Universities UK

THE FUNDING ENVIRONMENT FOR UNIVERSITIES 2014

RESEARCH AND POSTGRADUATE RESEARCH TRAINING

HIGHER EDUCATION IN FOCUS

Contents

Executive summary

The domestic research base generates wide-ranging and long-lasting benefits for the UK economy and society, and higher education institutions have a critical role to play in sustaining its world-class performance. As a consequence, changes in research and postgraduate training funding to the higher education sector can have a significant impact on the domestic research base as a whole, as well as on the UK's ability to remain a leading research power.

This report is the second in Universities UK's series *The funding environment for universities 2014*, which monitors the impact of changes in funding on the higher education sector. The report examines recent trends in research and postgraduate research (PGR) training funding and considers their potential impact on the funding environment for institutions.

The introduction to the report provides an overview of the role of universities in the UK research base and the wider funding context for domestic research and development (R&D). Sections 1 and 2 identify and discuss, respectively, the main recent trends in research funding and PGR demand and funding for UK higher education institutions. Finally, Section 3 considers the policy implications of changes in research and PGR training funding and how they could potentially impact on the funding environment for institutions.

Research

The research funding environment for universities has become more challenging in the last few years, shaped by three key trends.

The first main trend is a real terms decline in core research funding from public sources, which may undermine the sustainability and performance of the UK higher education research base in the long term. Between 2009–10 and 2012–13, UK universities experienced a total fall in core research funding of £75 million in cash terms and £467 million in real terms, which is expected to become more significant by the end of the current Spending Review period.

Thanks to sound financial management and one of the highest levels of research productivity in the world, universities have managed to absorb these cuts without compromising their standards of excellence; however, there is a growing concern that a persistent decline in funding may result in an erosion of their research capacity in the long term. Since investment in the research base also has a documented positive effect on private sector productivity, a failure to reverse the recent decline in public support for R&D represents both a threat to the sustainability of the UK's position as a leading research power and a missed opportunity to provide a boost to the UK economy. The UK invests much less in research, from public sources, than other countries across the OECD. Therefore, there is a strong need for an increase in UK public investment in R&D.

The health and dynamism of the higher education research base depends crucially on sustained public investment, but also on the principles by which government measures

research excellence and organises and allocates funding to university-based research. Given the efficiency and effectiveness demonstrated by the current assessment and funding structures, UUK remains supportive of the dual support system as the most effective and proportionate principle for organising research funding, and of the independent, impartial assessment of research as the most appropriate approach for allocating it.

The second main trend is an increase in the concentration of research funding across institutions. In 2013–14, institutions in the fifth quintile (the upper 20% of the funding distribution) received 75% of all mainstream quality-related (QR) funding from the funding councils, compared to 73% in 2010–11. The distribution of research council (RC) funding remained broadly stable across institutions in the third, fourth and fifth quintiles over the last few years; however, some of the institutions located in the first quintile, which had received small research grants in 2009–10, appear to have lost access to RC funding altogether two years later. Any change in the concentration of research funding across the higher education sector may have a significant effect on the health and dynamism of the research base in the long term; consequently, it will be important for policies that affect the concentration of funding across institutions to consider the impact on the UK's ability to support excellence as well as nurture the world-class departments of tomorrow in a sustainable way.

The final main trend is an increase in both cross-institutional and cross-sectoral research collaborations. The rise of collaborative research is a welcome development that helps maximise the efficiency and impact of university-based research, but is also a necessary move for universities in an era of tight financial constraints. In recognition of the value and necessity of research collaborations for the vitality, efficiency and sustainability of the research base, it is important to ensure that these are further encouraged and that the funding mechanisms currently in place do not create barriers to engagement. The crucial role played by the Charity Research Support Fund and the business research element of QR funding in enabling cross-sector research collaborations should also continue to be recognised.

Postgraduate research training

Recent changes in overall PGR student numbers suggest that the demand for PGR study at UK institutions has remained strong over the last decade, but showed signs of slowing down in 2012–13:

- Between 2003–04 and 2011–12, PGR student numbers showed the second fastest growth rate of all levels of study, rising by one quarter over this period, and only trailing slightly behind the fastest growing group, first degree students (which grew by 27%).
- However, in 2012–13 (the latest year for which data is available) PGR numbers started to stagnate (-0.5%). The recent stagnation in doctoral student numbers may be a sign that demand for PGR study may taper down over the next few years, particularly if funding opportunities from the RCs continue to shrink and demand for postgraduate taught (PGT) qualifications (which are increasingly often a stepping stone to a doctoral degree) continues to weaken.

PGR students are crucial to the strength of both the UK research base and the future highly-skilled workforce. Therefore, it is essential that prospective students with the ability and motivation to undertake PGR training are provided with opportunities to seek financial support. Ensuring this also entails a careful assessment of how undergraduate and postgraduate taught fees impact access to doctoral programmes, and how these effects vary across subject areas.

An equally important issue highlighted by recent trends in demand for PGR study is the financial sustainability of high-quality doctoral training provision. The steady growth in PGR numbers over the last decade has been fuelled by a strong increase in international students, and a commitment by institutions to invest some of their own resources in studentships that would have otherwise been cut following a decline in support by the RCs. While the rise in international student numbers is to be welcomed, there is a concern that this approach to supporting demand will prove unsustainable in the future. A further key factor in the sustainability of future provision is the ability of institutions to meet the costs of doctoral training in different subjects, which is strongly affected by the extent to which the research degree programme (RDP) supervision fund recognises and reflects the subject mix.

From a funding perspective, the rise of the Doctoral Training Partnership (DTP) and Centres for Doctoral Training (CDT) schemes as the mainstream models for allocating RC studentships has been the most significant trend shaping PGR provision at UK universities. Apart from changing the way the RCs fund 'mainstream' doctoral training, the widespread adoption of the DTP and CDT models also encouraged a shift in the way institutions design and run their PGR programmes. It has brought about closer multi-institutional working, stronger operational management, closer strategic alignment between the institutions' research strengths and the RCs research priorities, and more emphasis on partnership-building and match-funding opportunities. The available evidence suggests that these schemes have helped further raise standards in UK doctoral training. However, it should also be recognised that the match-funding requirement entailed by participation in DTP and CDT bids represents a significant financial risk for universities, and that those institutions that fail to secure funding under the new models may face significant challenges in funding provision, possibly affecting their future abilities to compete for funding and the dynamism of the UK research base as a whole. For institutions to be able to compete in a global market for PGR students and continue to train students in a world-class research environment, it is vital that public funding for PGR provision rewards excellence, but is also sufficiently flexible to ensure that high-quality provision is sustained in the longer term.

Introduction

Report aim, scope and structure

This report is the second in Universities UK's series *The funding environment for universities 2014*, which monitors the impact of changes in funding on teaching and research in the higher education sector. The report examines changes in research and postgraduate research (PGR) training funding, and considers their potential implications for higher education institutions. In terms of scope, the report focuses on trends in core funding for research and postgraduate training and excludes research capital funding; this area of research funding will be addressed separately in a future publication, which will aim to contribute to the ongoing policy discussions on capital investment in connection with the recent government consultation on the Science Capital Roadmap.

The introduction to the report provides an overview of the wider funding context for R&D. Sections 1 and 2 identify and discuss, respectively, the main recent trends in research funding and PGR demand and funding for UK higher education institutions. Finally, Section 3 considers the policy implications of changes in research and PGR training funding and how they could potentially impact on the funding environment for institutions.

The international context

The domestic research base is a major source of economic, social and cultural value for the UK. The benefits it generates for the economy and society are wide-ranging and long-lasting. The work carried out by universities and research institutes, from producing ground-breaking research to training the next generation of researchers and high-skilled workers, produces substantial returns to public investment, which have been estimated to range between 20% and 50% but can be considerably higher than this[1].

Publicly-funded research boosts the prosperity and growth potential of the economy by enhancing the problem-solving capacity of businesses – which, in turn, is associated with higher workforce productivity and firm-level innovation performance – and by contributing to the development of new markets and products. By increasing our understanding of, and developing solutions to, the UK's current and future economic and social challenges, research also helps improve the quality of life of all citizens and generate savings for the taxpayer.

Our research base has a strong international performance, particularly given the UK's low gross domestic expenditure on R&D (GERD) compared to many of its international competitors. Despite representing just 0.9% of the world's population, 3.2% of R&D expenditure (and declining), and 4.1% of researchers, the UK accounts for 9.5% of downloads, 11.6% of citations and 15.9% of the world's most highly-cited articles.[2]

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[1] Department for Business, Innovation and Skills (2014) *Insights from international benchmarking of the UK science and innovation system* a report by Tera Allas

[2] Department for Business, Innovation and Skills (2013) *International Comparative Performance of the UK Research Base*

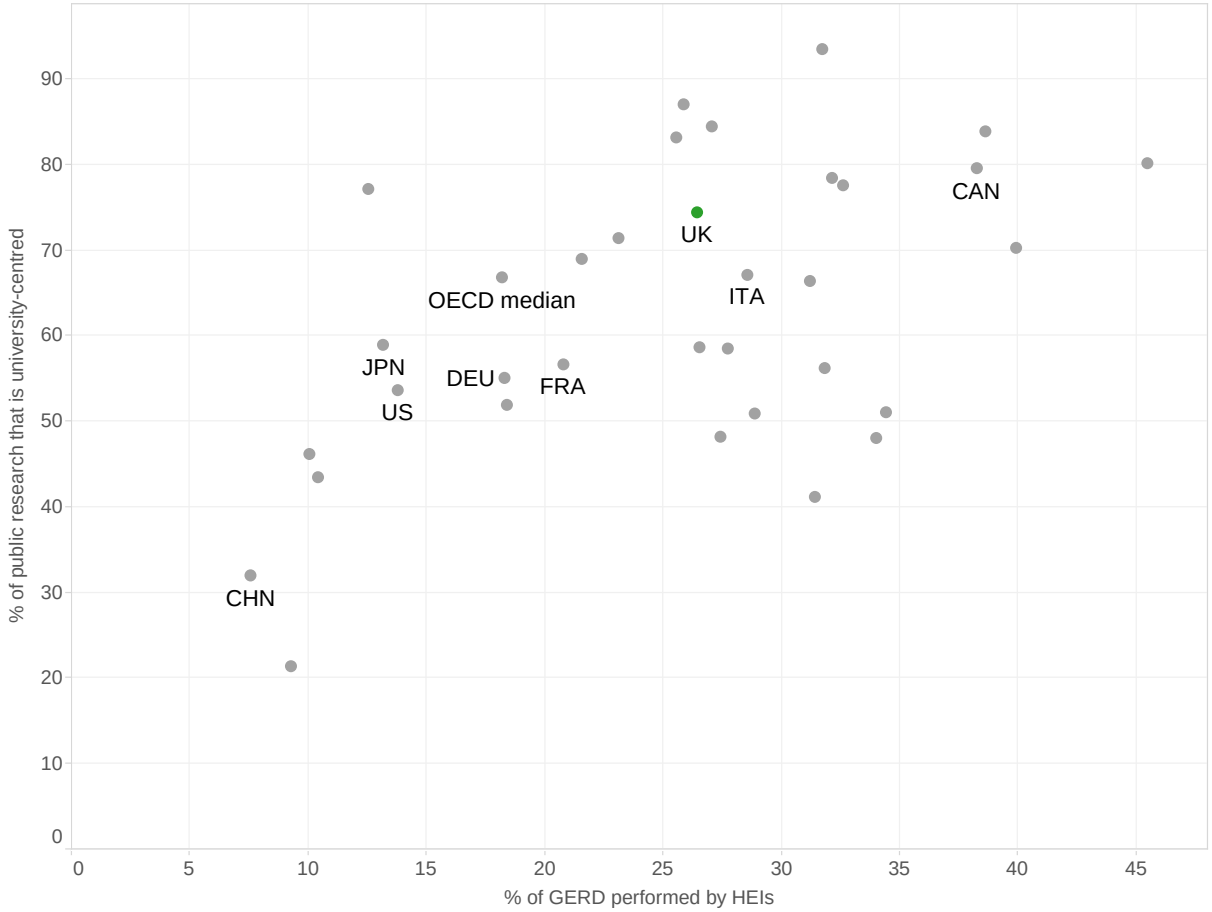
The UK has maintained a substantial lead over all comparator countries in terms of articles and citation per unit of R&D expenditure, and ranks second in terms of outputs per researcher. In 2012 the UK research base produced 3.9 articles (up from 3.35 in 2008) and 43.1 citations (up from 36.77) per unit of GERD and 0.51 articles (up from 0.50 in 2008) and 5.87 citations (up from 4.76 in 2008) per researcher.[3]
A further strength of the UK research base lies in the breadth of its research expertise, which spans across the full spectrum of research disciplines. This is reflected in the UK's field-weighted citation impact (1.67, compared to a world average of 1.0), which has continued to rise and currently ranks first among all G8 countries.[4]

The UK's position as a global research leader depends in large part on the quality and efficiency of its university-based research. UK higher education institutions are by far the leading hubs of publicly-funded R&D in the UK and also crucial contributors to the domestic R&D base as a whole. This is reflected in the proportions of publicly-funded and domestic R&D they perform, which are shown in Figure 1 below. As this figure shows, universities carry out nearly three quarters (74.3%) of publicly-funded GERD and over one quarter (26.5%) of total GERD, the two highest proportions in the G7 country group after Canada, and significantly above the OECD countries median.

UK higher education institutions are also some of the most productive in the world – in 2012, they produced 11.8 articles (up from 10.37 in 2008) and 141.0 citations (up from 122.97 in 2008) per unit of Higher Education R&D expenditure (HERD), compared to an average of, respectively, 8.4 and 85.3[5] across 27 EU member states.

[3] Department for Business, Innovation and Skills (2013) *International Comparative Performance of the UK Research Base*
[4] Ibid.
[5] Ibid.

Figure 1: The role of UK universities in the domestic R&D base (2010 or latest available year)



Source: OECD 2014

As a result of the major role universities play in the domestic research base, any change in public funding to the higher education sector can have a significant impact on the current and future capability of the UK to produce world-leading research, which relies on sustained public investment in R&D. Before discussing these changes in detail in chapters 1 and 2 of the report, it is useful to look at the general funding landscape for UK R&D to understand the context in which these trends have emerged.

