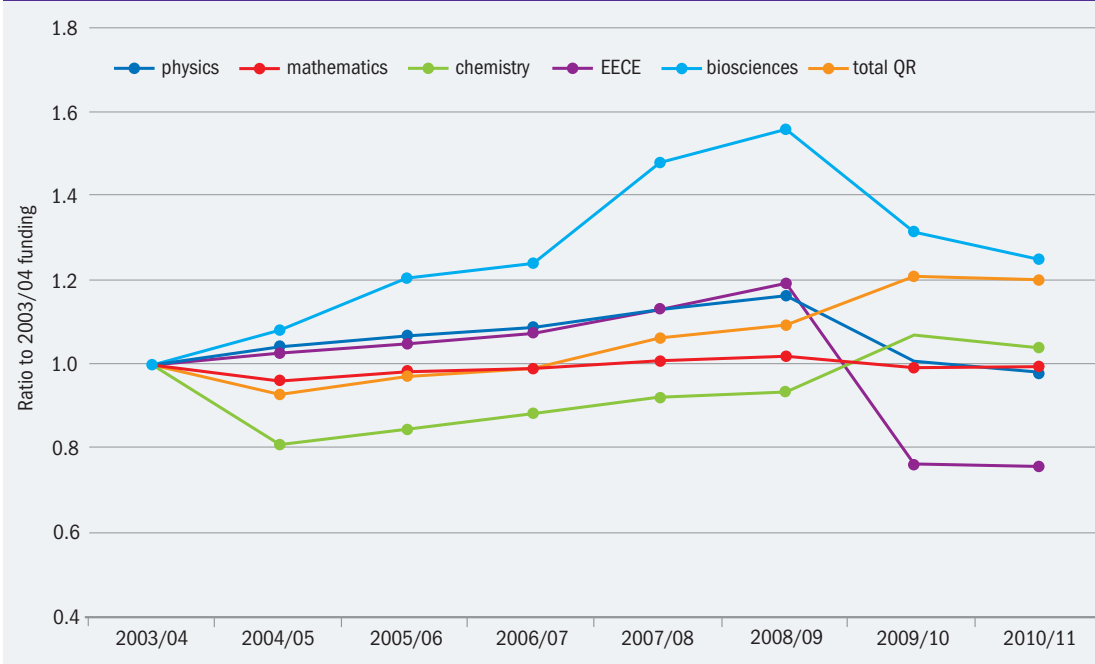
3: Quality-related research income of UK HEIs

Figure 7: Selected cost centres' share of HEFCW QR income 2003/04 to 2010/11



Source: HEFCW.

Figure 8: Ratio of HEFCW QR income to that in 2003/04 for selected cost centres 2004/05 to 2010/11



Source: HEFCW.

3.3: Quality-related income of Welsh HEIs

Table 16 presents data on the QR income allocated to selected cost centres in Wales by HEFCW from 2004/05 to 2010/11. Overall, QR funding nominally allocated to academic cost centres has risen by 29%. Considering individual cost centres, the funding for physics has fallen by 5% but for mathematics has risen by 4%. The funding for chemistry has risen by 28%, for biosciences by 16%, and that for EECE has fallen

by 27%.

Data in figure 7 show the selected cost centres' share of overall QR research income in Wales. As for Scotland, it is notable how there were significant changes in 2009/10 following the RAE 2008, a point that is underlined in figure 8 that illustrates the ratio of QR research income in selected cost centres to that in 2003/04.

4: Total research income of UK HEIs

Table 17 presents the total QR and external research income for all cost centres and for physics between 2004/05 and 2009/10 together with the external research income from public sources (the research councils and UK public and health funding), the total research income, and the total research income from UK public sources. Table 18 shows the proportions of external and QR research income for all cost centres and for the physics cost centre, and the proportion of research income from UK public sources. Figures 9 and 10 present the data in table 18 graphically.

Research income in physics rose by 57% between 2004/05 and 2009/10: the overall research income in HEIs rose by 48%. The data show that in comparison to the overall picture in UK HEIs, physics is more reliant on external research income, and that over the

period of time under consideration, the proportion of total research income in physics from external sources has increased from 74% to 79% in comparison to that for all cost centres which increased from 68% to 70%.

Between 2004/05 and 2009/10 around 87% of research income in physics was from UK public sources, compared to around 68% for all cost centres. Nigel Brown Associates concluded that in 2007/08, on average, 89% of total research income in physics departments included in the study of the finances of chemistry and physics departments⁸ came from public funds, which is in line with the figures calculated in this study. This study therefore supports the conclusion that it is inevitable that the financial health of physics research in UK HEIs will depend heavily on the metrics used to distribute public funding.