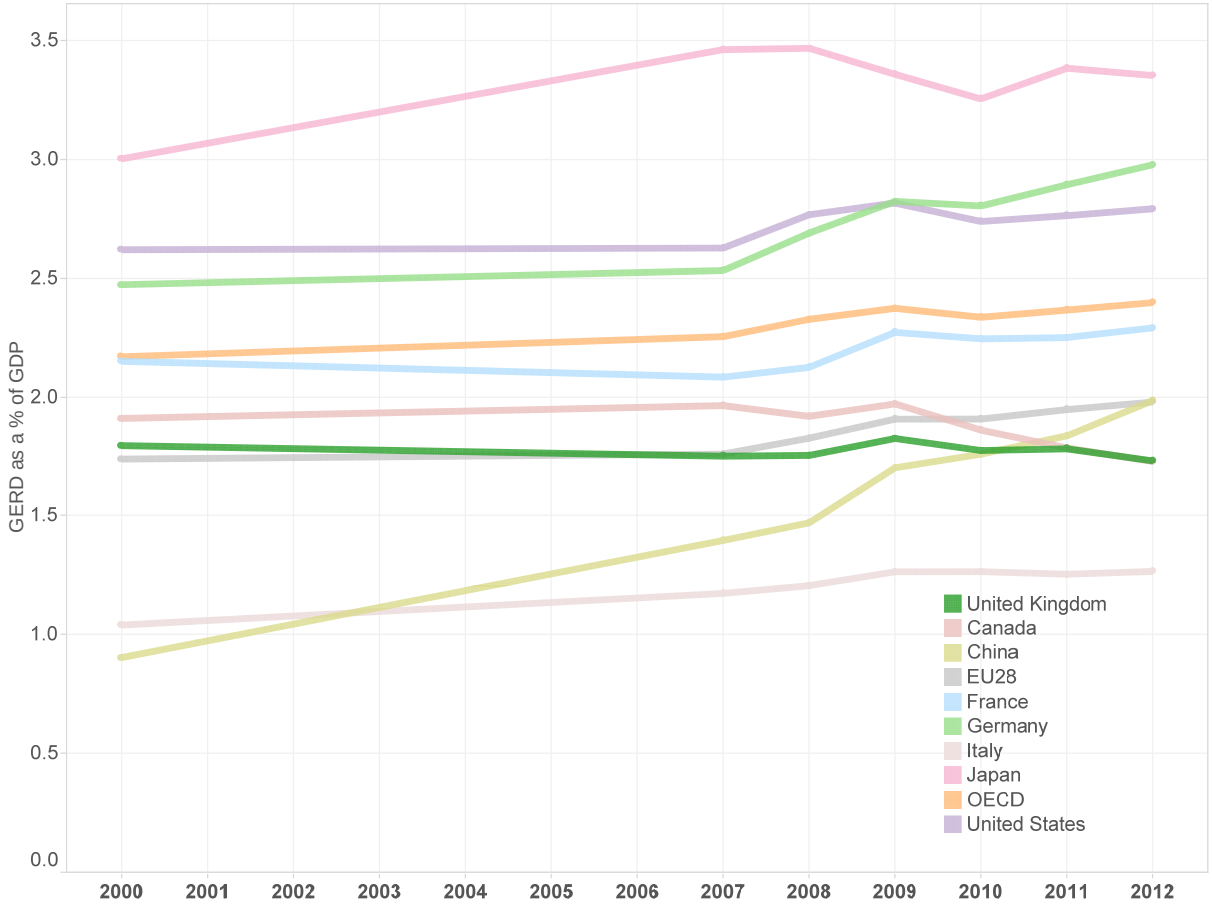
As can be seen in Figure 2, the UK's level of GERD lags substantially behind the OECD and EU28 averages. The UK performance in the G7 group[6] is also relatively poor on this measure: only Italy and Canada invest less in R&D as a proportion of GDP.

Figure 2 further suggests that investment in UK R&D has remained relatively flat over the last decade. The slight growth in UK R&D expenditure observed between 2008 and 2009 was more than offset by three years of mild, but sustained decline. While this trend is by no means unique to the UK, it does imply that the gap in R&D expenditure between the UK and key established and emerging competitors, such as Germany and China (which seem to have

[6] Consisting of the United Kingdom, Canada, France, Germany, Italy, Japan and the United States

bucked the flat or declining trend observed in the rest of the sample), may be expected to widen in the absence of a strong uplift in domestic R&D investment.

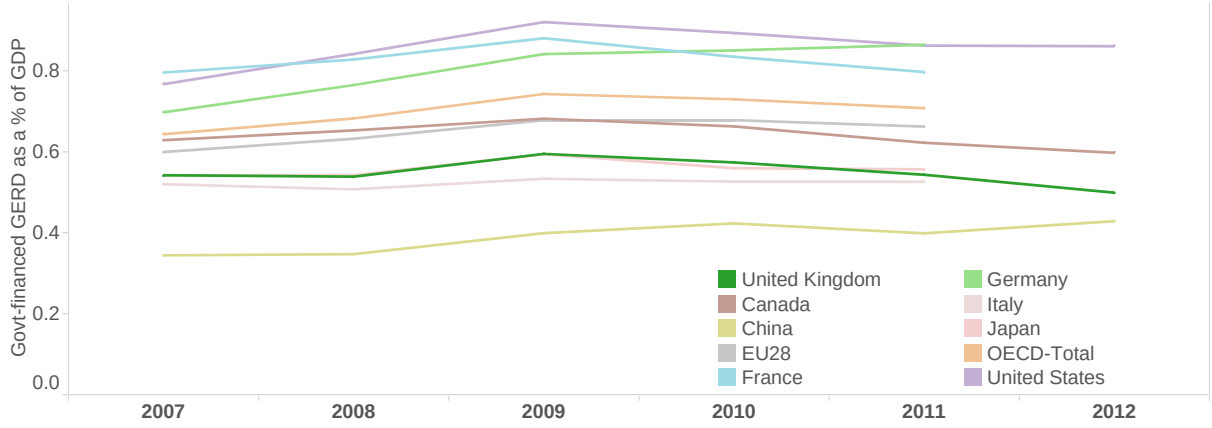
Figure 2: GERD as a proportion of GDP – individual G7 countries, China, EU28 and OECD, 2000–2010 (or latest available year)



Source: OECD 2014

By contrast, the level of government investment in UK R&D (including funding channelled through the research councils and the four UK higher education funding councils) increased steadily between 2007 and 2009, but has since started to decline. Figure 3 shows that, in 2012, government-financed GERD was 0.5% of GDP, a proportion significantly below the 2011 OECD average and 16% lower than in 2009. It is significant that this ratio decreased even as UK GDP growth ground to a halt. This is explained by the fact that government-financed GERD also declined in the aftermath of the recession, and fell more sharply than GDP. In 2009, public funding for R&D was over £480 million lower than in 2011 (in cash terms), and only slightly above its 2008 levels.

Figure 3: Government-financed GERD – UK total and as a proportion of GDP, 2007–2010 or latest available year



Source: OECD 2014

1: Trends in research funding for universities

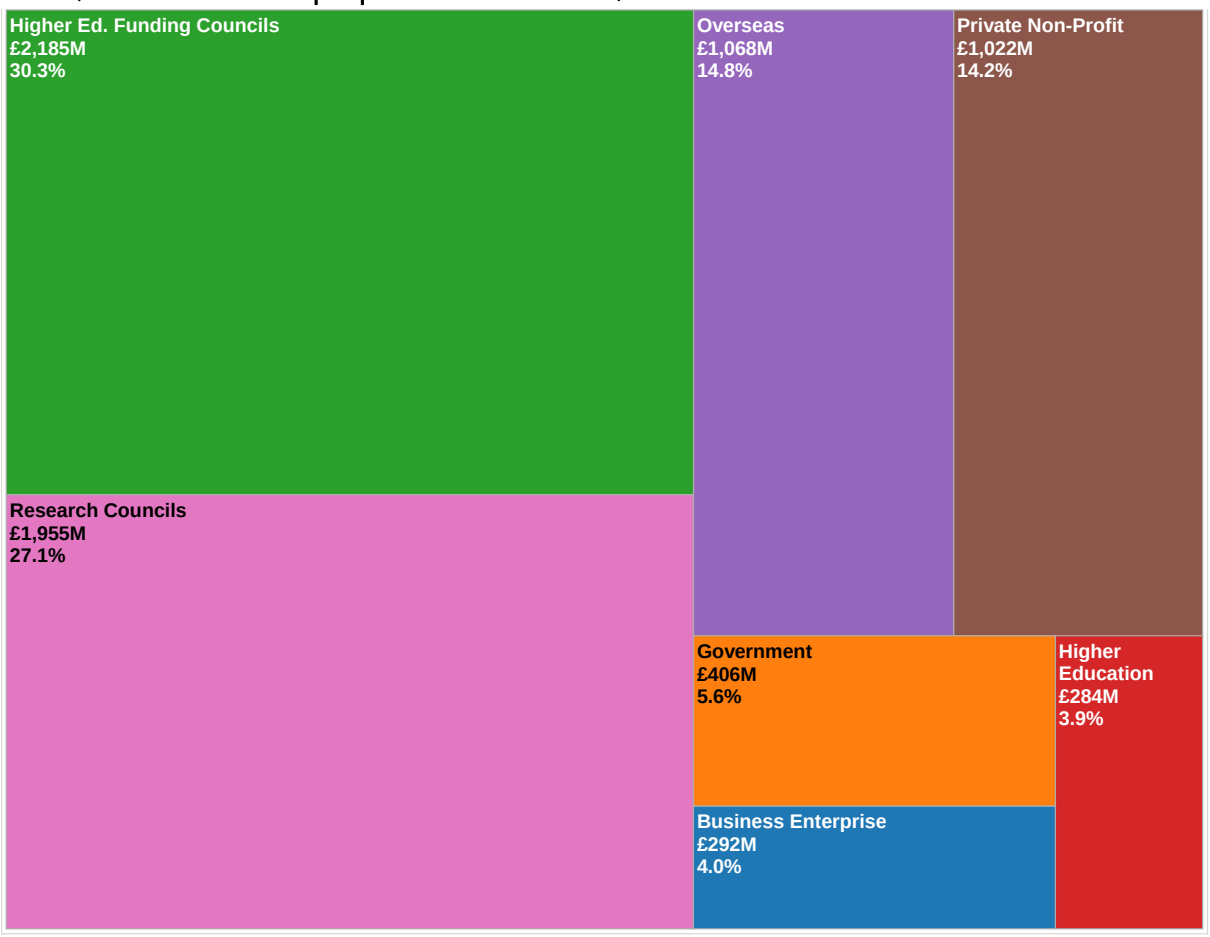
In the UK, public support to university-based research is mainly provided through the 'dual support' system for research funding. In this model, research funding is distributed partly through the four UK higher education funding councils[7] and partly through the seven RCs [8]. As well as setting the budget to be allocated through these two sources, the Department for Business, Innovation and Skills also provides smaller amounts of competitive funding directly or through the learned societies.

Figure 4 provides an overview of R&D performed in UK higher education institutions by sector of funding. This shows that in 2012 the dual support system funded 57.4% of all R&D performed in the higher education sector; of this, 30.3% came through the higher education funding councils and 27.1% from the research councils. Most of the remaining 42.6% was

[7] Higher Education Funding Council for England (HEFCE), Scottish Funding Council (SFC), Higher Education Funding Council for Wales (HEFCW), Department for Employment and Learning Northern Ireland (DEL)
[8] Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Economic and Social Research Council (ESRC), Engineering and Physical Sciences Research Council (EPSRC), Medical Research Council (MRC), Natural Environment Research Council (NERC), Science and Technology Facilities Council (STFC)

financed by charities (14.2%) and overseas public and private entities (14.8%), with smaller contributions from government, business and higher education institutions themselves (through their own funds such as endowments, property and surplus from selling goods and services).

Figure 4: R&D performed in the UK higher education institutions by sector of funding, 2012 (£ value and as a proportion of the total)



Source: ONS 2014

Throughout the 2000s, universities benefitted from increasing public investment in research and were therefore able to lay strong foundations for the global research leadership they currently enjoy. However, over the last few years the research funding environment for universities has become significantly more challenging. Recent changes in funding policies and levels have led to the emergence of the three main trends, which will be examined individually in sections 1.1, 1.2 and 1.3.

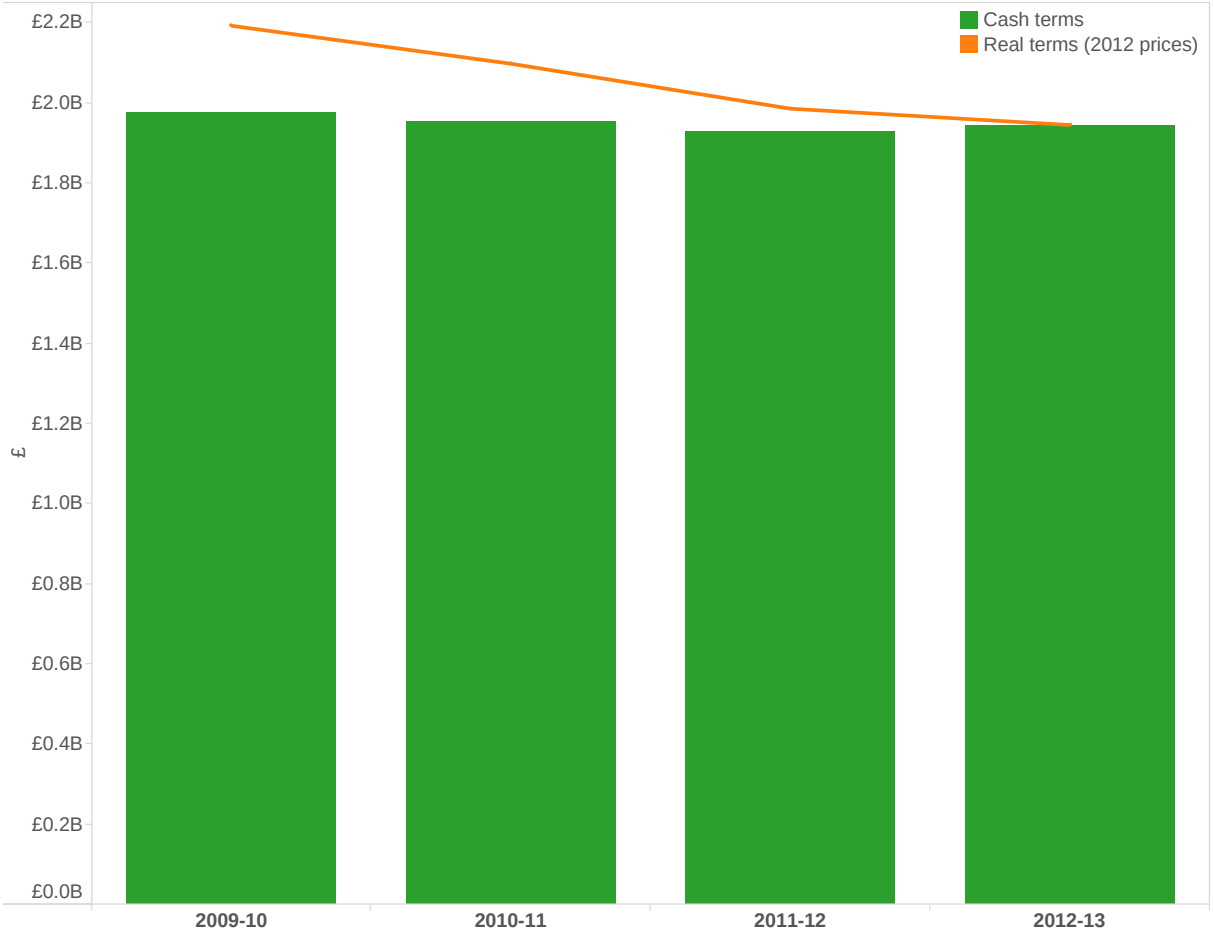
1.1 Core research funding from public sources has declined in real terms

The bulk of government support to university-based research comes from the science and research budget (worth around £4.6 billion a year), which, as a result of the 2010 Comprehensive Spending Review, has been ring-fenced until 2014–15. The science and research budget ring fence provided a much needed cash terms protection to research funding over the life of the Spending Review period (2010–11 to 2014–15, then extended to 2015–16 following the 2013 Spending Round) but inevitably resulted in a real terms decline in

the value of research grants allocated or awarded to institutions. This occurred at the same time as significant cuts to research capital funding (excluded from the science and research budget ring fence) were being announced. Four years down the line, the effect of these developments are still felt in the sector, which faces a significantly tighter funding environment than in 2009–10.

This can be seen in Figures 5 and 6 below, which present, respectively, the level of funding council recurrent grants for research (the total grant for research as shown in the annual grant letter or additional grant letter from the funding councils) and research grants and contracts from public sources received by universities between 2009–10 and 2012–13 (the latest academic year for which complete data is currently available), in both cash and real terms.[9] Figure 5 shows that, in 2012–13, universities received £1.94 billion in recurrent research grants from the four funding councils. Compared to 2009–10, this corresponds to a decrease of £30 million in cash terms and £248 million in real terms[10].

Figure 5: UK recurrent funding council grants for research, 2009–2013 (in cash and real terms)

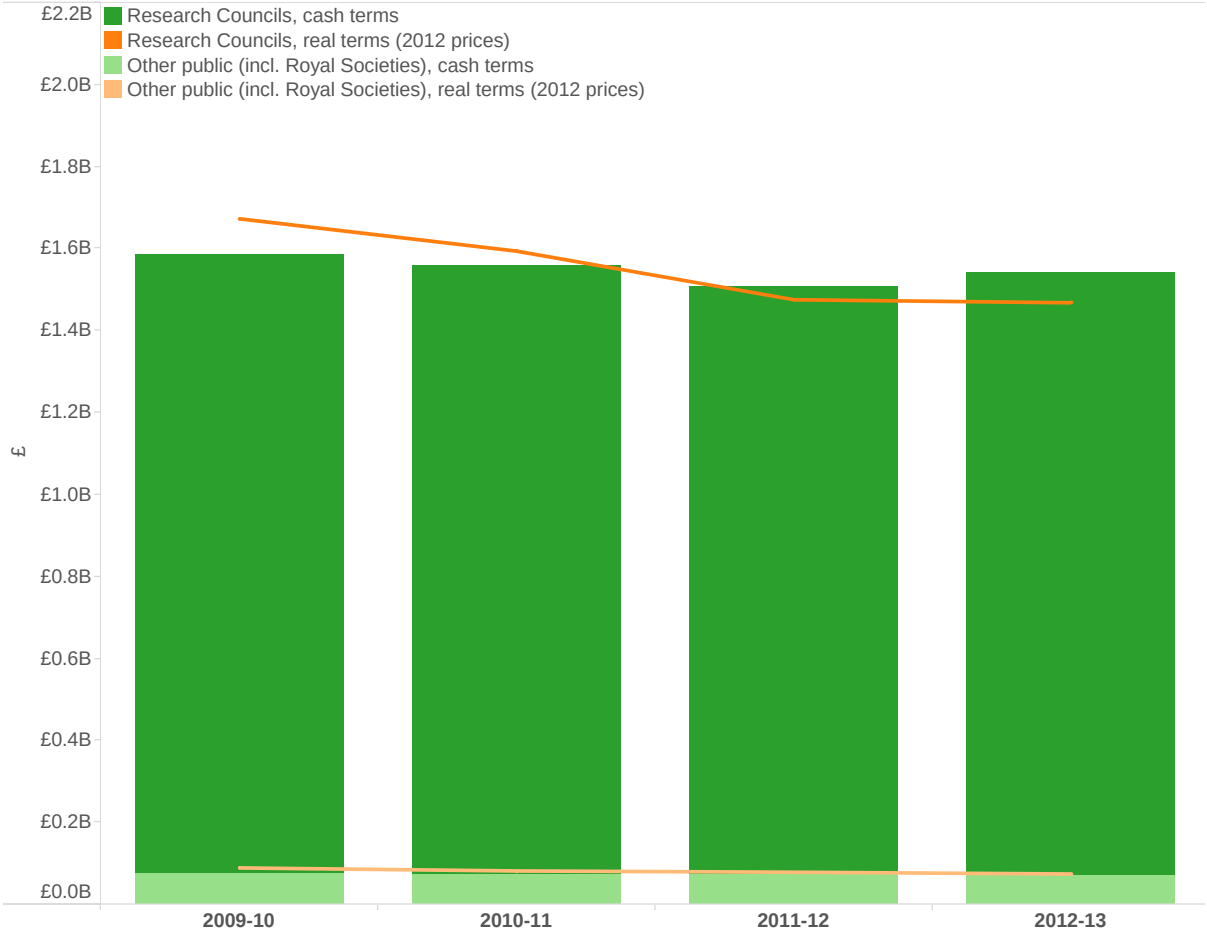


Source: HESA 2014, UUK estimates

[9] This section looks at core research funding as defined by these two broad streams, and thus excludes other recurrent and special funding (eg additional funding announcements made in the annual grant letters).
[10] Real terms estimates are provided at 2012–13 prices and have been adjusted using the Consumer Price Index data produced by the Office for National Statistics (last updated March 2014).

As shown in Figure 6, a reduction can also be observed in the level of research grants and contracts awarded to universities by the seven RCs and other public sources (including the learned societies) over the same period. Between 2009–10 and 2012–13, funding from these two sources declined, respectively, by £39 million in cash terms and £205 million in real terms, and by nearly £6 million in cash terms and over £15 million in real terms.

Figure 6: UK research grants and contracts income by source, 2009–2013 (in cash and real terms)

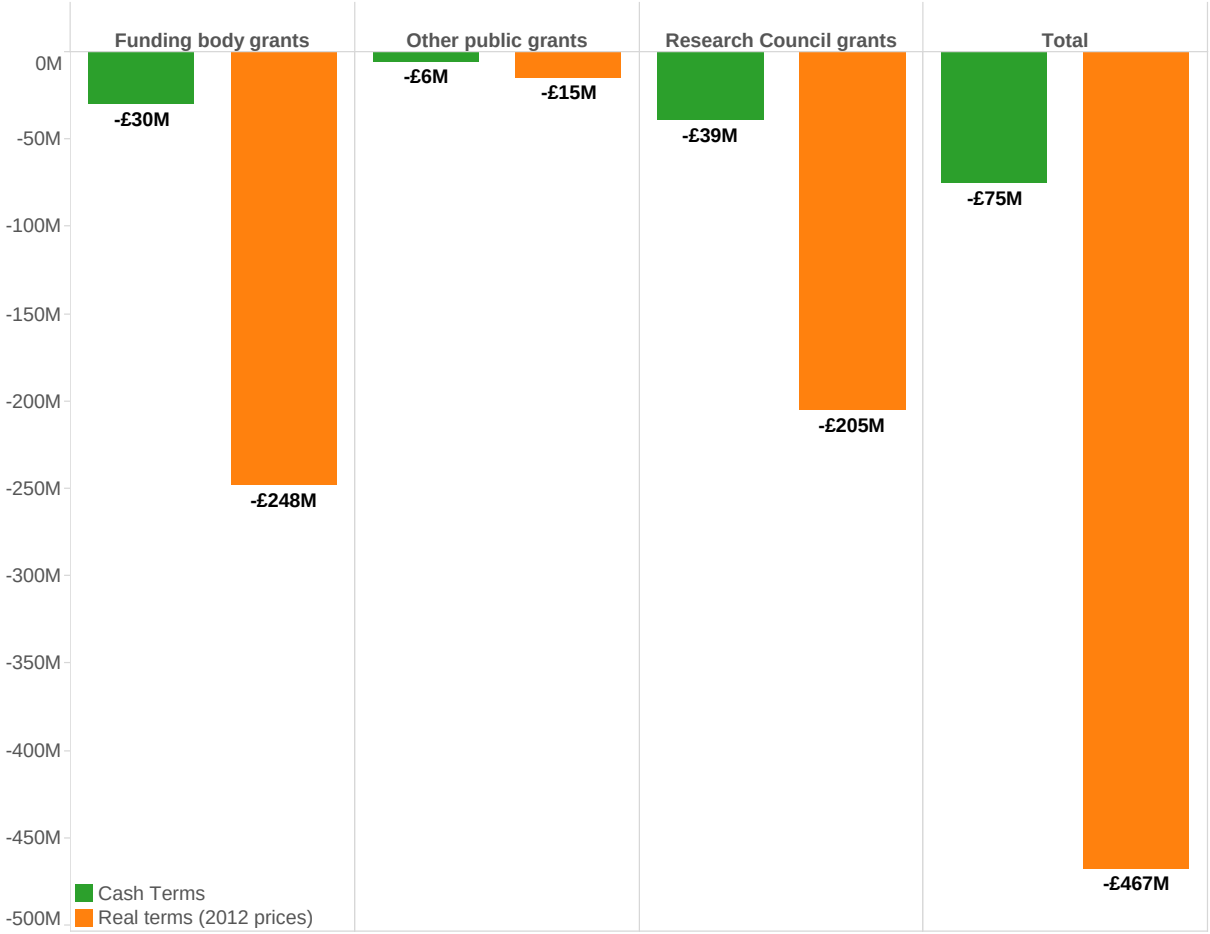


Source: HESA 2014, UUK estimates

In total, these reductions – summarised in Figure 7 – amount to a fall in core research funding to the higher education sector of £75 million in cash terms and £467 million in real terms over the three years considered. This fall in funding has been substantially mitigated by the cash terms protection provided by the science and research budget ring fence, but remains significant. It is important to note that, on top of these cuts, universities are continuing to absorb real terms reductions in core public research funding in 2013–14 and are expected to face further declines in 2014–15. In 2013, UUK estimated that, by the end of the spending period (2014–15), universities will have absorbed real terms cuts in research funding cuts of around £600 million.[11]

[11] Universities UK (2013) *Universities UK submission to the 2013 Spending Round*

Figure 7: Change in core research funding for UK higher education institutions by broad source, 2009–10 to 2012–13 (in cash and real terms)



Source: HESA 2014, UUK estimates

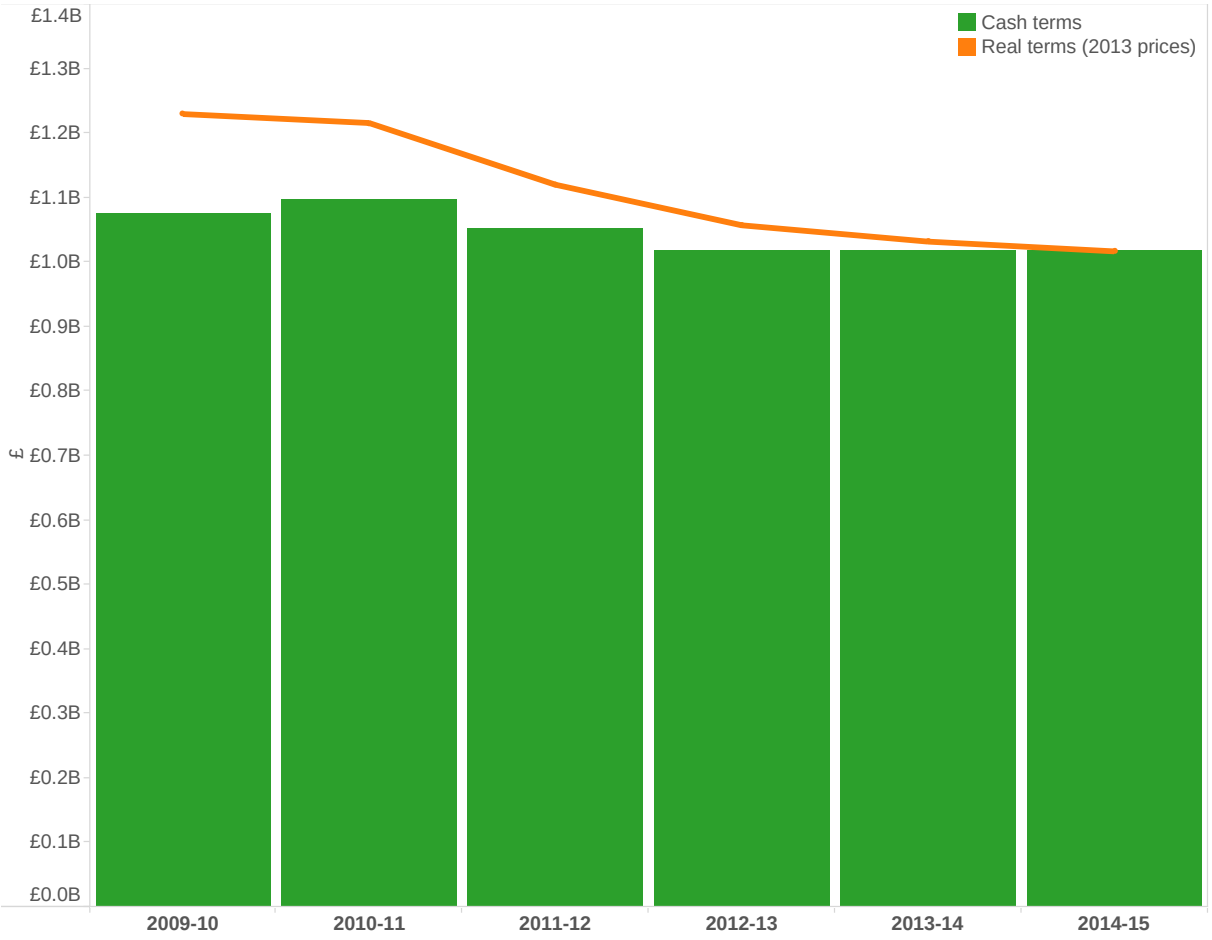
The general decline in core public funding for university research masks more specific changes in levels of funding from different streams. Therefore, to observe these changes, it is necessary to examine the individual components of public funding at a more detailed level; since data on funding body recurrent research grants is already available up to 2014–15 (albeit in a provisional form) this will also make it possible to examine more recent trends on that funding stream and also take a look forward at the evolution of funding up to 2014–15. The next two subsections will explore recent changes in, respectively, mainstream QR funding and RC funding for universities.

Mainstream quality-related funding from the higher education funding councils

Mainstream QR funding is the core element of the higher education funding councils' (FCs) recurrent grants for research, and is allocated on the basis of each institution's performance in the Research Assessment Exercise (renamed as Research Excellence Framework [REF] in 2014). Mainstream QR funding supports institutional autonomy and has a vital strategic importance for universities. It can be used discretionally to support the full range of research activities underpinning universities' research strategies, from covering the costs of researchers' salaries to funding strategic research capital investments.

As suggested by Figure 8, which illustrates the levels of mainstream QR allocated for England (or, for future academic years, provisionally committed) between 2009–10 and 2014–15, in the current academic year universities in England received £56 million less in cash terms from this funding stream (around £205 million less in real terms) compared to 2009–10. And they are expected to see a further decline of less than £100,000 in cash terms and £17 million in real terms in 2014–15.