8. Follow-up Study of the Finances of Chemistry and Physics Departments in UK Universities, Institute of Physics and Royal Society of Chemistry, 2010 (www.iop.org/publications/iop/2010/page_44092.html).

Table 17: Comparison of external research income and QR research income for the physics cost centre and all cost centres 2004/05 to 2009/10

Income source and cost centres	Income (£000s)						Change between 2004/05 and 2009/10
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	
All cost centres: external research income (A)	2,823,056	3,092,537	3,410,547	3,695,683	4,120,298	4,321,672	53.1%
All cost centres: external research income from UK public sources (B)	1,462,046	1,633,079	1,774,007	1,978,606	2,220,338	2,348,619	60.6%
All cost centres: QR income (C)	1,341,443	1,522,050	1,638,290	1,661,908	1,710,551	1,849,925	37.9%
All cost centres: research income from UK public funds (B + C)	2,803,489	3,155,129	3,412,297	3,640,514	3,930,889	4,198,544	49.8%
All cost centres: total research income (A + C)	4,164,499	4,614,587	5,048,837	5,357,591	5,830,849	6,171,597	48.2%
Physics: external research Income (D)	165,270	186,340	206,873	236,716	269,353	276,683	67.4%
Physics: external research income from UK public sources (E)	136,578	154,359	168,898	198,919	224,626	232,496	70.2%
Physics: QR income (F)*	58,252	66,861	71,383	72,218	72,718	74,724	28.3%
Physics: research income from UK public funds (E + F)*	194,830	221,220	240,281	271,137	297,344	307,220	57.7%
Physics: total research income (D + F)*	223,522	253,201	278,256	308,934	342,071	351,407	57.2%

* Northern Irish QR income are not included in the physics data.

Sources: HESA research grants and contracts income, HEFCE, SFC, HEFCEW and DELNI.

4: Total research income of UK HEIs

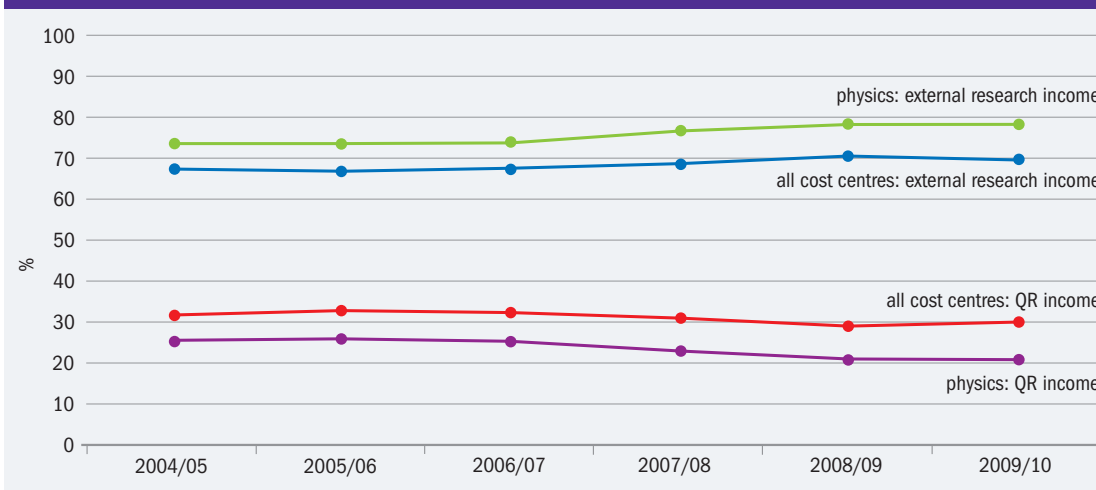
Table 18: Comparison of external research income, QR research income and publicly funded research income for the physics cost centre and all cost centres 2004/05 to 2009/10

Income source and cost centres	Proportion of total research income by year					
	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10
All cost centres: external research income	68%	67%	68%	69%	71%	70%
All cost centres: QR income	32%	33%	32%	31%	29%	30%
All cost centres: UK publicly funded research	67%	68%	68%	68%	67%	68%
Physics: external research income	74%	74%	74%	77%	79%	79%
Physics: QR income*	26%	26%	26%	23%	21%	21%
Physics: UK publically funded research*	87%	87%	86%	88%	87%	87%

* Northern Irish QR income are not included in the physics data.

Sources: HESA research grants and contracts income, HEFCE, SFC, HEFCW and DELNI.

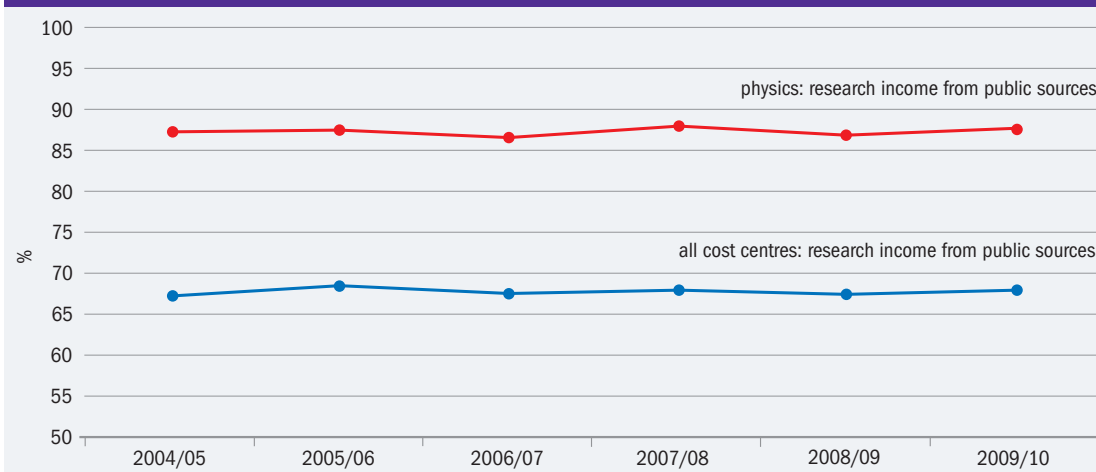
Figure 9: Proportions of external and QR research income in the UK for the physics cost centre and for all cost centres 2004/05 to 2009/10



*Northern Irish QR income are not included in the physics data.

Sources: HESA research grants and contracts income, HEFCE, SFC, HEFCW and DELNI.

Figure 10: Proportions of research income funded from public sources in the UK for the physics cost centre and for all cost centres 2004/05 to 2009/10



*Northern Irish QR income are not included in the physics data.

Sources: HESA research grants and contracts income, HEFCE, SFC, HEFCW and DELNI.

5: Conclusions

Overall, the research income attracted by the physics cost centre in UK HEIs rose between 2004/05 and 2009/10 by 57%.

In 2009/10 QR income from the funding councils accounted for 21% of research income in physics, and other external research income accounted for 79% of research income. Overall, 87% of research income in physics was from UK public sources including the research councils, and 64% of research income in physics was from the research councils.

Physics is therefore particularly sensitive to changes in public funding in general and research council funding in particular, and consequently the forthcoming period of public sector spending cuts has greater potential to affect physics more than other cost centres.

The nature of subjects like physics is that they are underpinning, a point recognised explicitly in the 1998 Comprehensive Spending Review, and, consequently, projects are often further from the market in respect of developing new products than those in some other STEM subjects, and thus, attract less income from commerce and industry. Furthermore, unlike the biological sciences and medicine, physics does not receive a

great deal of funding from charitable funding organisations, as most charitable funding is directed at research on specific diseases rather than at the underpinning science.

While economic growth remains stagnant there will also be pressure on non-public sources of funding, but these will obviously affect physics less than many other subjects. Indeed, should economic growth increase, while public spending remains constrained, physics' research funding position could slip relative to other areas that are less reliant on public funding.

The physics community and the research and funding councils must monitor carefully the research income for physics over the next few years to ensure that the funds available do not fall significantly, and ensure that the UK's position in research is maintained. It is unlikely that there will be a culture change in the investment strategies of industry and consequently physics research will retain its dependent on public funding. Without continued investment in areas like physics achieving the UK's vision of a "high-technology" economy will be under threat.

Appendix A: External research income in detail 2007/08 to 2009/10

Table 19: External research income for all cost centres 2007/08 to 2009/10

Income source	External research income by year (£000s)		
	2007/08	2008/09	2009/10
BIS research councils, The Royal Society, British Academy and The Royal Society of Edinburgh	1,349,265	1,521,895	1,577,317
UK central government bodies, local authorities, health and hospital authorities	629,341	698,443	771,302
UK industry, commerce and public corporations	295,547	311,751	279,292
UK-based charities (open competitive process)	706,370	770,435	820,935
UK-based charities (other)	117,688	123,896	94,343
EU government bodies	277,541	322,871	374,258
EU industry, commerce and public corporations	28,387	37,073	45,014
EU-based charities (open competitive process)	5592	6653	7662
EU other	17,737	22,805	23,431
Non-EU industry, commerce and public corporations	83,242	88,730	97,846
Non-EU-based charities (open competitive process)	58,540	86,908	97,181
Non-EU other	74,671	79,646	92,368
Other sources	51,762	49,192	40,723
Total	3,695,683	4,120,298	4,321,672

Sources: HESA research grants and contracts income.