Figure 8: Mainstream quality-related (QR) funding for higher education institutions in England, 2009–2015 (in cash and real terms)



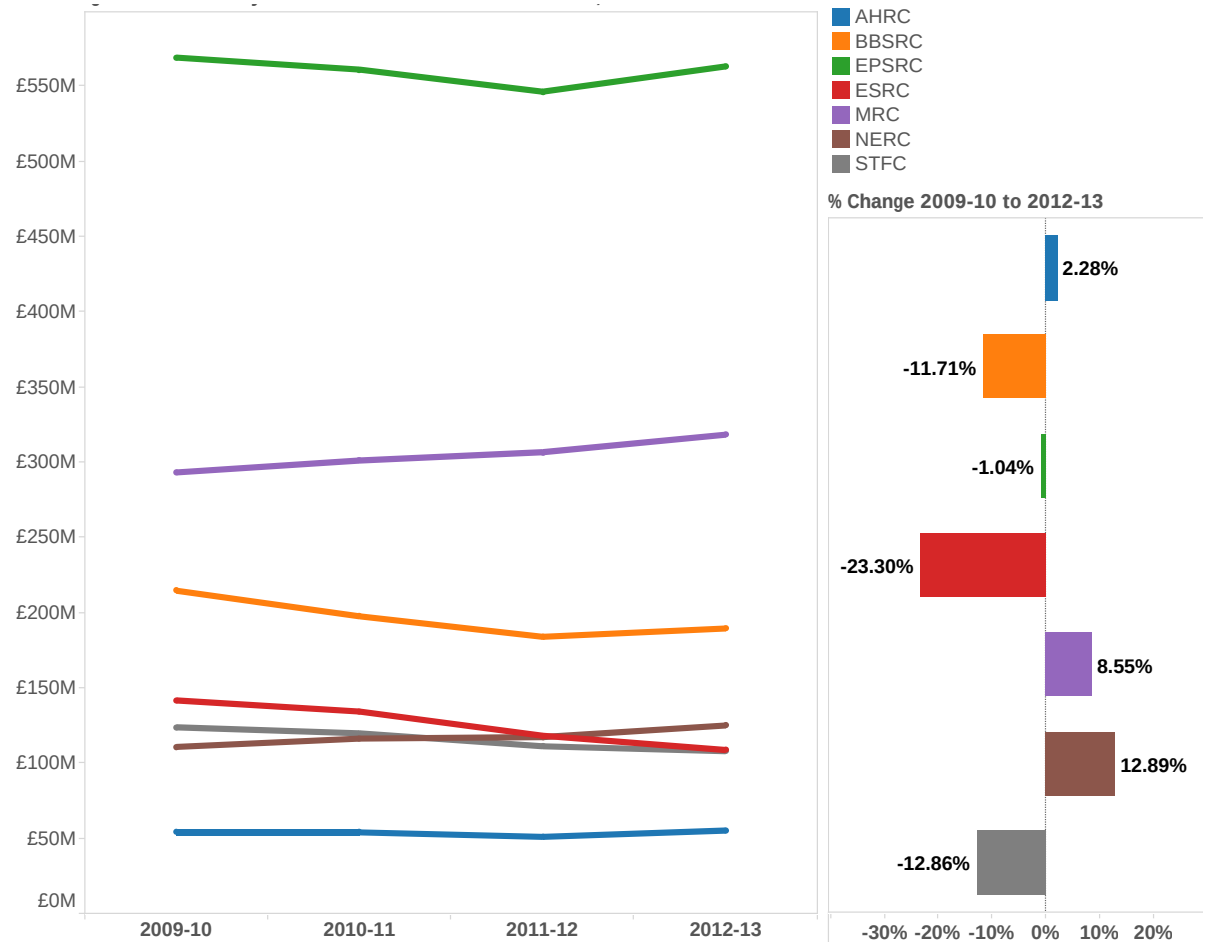
Source: HESA 2014

Research grants from the UK research councils

The seven RCs fund university-based research through project grants awarded on a competitive basis. RC grants are open to a wide range of eligible research organisations, some of which are not part of the higher education sector; as a result, the figures discussed here will only relate to the proportion of funding that is awarded to higher education institutions.

Figure 9 below presents a detailed breakdown of research grant funding for individual RCs[12]. It shows that, in recent years, changes in research funding levels have been unequal across the board. In 2012–13, universities received more funding from three of the seven RCs, but less from the remaining four compared to 2009–10. Over the period, NERC funding displays the largest proportional increase (nearly 13%), followed by MRC (8.6%) and AHRC, which shows a very marginal rise (nearly 3%). Of the RCs whose funding awarded to universities has declined, the ESRC shows the largest fall (almost a quarter); substantial declines have also occurred in funding awarded by STFC and BBSRC, while EPSRC funding has only seen a slight decrease of about 1%. The mixed picture painted by these changes suggests that, although university-based research generally faces tighter funding conditions than in the past, some subject areas (and particularly the social sciences) may have been more severely affected by the recent decline in public funding opportunities than others.

Figure 9: Research grants received by UK higher education institutions from the RCs, 2009–10 to 2012–13



Source: HESA 2014

[12] Excluding 'other public' funding, which includes funding provided by the learned societies

1.2 Funding council and research council funding have become more concentrated

In the context of publicly-funded research, 'concentration' can refer to the spread of research activity across different measures (eg universities, RAE/REF units of assessment), as measured by research income or funding (eg QR funding, total research grants and contracts), people (eg number of research-active staff or PhD students) or outputs (eg publications in top-tier academic journals). Given the focus of this report, the concentration of research activity will be discussed here in terms of the spread of each stream of research funding (QR and RC grants) across universities.

Changes in the concentration of research funding for universities are significant over time, as they may have long-term implications for the diversity, flexibility and sustainability of the UK's research base. Over the years, UUK has commissioned a series of reports (in 2003[13], 2007[14] and 2009[15]) examining trends in funding concentration and their effects on diversity. The latest report was published prior to the FCs' decision to change the QR formula from 2010–11 to reward more generously research rated 4* ('world-leading') in the 2008 RAE and to no longer fund research rated 2* from 2012–13. Therefore, building on those analyses, the next two subsections provide an update on trends in concentration occurring since the last report. The first subsection will focus on mainstream QR funding while the second will consider RC funding.

Trends in the concentration of mainstream QR funding

Figure 10 shows the distribution of mainstream QR funding across the higher education sector according to the share of the total annual pot received by each university in 2010–11 and 2013–14.

It shows that in 2013–14, institutions in the fifth quintile (the upper 20% of the funding distribution) have received around three quarters of the total mainstream QR funding, compared to 73% in 2010–11. Conversely, in the same year, institutions in the other four quintiles have received a lower cumulative proportion of QR funding than in 2010–11. As can be seen in the bottom chart of Figure 11, the proportional decline in the amount of cumulative funding received has been stronger for institutions in the first (-44%) and second (-22%) quintiles than the third (-13%) and the fourth (-5%).

Due the decline of QR funding over the period, in 2013–14 institutions in the upper 20% of the distribution have still incurred a cumulative loss of funding of around £21 million in cash terms compared to 2010–11. Nevertheless, this compares well with the nominal losses seen by institutions in the fourth quintile; despite having seen the lowest proportional decrease in QR funding, they show the highest nominal cumulative loss of funding over the period, which is nearly £24 million in cash terms.

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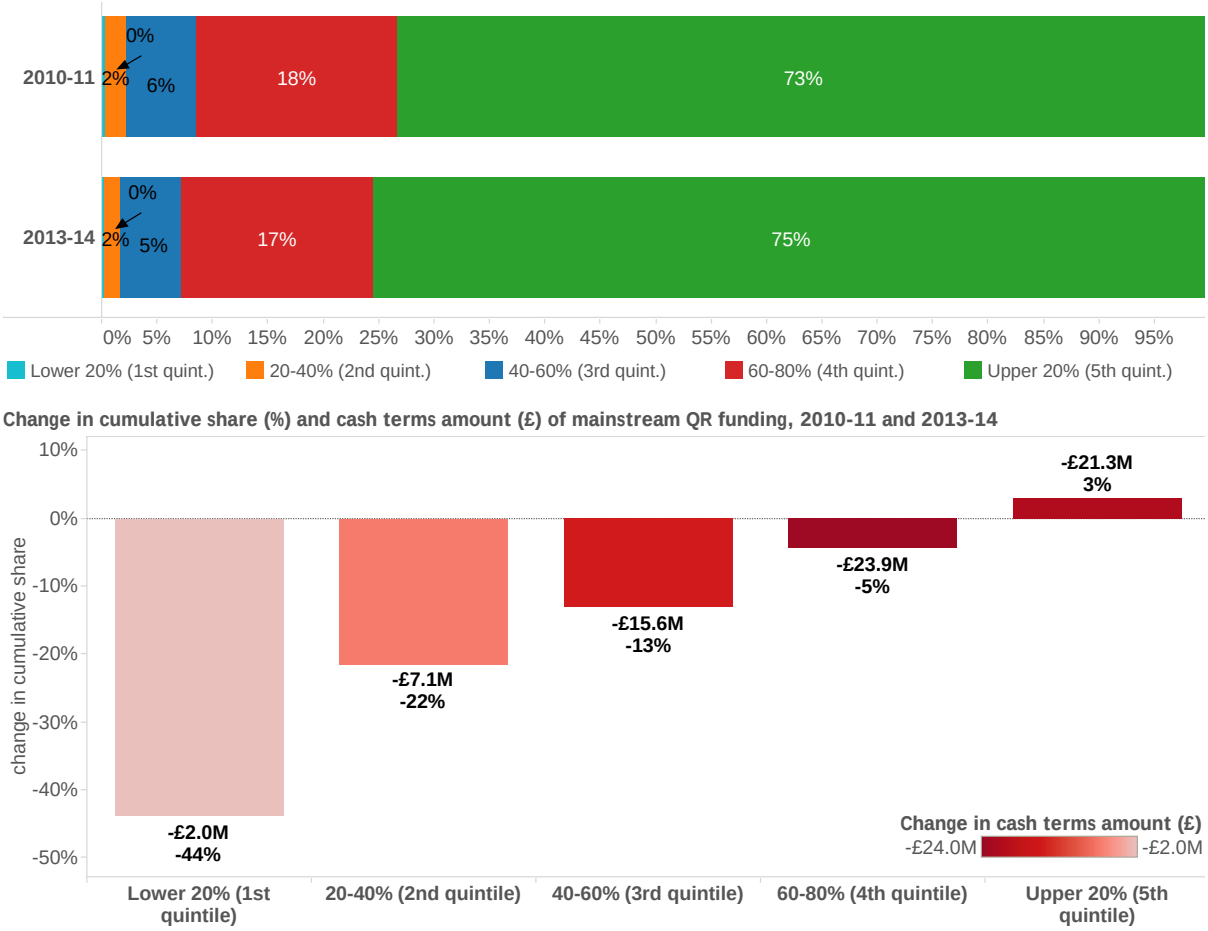
[13] Evidence ltd (2003) *Funding research diversity* a report for Universities UK
[14] Evidence ltd (2007) *Monitoring research diversity: Changes between 2000 and 2005* a report for Universities UK
[15] Evidence ltd (2009) *Monitoring research concentration and diversity: changes between 1994 and 2007* a report for Universities UK.

Therefore, these figures appear to indicate that concentration in mainstream QR funding has increased over the last three years, and benefitted institutions in the upper 20% of the distribution. However, since the total funding available has fallen slightly between 2010–11 and 2013–14, this increase in concentration has not translated into a larger cumulative funding allocation to these institutions compared to two years ago.

A broad comparison of these results with the findings of previous analyses of trends in concentration suggests that concentration in mainstream QR funding is still lower than it was for most of the 2000s, but remains higher than in 2008–09, when it reached its lowest level.

Figure 10: Distribution of mainstream quality-related (QR) funding across UK higher education institutions (quintiles), 2010–11 and 2013–14



Source: UK Funding Councils 2014, UUK estimates

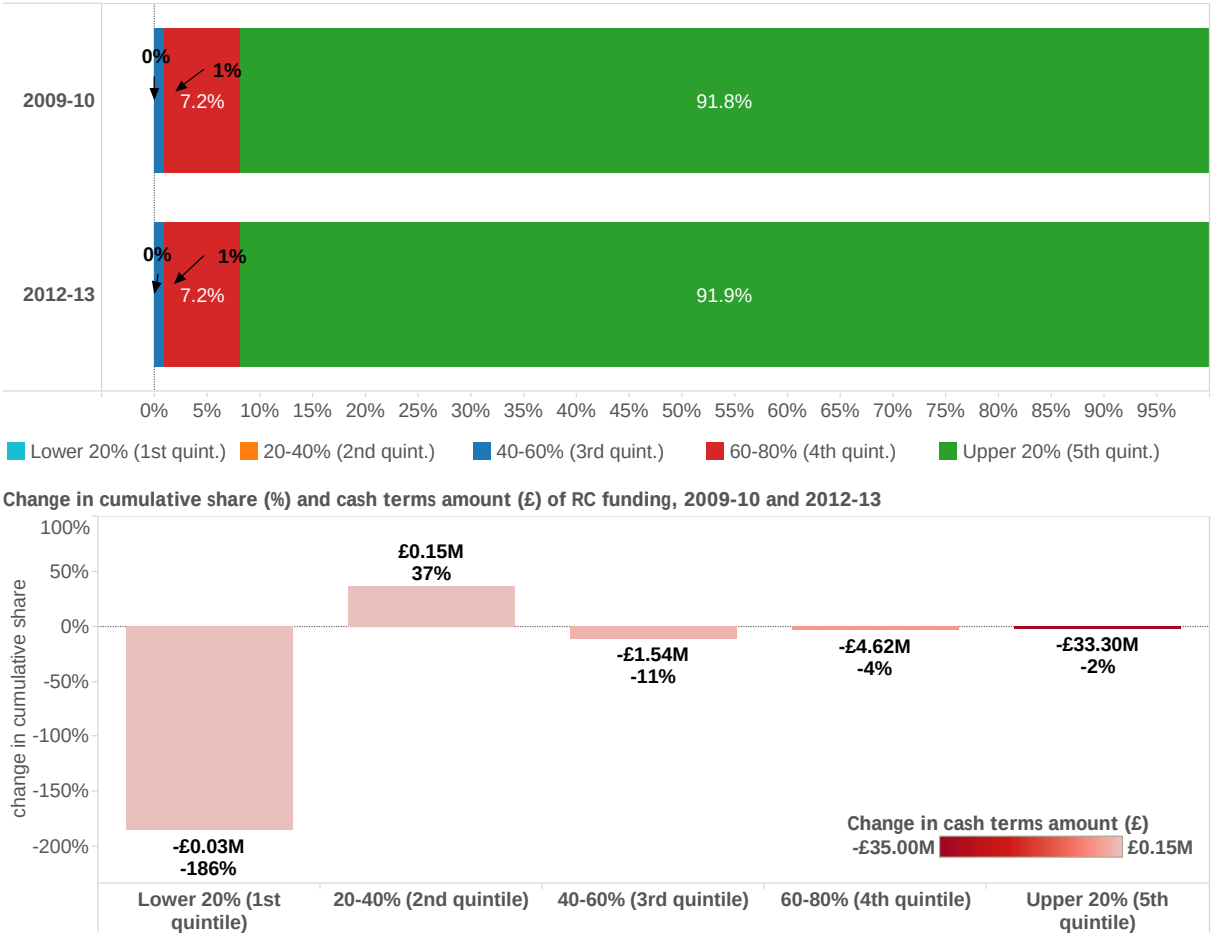
Trends in the concentration of research councils' funding

RC funding tends to be more concentrated than mainstream QR funding. In 2010–11, institutions in the upper 20% of the RC funding distribution received over 90% of the total RC funding awarded to universities, compared to 73% of mainstream QR funding.

The distribution data presented in Figure 11 suggests that, in this funding stream, there has not been an increase in the concentration of funding comparable to that seen in mainstream QR funding.

In 2012–13, universities in the upper 20% quintile cumulatively secured 91.9% of the total funding awarded to the higher education sector, compared to 91.8% in 2009–10. This was mirrored by an equally small decrease in the cumulative share of RC funding going to institutions in the third quintile, which went from 0.9% in 2009–10 to 0.8% in 2012–13. However, it is also significant that universities in the first quintile, which had received small research grants in 2009–10, appear to have lost access to RC funding altogether two years later. These results resonate with the wider shift in funding approach by the RCs, which, in the last few years, have increasingly moved away from short-term, small grants and towards longer and larger grants to be awarded to fewer institutions. Again, in terms of absolute funding levels, in 2012–13 all institutions except those in the second quintile saw nominal losses.

Figure 11: Distribution of RC funding across UK higher education institutions (quintiles), 2009–10 and 2012–13



Source: HESA 2014, UUK estimates[16]

[16] The percentage change in the cumulative share of RC funding awarded to institutions in the first quintile exceeds 100% due to the fact that one institution received a net negative flow of RC funding in 2012–13.

1.3 Cross-sectoral and cross-institutional collaborations have become more important

Collaborative research has been gaining momentum in the last few years. This phenomenon has both an intra- and an inter-sector dimension: research collaborations are on the rise within the higher education sector as well as between universities and charities and businesses.