Appendix A: External research income in detail 2007/08 and 2009/10

Table 20: External research income for selected cost centres 2009/10

Income source	External research income (£000s)					
	Physics	Mathematics	Chemistry	EECE	Biosciences	Total
BIS research councils, The Royal Society, British Academy and The Royal Society of Edinburgh	220,697	50,894	107,994	79,824	227,355	686,764
UK central government bodies-local authorities, health and hospital authorities	11,799	3333	12,732	18,044	49,164	95,072
UK industry, commerce and public corporations	5881	3256	11,889	16,045	31,247	68,318
UK-based charities (open competitive process)	5392	4962	11,108	2341	171,297	195,100
UK-based charities (other)	248	405	1537	207	9613	12,010
EU government bodies	23,771	6740	18,295	25,319	52,349	126,474
EU industry, commerce and public corporations	525	282	2295	2450	5774	11,326
EU-based charities (open competitive process)	51	38	176	0	1265	1530
EU other	1558	178	542	207	3242	5727
Non-EU industry, commerce and public corporations	2468	1125	5528	2119	7141	18,381
Non-EU-based charities (open competitive process)	750	78	810	125	8596	10,359
Non-EU other	2382	4214	1435	998	10,806	19,835
Other sources	1161	235	1608	1373	1929	6306
Total	276,683	75,740	175,949	149,052	579,778	1,257,202

Sources: HESA research grants and contracts income.

Appendix B: Sources of external research income

External research income includes all income in respect of externally sponsored research carried out by the HEI or its subsidiary undertaking for which directly related expenditure has been incurred. From 2007/08 research income has been assigned to one of 14 categories which are defined below; how these 14 categories map to the eight categories used up to 2006/07 and which are used in this report is shown in table 1 in section 1.2

BIS research councils, The Royal Society, British Academy and The Royal Society of Edinburgh income includes all research grants and contracts income from the research councils sponsored by the Department for Business, Innovation and Skills (BIS), The Royal Society, British Academy and The Royal Society of Edinburgh.

UK-based charities income includes all research grants and contracts income from all charitable foundations, charitable trusts, etc. based in the UK that are registered with the Charities Commission or those recognised as charities by the Office of the Scottish Charity Regulator (OSCR) in Scotland.

Income from UK-based charities is split between those with an open competitive process for the allocation of funds and other charities.

UK-based charities (open competitive process) income includes research grants or contracts income from UK-based charities that was available to more than one HEI through direct competition, awarded to the HEI that demonstrated the highest quality research proposal according to external peer review. It also includes grants where it can be shown that the charity took external expert advice on its choice of HEI, and either the charity had made it known that it was open to grant applications from other HEIs, even though an open invitation to bid for the particular grant was not issued; or the charity restricted the funding opportunity on a reasoned basis in that particular requirements of the project could only be met by a limited number of HEIs (i.e. where a project required highly specialist expertise or facilities, or a specific regional focus).

UK-based charities (other) includes research grants or contracts income from UK-based charities that does not meet the definition of open competition.

UK central government bodies, local authorities, health and hospital authorities income includes all research grants and contract income from UK central government bodies, UK local authorities and UK health

and hospital authorities, except the research councils and UK public corporations. This includes government departments and other organisations (including registered charities) financed from central government funds. Research grants and contracts from non-departmental public bodies (NDPBs) such as the British Council are also included in this source of income.

UK industry, commerce and public corporations income includes all research grants and contracts income from industrial and commercial companies and public corporations (defined as publicly owned trading bodies, usually statutory organisations with a substantial degree of financial independence) operating in the UK.

EU government bodies income includes all research grants and contracts income from all government bodies operating in the EU, which includes the European Commission, but excludes bodies in the UK.

EU-based charities (open competitive process) income includes research grants or contracts income from EU bodies with exclusively charitable purposes, which was available to more than one HEI through direct competition. It also includes grants where it can be shown that the charity took external expert advice on its choice of HEI, and either the charity had made it known that it was open to grant applications from other HEIs, even though an open invitation to bid for the particular grant was not issued; or the charity restricted the funding opportunity on a reasoned basis in that particular requirements of the project could only be met by a limited number of HEIs (i.e. where a project required highly specialist expertise or facilities, or a specific regional focus).

EU industry, commerce and public corporations income includes all research grants and contracts income from industrial and commercial companies and public corporations (defined as publicly owned trading bodies, usually statutory corporations, with a substantial degree of financial independence) operating in the EU outside of the UK.

EU other income includes all research grants and contracts income from EU-based non-competitive charities and any other EU income not otherwise specified.

Non-EU-based charities (open competitive process) income includes research grants or contracts income from non-EU bodies with exclusively charita-

Appendix B: Sources of external research income

ble purposes, which was available to more than one HEI through direct competition. It also includes grants where it can be shown that the charity took external expert advice on its choice of institution, and either the charity had made it known that it was open to grant applications from other HEIs, even though an open invitation to bid for the particular grant was not issued; or the charity restricted the funding opportunity on a reasoned basis in that particular requirements of the project could only be met by a limited number of HEIs (i.e. where a project required highly specialist expertise or facilities, or a specific regional focus).

Non-EU industry, commerce and public corporations income includes all research grants and contracts

income from industrial and commercial companies and public corporations (defined as publicly owned trading bodies, usually statutory corporations, with a substantial degree of financial independence) operating outside the EU.

Non-EU other income includes all research grants and contracts income from all non-EU-based non-competitive charities and any other non-EU income not otherwise specified.

Other sources of income includes all research grants and contracts income not covered above. This includes income from other HEIs where the HEI is the original contractor.

Appendix C: List of tables

Table 1: External research income funding sources	5
Table 2: Total external research income of HEIs 2004/05 to 2009/10	6
Table 3: The percentage share of total external research income by source in HEIs 2004/05 to 2009/10	7
Table 4: The total external research income in the physics cost centre by income source 2004/05 to 2009/10	7
Table 5: The percentage share of total external research income by source in the physics cost centre between different sources 2004/05 to 2009/10	8
Table 6: The external research income in selected cost centres by income source 2009/10	8
Table 7: The external research income in selected cost centres per member of permanent academic staff by income source 2009/10	9
Table 8: The distribution of total external research income in selected cost centres between different sources 2009/10	9
Table 9: The proportion of total external research income from the research councils by cost centre 2009/10	10
Table 10: HEFCE QR research income in selected cost centres 2004/05 to 2011/12	12
Table 11: Number of HEIs receiving HEFCE QR income in selected cost centres 2004/05 to 2011/12	12
Table 12: Number of category A staff in selected cost centres submitted to the Research Assessment Exercises in 2001 and 2008	13
Table 13: HEFCE QR research income per number of category A staff in selected cost centres 2004/05 to 2011/12	13
Table 14: Selected cost centres' share of HEFCE QR research income 1999/2000 to 2011/12	13
Table 15: SFC QR income in selected cost centres 2004/05 to 2011/12	14
Table 16: HEFCW QR income in selected cost centres 2004/05 to 2011/12	15

Appendix C: List of tables

Table 17: Comparison of external research income and QR research income for the physics cost centre and all cost centres 2004/05 to 2009/10	17
Table 18: Comparison of external research income, QR research income and publicly funded research income for the physics cost centre and all cost centres 2004/05 to 2009/10	18
Table 19: External research income for all cost centres 2007/08 to 2009/10	20
Table 20: External research income for selected cost centres 2009/10	21

Appendix D: List of figures

Figure 1: Total external research income of HEIs 2004/05 to 2009/10	6
Figure 2: Plot of total external research income against the number of permanent academic staff for individual physics cost centres 2009/10	11
Figure 3: Selected cost centres' share of HEFCE QR income 1999/2000 to 2011/12	14
Figure 4: Ratio of HEFCE QR income to that in 1999/2000 for selected cost centres 2000/01 to 2011/12	14
Figure 5: Selected cost centres' share of SFC QR income 2001/02 to 2010/11	15
Figure 6: Ratio of SFC QR income to that in 2001/02 for selected cost centres 2002/03 to 2010/11	15
Figure 7: Selected cost centres' share of HEFCW QR income 2003/04 to 2010/11	16
Figure 8: Ratio of HEFCW QR income to that in 2003/04 for selected cost centres 2004/05 to 2010/11	16
Figure 9: Proportions of external and QR research income in the UK for the physics cost centre and for all cost centres 2004/05 to 2009/10	18
Figure 10: Proportions of research income funded from public sources in the UK for the physics cost centre and for all cost centres 2004/05 to 2009/10	18

Statistical Report

Research Income of Physics Cost Centres in UK Higher Education Institutions

February 2012

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