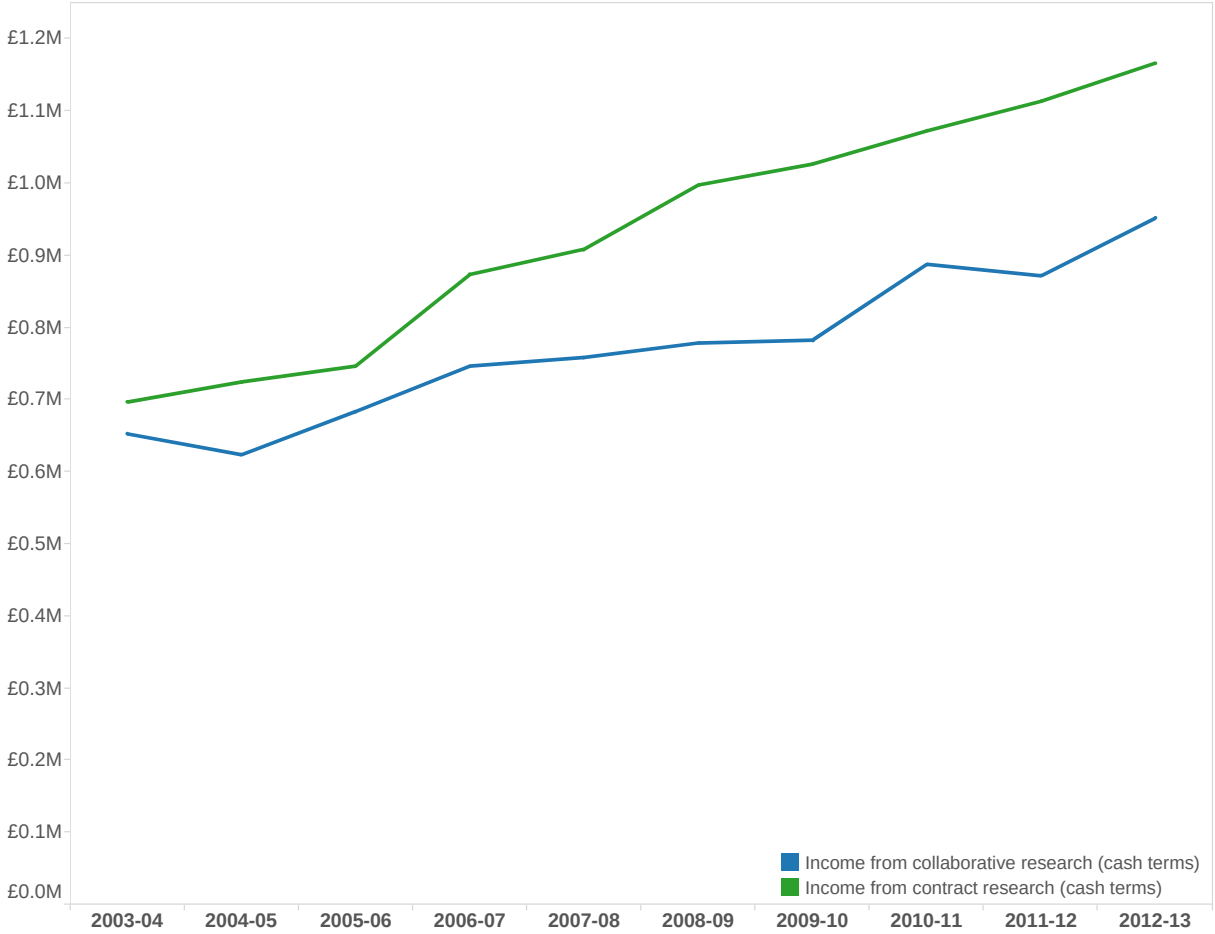
Multi-institutional research collaborations allow universities to share access to research expertise and facilities; in a period of tight funding constraints, pooling resources with other institutions can be an effective way of organising research activities, enhancing the impact of published research[17] and ensuring that promising lines of research do not have to be dismissed or abandoned due to financial risks. For this reason, they are seen as important in fostering the excellence and dynamism of the research base.

Intra-sector research collaborations cover a wide spectrum of activity, from national and international co-authorship of academic articles to joint research programmes and sharing of research equipment and infrastructure. As well as taking place at different organisational levels (between institutions, teams or individual researchers)[18], they often also span across countries and disciplines, promoting high-impact, multidisciplinary approaches to academic research. The evidence on article co-authorship can provide a good, albeit partial, indication of the importance of collaboration. The 2013 report on the international comparative research performance of the UK suggests that, in 2012, 47.6% of UK-authored published articles were co-authored with at least one non-UK researcher (the highest rate of international co-authorship after France) and 14.8% with researchers affiliated with different UK institutions[19]. As mentioned, this is just the tip of the iceberg: the creation of increasing numbers of research consortia and partnerships, also encouraged by the new funding models for PGR training introduced by the RCs, is perhaps the most significant (although less well documented) aspect of the recent rise in collaborative research approaches.

Although not a new phenomenon, collaboration between the higher education and the business and charity sectors is becoming more strategically important for universities. As shown in Figure 12 below, income from research-based interactions has risen steadily over the last decade, surpassing £2 billion in 2012–13.

[17] Hsu J, Huang D (2010) 'Correlation between impact and collaboration' *Scientometrics* 86, pp.317–324
[18] Higher Education Policy Unit (HEPU), University of Leeds and the Science Policy Research Unit (SPRU) University of Sussex (2000) Collaborative approaches to research
[19] Department of Business, Innovation and Skills (2013), *International Comparative Performance of the UK Research Base*

Figure 12: UK universities' income from collaborative and contract research, 2003–04 to 2012–13



Source: HEFCE 2014

This growth in cross-sector research collaborations may not have occurred without support from the public funding system. Public funding streams that underpin research-based collaboration in England include:

- the charity support element of QR funding, also known as the Charity Research Support Fund (CRSF), which is allocated on the basis of research income earned competitively from charities
- the business research element of QR funding, which is allocated on the basis of research income earned competitively from industry, commerce and public corporations

Together with the research degree programme (RDP) supervision fund, which supports PGR provision, these are called 'non-mainstream' elements of QR funding.

Charities have always been important partners for universities. While they invest relatively little in R&D compared to the business sector, they spend 80% (over £1 billion)[20] of their R&D

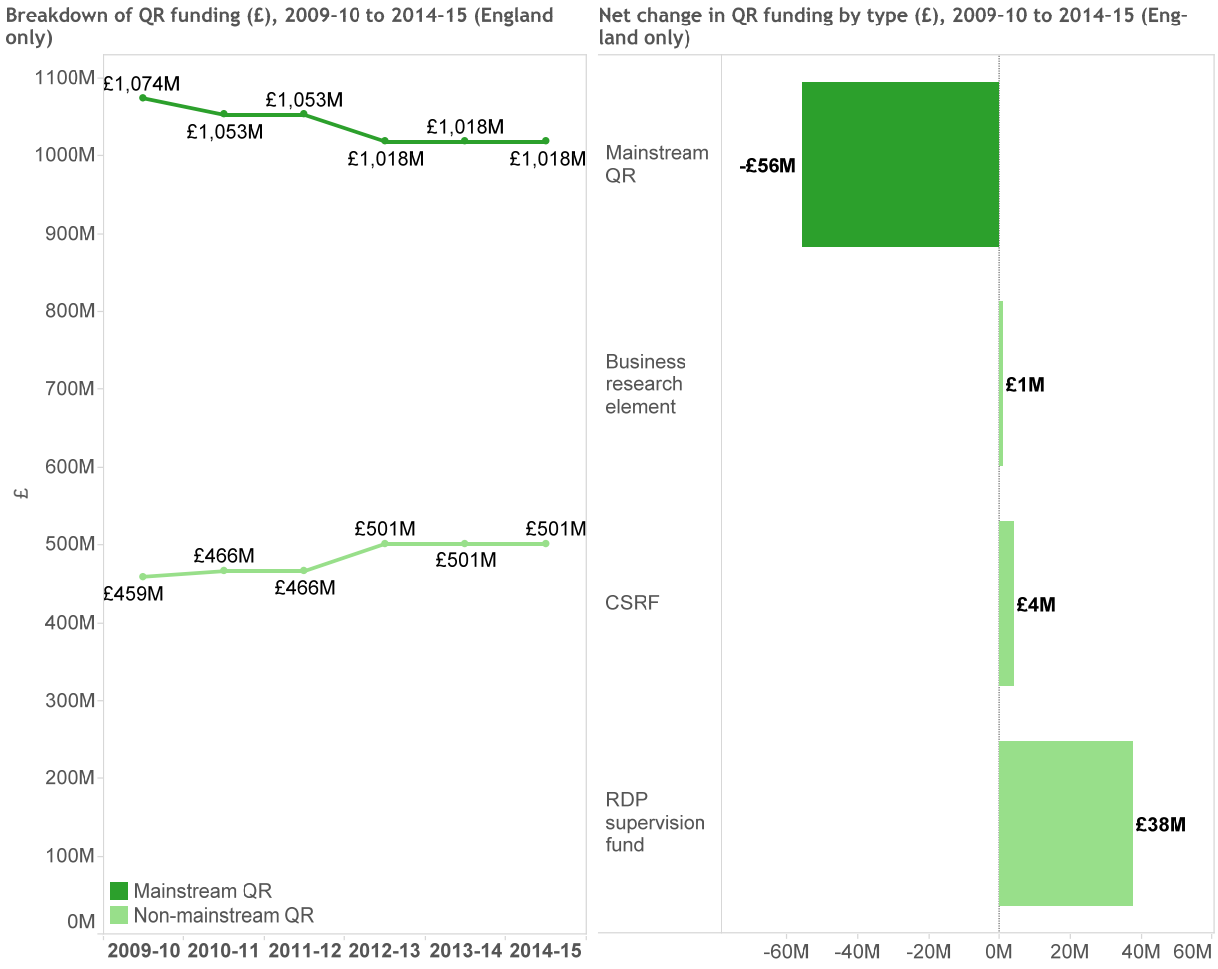
[20] Office for National Statistics, Gross Domestic Expenditure on Research and Development, 2012 (released 12 March 2014)

resources in university research, and account for over 20% of UK universities' research grants and contracts[21]. The CRSF makes it easier for them to do so, by providing the resources necessary for universities to cover the costs of research overheads.

The business research support element is also crucial to encourage stronger collaboration with industrial partners, and, like the CRSF, aims to do so by providing additional financial support to joint research with non-academic partners. This element is particularly effective in combination with the impactful Higher Education Innovation Fund, which supports both research- and non-research-based interactions with businesses.

As shown in Figure 13, the amount of QR funding allocated through the three non-mainstream elements in England has risen slightly as a result of a redistribution of around £43 million away from mainstream QR funding. The bulk of this extra funding has been reinvested in the RDP supervision fund, while the CSRF and the business research element have only received a cumulative boost of around £5 million since 2009–10.

Figure 13: Non-mainstream quality-related funding for higher education institutions in England, 2009–10 to 2014–15



Source: HEFCE 2014

[21] 2012–13 data from HESA (2014) *HE Finance Plus 2012/13*

2: Trends in postgraduate research demand and funding for universities

UK universities are major international players in the provision of postgraduate research (PGR) training. With 20,276 doctoral graduates in 2011, they are the fourth largest producers of PhD graduates in the world[22] after the United States, China and Germany.

The quality of PGR provision at UK universities reflects the world-class status of the domestic research environment. As well as being demonstrated by the UK's performance on objective research measures, this is also confirmed by the feedback received from students. Doctoral students at UK higher education institutions are extremely positive about the quality of training they receive. In the 2013 Postgraduate Research Experience Survey (conducted by the Higher Education Academy), 82% of respondents expressed overall satisfaction with their student experience, and reported the highest levels of satisfaction on research skills (85%) and supervision (84%).[23]

Beyond providing a pipeline of research talent for the UK research base, PGR education brings substantial benefits to the individual, the economy and society, and is instrumental to realising the skills ambitions outlined by the government's industrial strategy.

The importance of attracting, training and retaining talented prospective researchers in the UK is widely recognised; nonetheless, the public funding squeeze of the last few years has made it difficult to maintain an adequate level of support for PGR provision.

To understand changes in the funding environment for PGR study in higher education institutions, it is necessary to look at trends in the market for PGR students as well as in the public funding streams associated with PGR provision. The two will be examined, respectively, in sections 2.1 and 2.2.

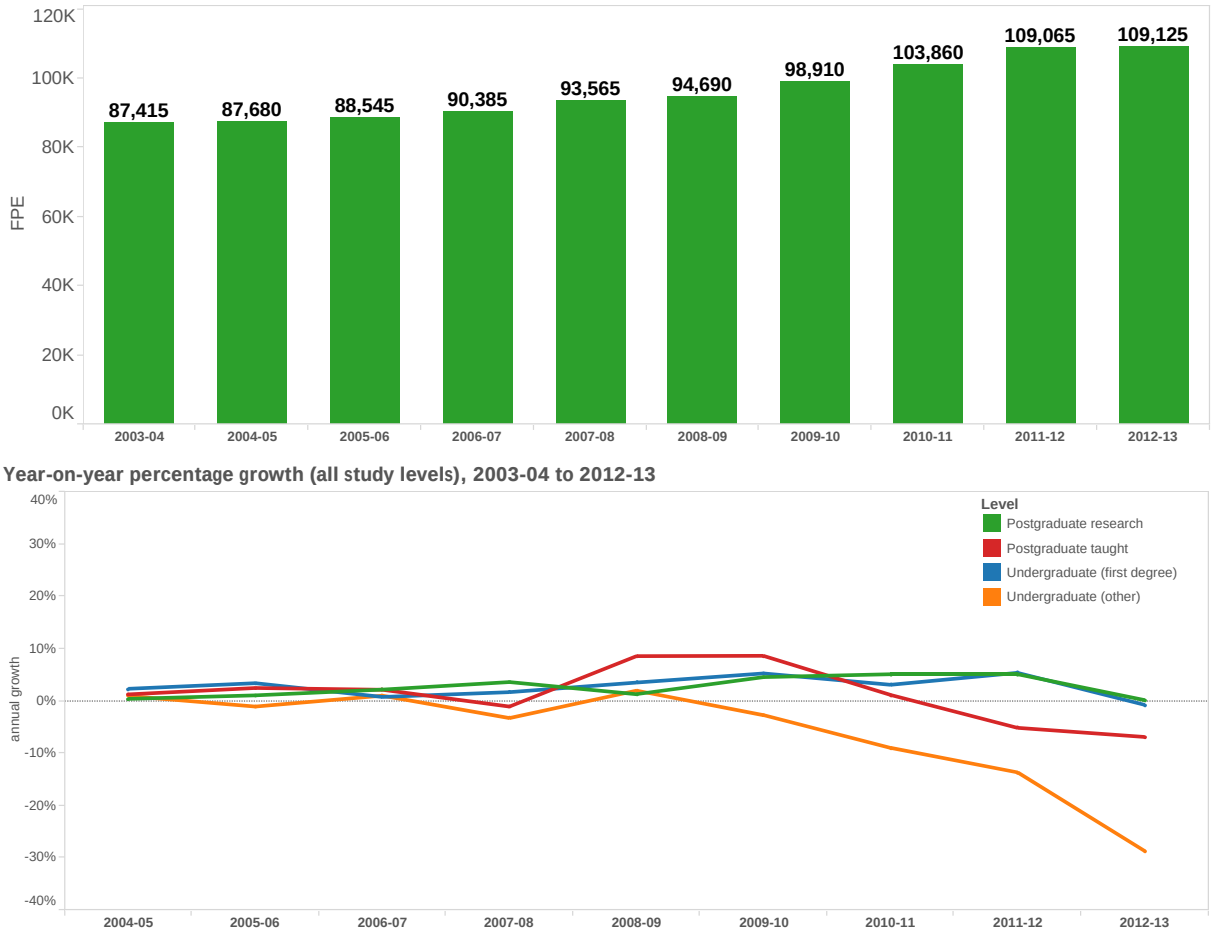
2.1 Trends in the market for postgraduate research students

The demand for postgraduate research study in the UK has remained strong, but showed signs of slowing down last year.

Over the last decade, PGR student numbers from all domiciles (presented in Figure 14) have shown the second fastest growth rate of all levels of study, rising by one quarter between 2003–04 and 2011–12, and only trailing slightly behind the fastest growing group, first degree students (which grew by 27%). However, in 2012–13 (the latest year for which data is available), PGR numbers have started to stagnate (-0.5%). On the one hand, this is still relatively positive news, as it suggests that PGR study has bucked the trend shown by postgraduate taught (PGT) student numbers, which last year declined by 7%. On the other hand, it raises concerns about the direction of future trends in demand, as it represents a significant slowdown of growth compared to previous years.

[22] Department for Business, Innovation and Skills (2013) *International Comparative Performance of the UK Research Base*
[23] Higher Education Academy (2013) *PRES 2013: Results from the Postgraduate Research Experience Survey*

Figure 14: PGR student numbers from all domiciles (count and year-on-year percentage growth) in UK higher education institutions, 2003–04 to 2012–13



Source: HESA 2014

The decline in research council-funded students has occurred alongside an increase in students who are self-funded and those that rely on institutional studentships.

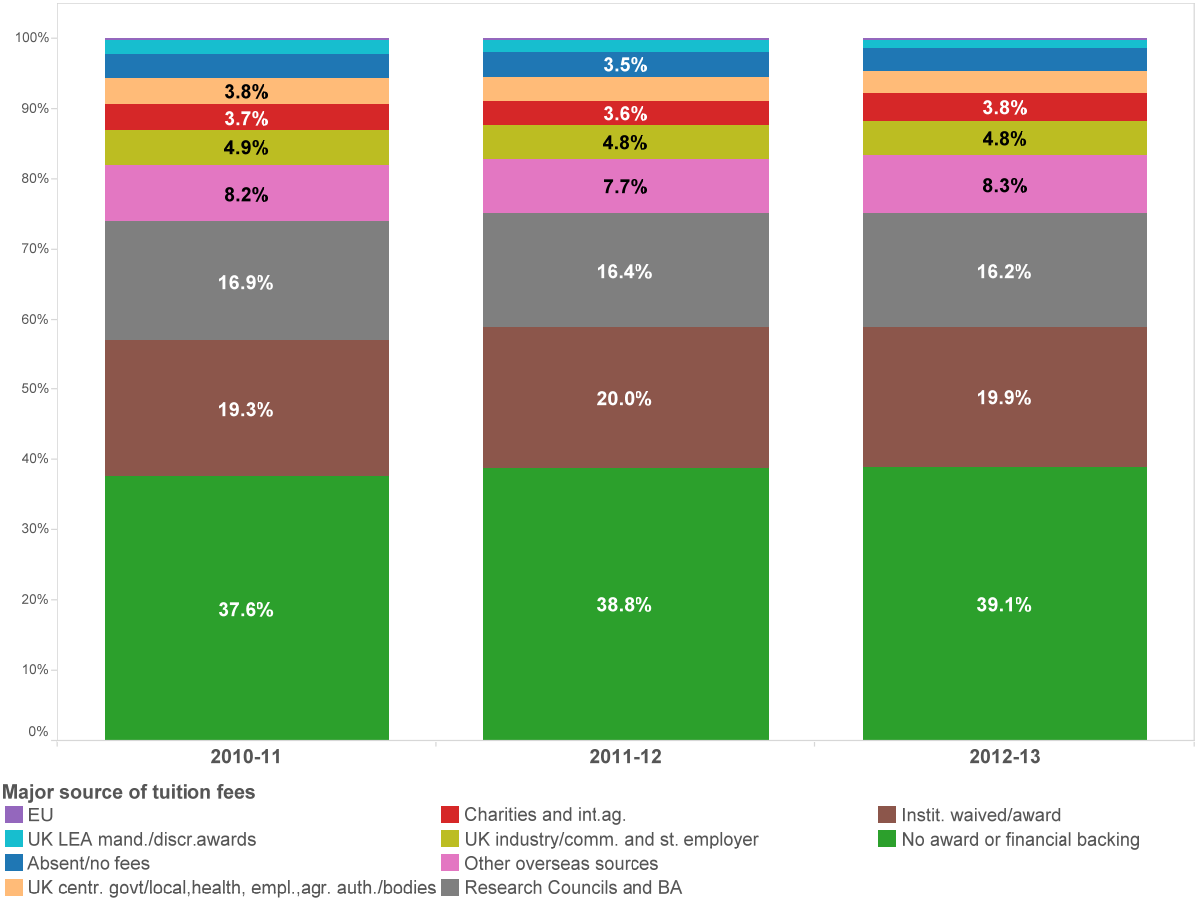
The declining resource budget allocated to the RCs resulted in a fall in RC support to doctoral students. This is partly reflected in a reduction in the proportion of students funded by the RCs and the British Academy between 2010–11 and 2012–13, from just under 17% to 16.2% of all students for which the major source of tuition fees is known (as shown in Figure 15). The associated fall in the number of new RC-funded studentships will be discussed in more detail in section 2.2.

By contrast, after a steady year-on-year decline in the early 2000s, over the last three years the proportion of PGR students without financial backing (which can be seen in Figure 15) has risen from 37.6% to 39.1% of the total[24]. During the same period, the proportion of students supported by institutional scholarships has also grown slightly, going from 19.3% to just under 20% of all students. The growth in the proportion of students supported by institutional scholarships reflects an effort by institutions to protect training opportunities by

[24] All students for which the main source of funding is known

investing more of their own resources in PGR provision and attracting more funding from business and charity sources.

Figure 15: Breakdown of PGR students in UK higher education institutions by main source of funding, 2010–11 to 2012–13

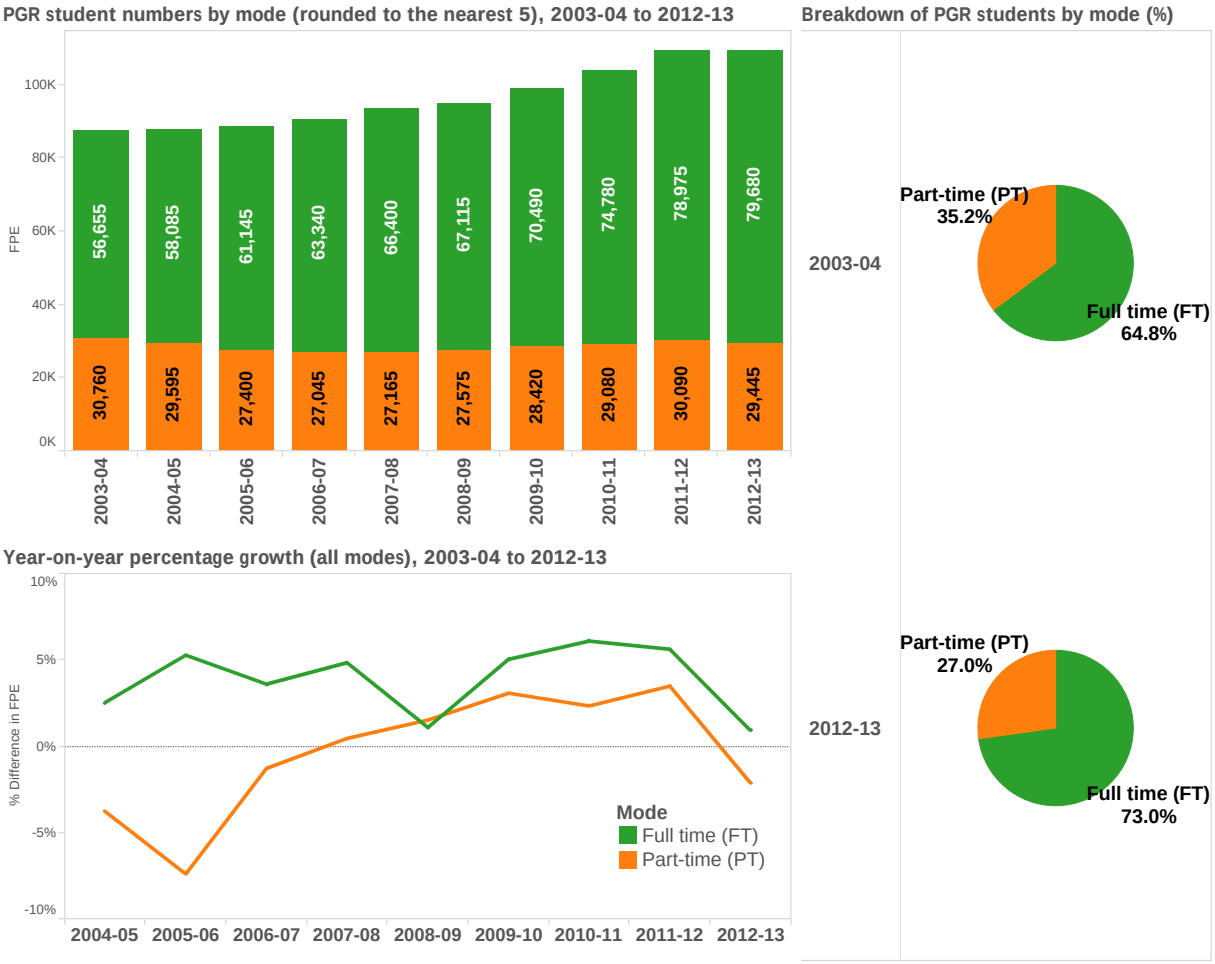


Source: HESA 2014

The recent decline in demand for part-time study seen at other levels also appears to have affected PGR training.

The growth in PGR numbers (shown in Figure 16) over most of the last decade was mainly driven by a strong increase (nearly 40% between 2003–04 and 2012–13) in full-time students; by contrast, part-time student numbers slightly declined (-4.3% over the same period). As a result, full-time students now make up a much greater proportion of the PGR population than ten years ago; in 2012–13 they represented 73% of all PGR students, compared to just under 65% in 2003–04.

Figure 16: PGR student numbers in UK higher education institutions by mode (count, year-on-year percentage growth and proportion of total), 2003–04 to 2012–13

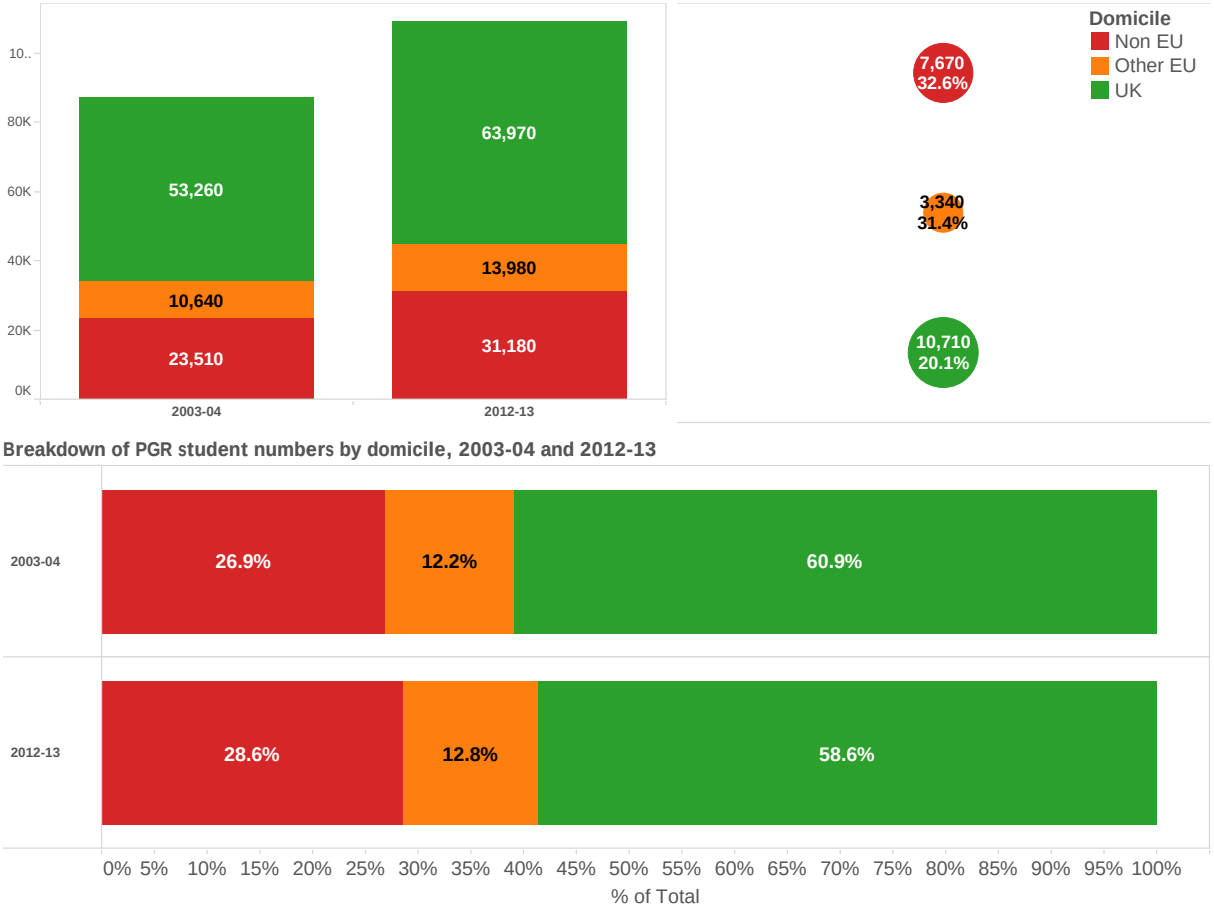


Source: HESA 2014

The PGR student population has become increasingly international.

As suggested by Figure 17, the recent growth in PGR numbers was predominantly fuelled by a strong proportional rise in international students. The number of doctoral students from the rest of the EU and other non-EU countries grew at a significantly higher rate than that of UK-domiciled students between 2007–08 and 2012–13. As a result, the share of the PGR population that is domiciled in the UK fell from 60.9% to 58.6% of the total student population over this period.

Figure 17: PGR student numbers in UK higher education institutions by domicile (count [top left], cumulative growth [top right] and percentage breakdown [bottom]) , 2003–04 and 2012–13



Source: HESA 2014

Increasing proportions of students enter PGR study with a Masters degree.

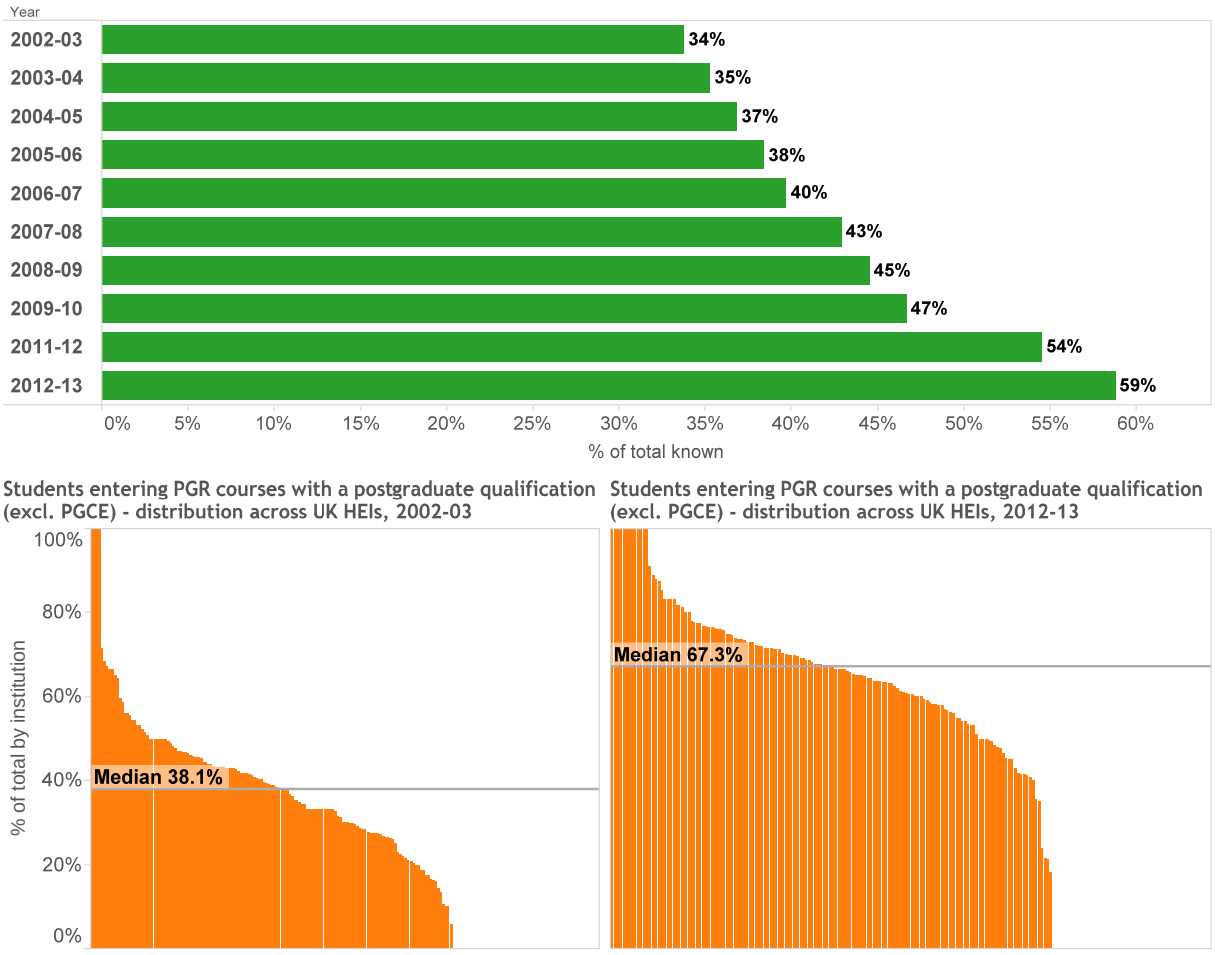
In 2002–03, less than a third of students entered doctoral level courses with a Masters degree; by 2012–13, this proportion had increased to 59% of the total[25]. As can be seen in Figure 18 below, this change is also consistent across the sector, as all institutions have seen an increase in the proportion of PGR entrants with a Masters degree.

The increasing proportion of students who enter doctoral training with a PGT qualification could be expected to strengthen the link between demand for study at the PGR and PGT levels. However, it is important to note that the strength of this correlation is likely to vary between STEM[26] and AHSS[27] subjects, in that the standard progression routes to PGR study are different between the two. In 2012–13, nearly seven in ten (68.9%) doctoral students in AHSS subjects has a Masters degree, while the corresponding proportion for those in STEM subjects was only four in ten (46.71%). These differences are relevant to funding policy,

[25] All students for which the main source of funding is known
[26] Science, technology, engineering and mathematics
[27] Arts, humanities and social sciences

especially when seen in the wider context of the student finance challenges at the undergraduate and postgraduate taught levels.

Figure 18: Proportion of PGR students in UK higher education institutions entering doctoral programmes with a postgraduate qualification (excl. PGCE), 2002–03 to 2012–13



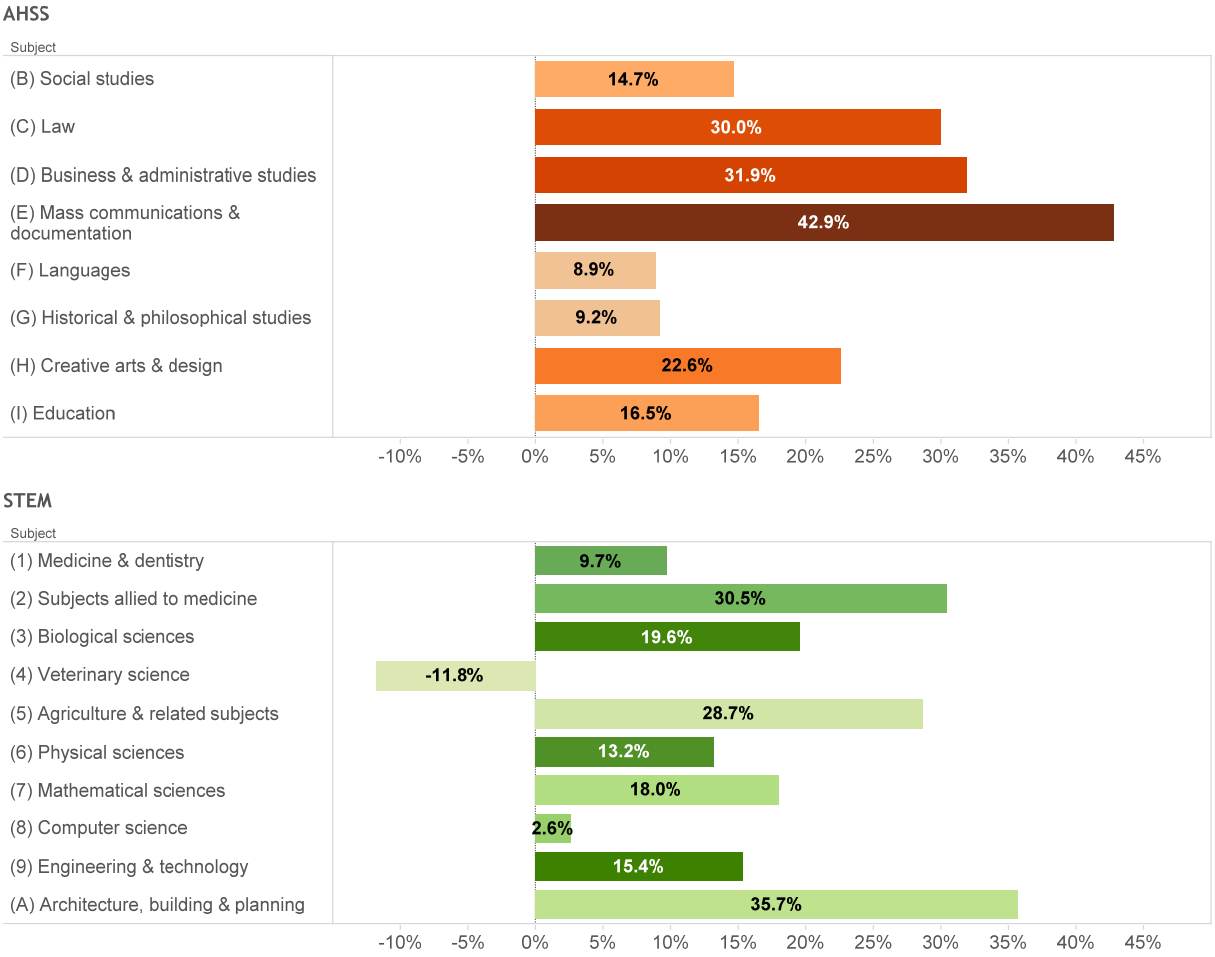
Source: HESA 2014

Compared with five years ago, student numbers have grown in the majority of subjects, but particularly in the AHSS.

In 2012–13, students in STEM subject areas still account for 59% of the total PGR population. However, as shown in Figure 19, many of the fastest-growing subject areas (with the exception of architecture and subjects allied to medicine) are in the AHSS subject area. For instance, student numbers in law, business and management, and mass communications and documentation increased by over 30% over the period. The substantial growth in AHSS doctoral students seems to buck the trend seen at all other levels of study, where student numbers in AHSS subject areas grew less strongly than in STEM, and even declined in a number of subjects (eg modern languages). A possible explanation for this is the fall in RC-funded student numbers, as doctoral students in STEM subjects are more likely to fund their studies through RC studentships than AHSS students. For instance, in 2012–13 RC studentships supported about 21% of all engineering, science and technology and 24% of all

physical sciences doctoral students, compared to 11% of history and philosophy and 6% of creative arts and design students funded by the AHRC in the same year. As a result, the decline in available studentships may have deterred potential PhD students in STEM to a greater extent than those aiming to undertake doctoral programmes in AHSS.

Figure 19: Percentage change in PGR student numbers in UK higher education institutions by broad subject group (AHSS and STEM), 2007–08 to 2012–13



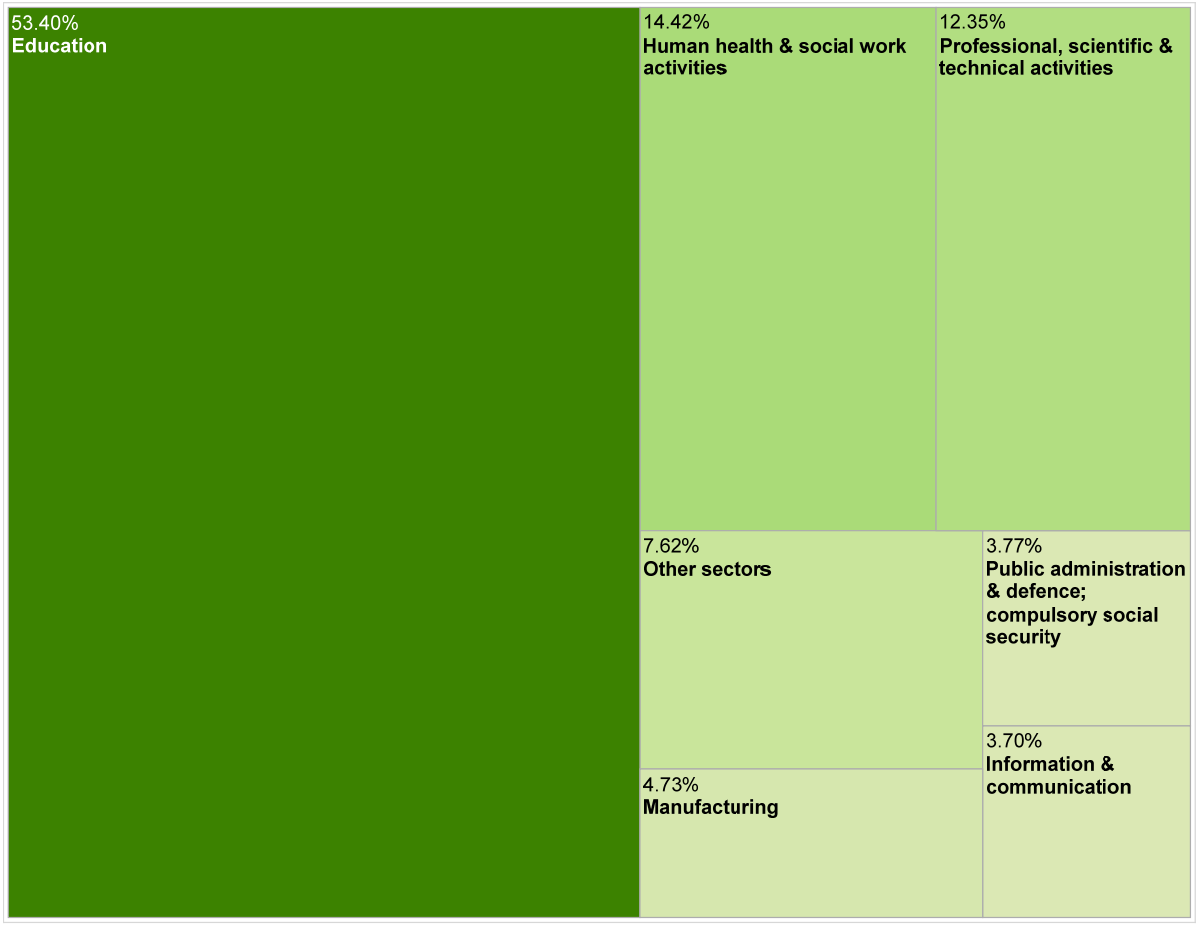
Source: HESA 2014

The employment destinations of PGR students in the UK are still predominantly in education but have become increasingly diverse.

Education (all levels) remains the most popular post-qualification employment destination for PGR students in the UK, with 53.4% of PGR qualification leavers finding employment in the education sector (as shown in Figure 20). Nonetheless, this proportion has declined over time and varies greatly across subjects: the overwhelming majority of PGR graduates in the humanities enter education, but this is not necessarily the case in STEM subjects, where as many as 40% enter other sectors. The available statistics on the first employment destinations of RC-funded doctoral students paint a similar picture: they confirm that increasing proportions of students progress to jobs outside academia and that the subject of study has a strong impact on the pattern of employment outcomes. For example, in 2012–13 only 37% of EPSRC and 46% of BBSRC-funded doctoral leavers were employed in the higher

education sector, while the corresponding figures for AHRC and ESRC-funded students were, respectively, 55% and 60%.[28]

Figure 20: Top six sectors of employment of doctorate holders[29], 2011–12 (DLHE survey)



Source: HESA 2014

2.2 Trends in postgraduate research funding for universities

Public support for PGR study is provided through two main funding mechanisms: studentship allocations or grants from the seven RCs and block grants from the four higher education funding councils.

This structure closely matches that of the dual support system allocating research funding, whereby the higher education funding councils provide the general funds needed to sustain the 'bedrock' of PGR provision and the RCs instead act as 'sponsors' to students across the range of research areas that fall within their remit. As will be discussed in the following subsections, both funding streams have seen quite significant change in the last few years.

[28] Research councils impact reports 2012–13 (EPSRC, BBSRC, AHRC, ESRC)

[29] Figures include all respondents with a known employment destination within 6 months of leaving higher education and exclude those not in employment.

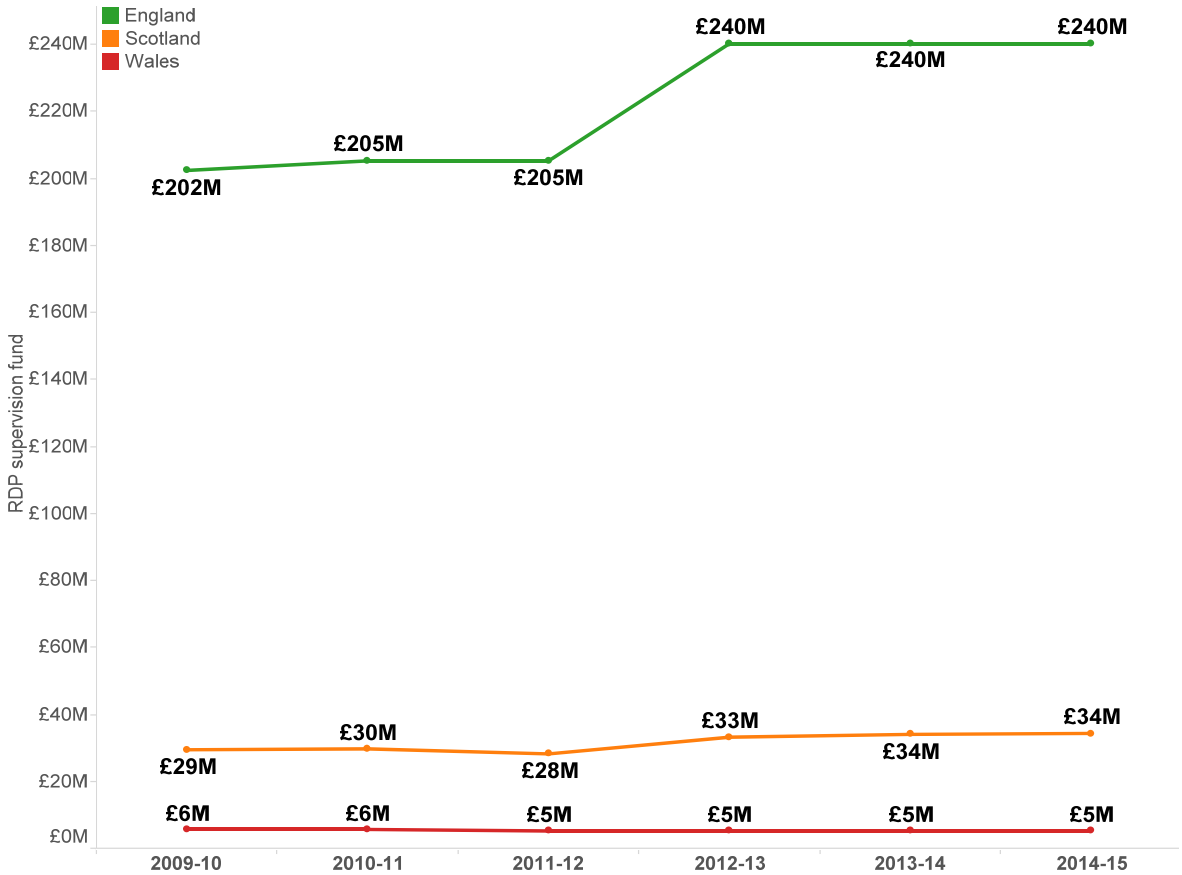
Block grant funding has risen in England and Scotland and, following a change in its allocation method, it has become more concentrated in England.

Block grant funding from the higher education funding councils recognises the cost of supervising doctoral degree students and is allocated as part of the recurrent research grant to higher education institutions. As shown in Figure 21 below, its distribution across higher education institutions is less concentrated than that of RC-funded students (which can be seen as a proxy of RC studentships) and is therefore fundamental for sustaining PGR capacity.

Since its introduction in 2004–05, block grant funding has been put under considerable pressure by the stable growth in PGR numbers. It is partly in response to this pressure that the FCs in England and Scotland have provided a funding boost to these streams, which, as shown in Figure 21 below, have risen by £35 million and £5 million respectively between 2009–10 and 2014–15.

As noted earlier, the growth of the RDP supervision fund in England resulted from a redistribution of resources occurring at the expense of mainstream QR funding. From 2012–13, the government decided to no longer fund research activity with a rating of 2*, which enabled additional resources to be directed to RDP.

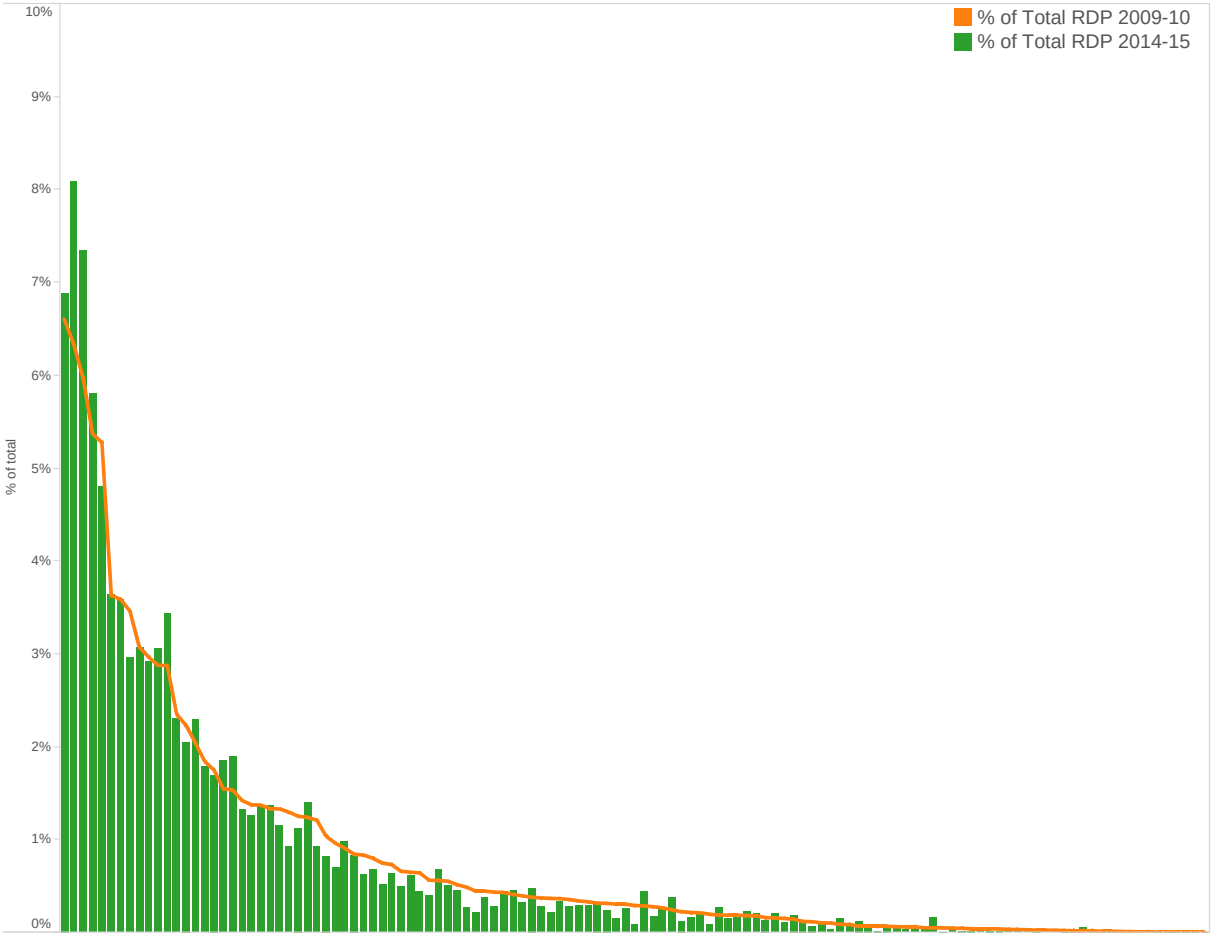
Figure 21: PGR funding to UK higher education institutions from the FCs, 2009–10 to 2014–15



Source: HEFCE, HEFCW, SFC 2014

Alongside a growth in funding levels, there has also been an increase in the concentration of RDP funding in England. This is shown in Figure 22 below, which suggests that the five institutions in the upper section of the distribution, as well as selected others in the upper-middle section, have seen a substantial increase in the share of total funding received in 2014-15 compared to five years prior. The main driver for this change has been the revision of the allocation method for RDP to account for RAE 2008 results in 2012–13. However, since the new formula allocates funding based on each Unit of Assessment's share of the London-weighted, quality-weighted, cost-weighted PGR full-time equivalents from the previous academic year, this effect has also been mediated by differences in trends in student volumes and balance of higher and lower-cost subjects across institutions.

Figure 22: Distribution of RDP funding across higher education institutions in England, 2009–10 and 2014–15



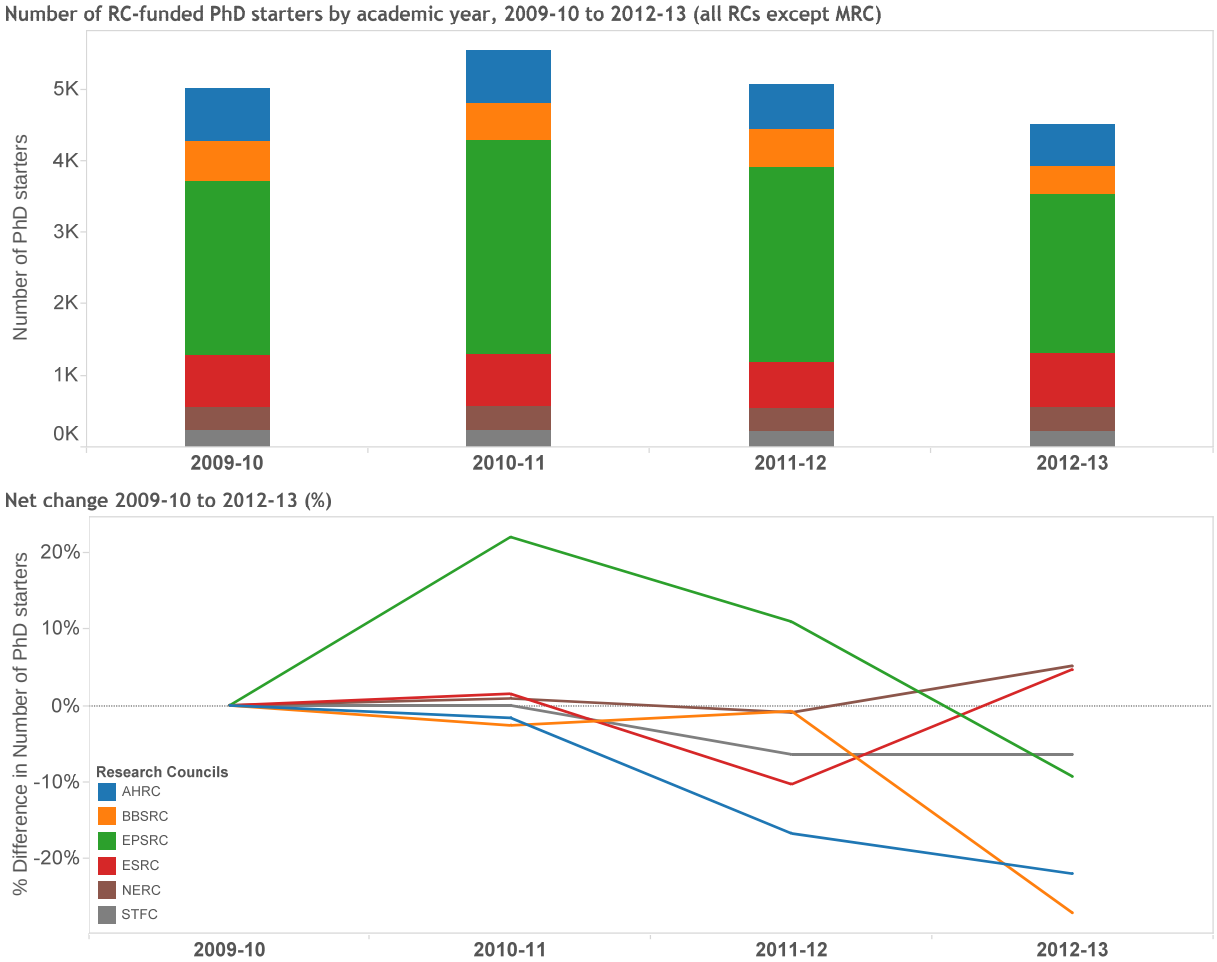
Source: HEFCE 2014

PGR studentship funding from the RCs has declined.

The RCs fund PGR education through the allocation of studentships or flexible doctoral training grants from which research organisations are required to support a minimum number of studentships.

As suggested by the decline of RC-funded students discussed earlier, total RC expenditure on studentships has declined in recent years, mainly as a result of a real terms reduction in the resource budgets allocated to the RCs from 2010–11 to 2012–13. Over this period, the total annual RC expenditure on postgraduate awards (including stand-alone Masters) fell from £571 million to £495 million (in real terms, at 2012–13 prices), which corresponds to a cumulative decrease of around 13%[30]. This fall in expenditure has translated into a decreasing number of new RC studentships available over the years, although not all RCs have cut support for new students. Figure 23 below shows that the total number of PhD starters funded by the RCs (excluding the MRC, for which data was partially missing) fell sharply between 2010–11 and 2012–13, going from around 5,540 to just over 4,500. This corresponds to a cumulative decrease of over 18% (or around 1,000) over the period. The NERC and ESRC slightly expanded their provision of new studentships, however this increase was offset by a sharp fall in new PhD starters supported by the EPSRC, BBSRC and AHRC. The STFC only saw a slight decline in support to new students.

Figure 23: Number of RC-funded PhD starters by academic year (all RCs excluding MRC), 2009–10 to 2012–13



Source: Research councils 2014

[30] Research Councils UK (2014) *Research Council Impact Reports 2013 - Trends in inputs, outputs and outcomes*

It is difficult to appraise the effect of reduced RC support on demand for PGR study, and, as mentioned earlier, outcomes may vary across the spectrum of subject areas covered by the RCs. However, if this trend continues, we might expect to see a lasting negative impact on the demand for PGR study, particularly from domestic students, who are more reliant on RC support due to the residence conditions attached to RC studentships. The UK's capacity to maintain a strong domestic research workforce may suffer as a result of this.

At the same time, the distribution of RC-funded students (a proxy for RC funding) also shows signs of increasing concentration of funding. In 2010–11, the 20 institutions in the upper part of the distribution in Figure 26 trained 51% of all RC-funded students; in 2012–13, this cumulative share had increased to 75%. Conversely, 33 of the 151 institutions that had trained some RC-funded students in 2010–11 no longer had any RC-funded students in 2012–13.

The Centres for Doctoral Training (CDT) and Doctoral Training Partnership (DTP) funding models have risen in importance in most of the RCs' PGR funding portfolios, growing in some cases at the expense of other funding streams (through discontinuation or consolidation with CDT schemes).

RCUK DTPs as 'partnerships [which] provide training for students across a broad range of subjects determined by a Research Organisation or consortia of Research Organisations' and which 'involve strategic engagement between the Research Organisation(s) and the RC funder(s) in developing the overall programme of training'.[31] CDTs are described as centres which 'provide training for students within focused research areas, often defined strategically by the RC funder(s) from the outset' and 'can be focused on academic or industrially relevant research topics, or a mix of both'. Like DTPs, they entail strong inter- and intra-sector collaboration; however, they are characterised by a tighter strategic specification than DTPs.[32]

The CDT and DTP models are the centrepiece of the RCs' PGR funding strategy. Over the last few years, they have become the standard models through which most RCs fund core PGR provision.

For higher education institutions, this shift in funding approaches has implied significant changes in the design and delivery of PGR training, including:

- Closer multi-institutional working – CDTs are often run by consortia rather than single institutions
- Stronger operational management[33]
- Closer strategic alignment with the RCs' priorities – requiring a more strategic approach in the preparation of funding proposals, including a careful consideration of how each institution's research strengths can help advance the RCs' priorities

[31] Research Councils UK (2013) *Research Council Common Terminology for Postgraduate Training*
[32] Ibid.
[33] ESRC (2012) Centres for doctoral training: different models

- Increased importance of match-funding – requiring increased efforts to build relationships with a wide range of partners outside the higher education sector

The expansion of the DTP and CDT schemes has taken place alongside other changes that have also significantly reshaped the RCs' PGR investment portfolio, in particular:

- The discontinuation of project and Masters studentships. Over the last few years, the majority of RCs have withdrawn support from stand-alone Masters and discontinued their project studentship schemes. In some cases a part of these studentships have been re-provided through 'core' schemes (ie large-scale flagship schemes such as Doctoral Training Partnerships); in most cases, however, the elimination of project studentships has implied an overall reduction in the level of PGR support provided.
- The consolidation of Council for Advancement and Support of Education (CASE) competition with 'core' schemes. The EPSRC and ESRC have discontinued their annual CASE competitions and instead provided those studentships as part of, respectively, their DTP and DTC schemes, by imposing a CASE conversion target on the main grants (now removed by the ESRC).

Students have reported that the DTP and CDT funding models work well.[34] It has been suggested that they have had a positive impact on PGR provision, mainly in the following ways:

- They have helped raise the quality of provision[35], through their multidisciplinary cohort-based training and an emphasis on quality standards and the student experience.
- They have introduced more flexibility – an attribute which was perceived to be lacking in previous models[36] – allowing institutions to recruit more flexibly and allocate resources where needed. This addresses a number of recommendations put forward in the Smith Report and the Wakeham Review.
- They allocate fewer, but better-resourced, studentships than the majority of past schemes, thus helping attract and retain high-calibre students. This addresses a point raised in recent years by UUK.
- They are perceived as significant kite marks of training quality by employers, students, research staff and potential partners and funders, thus making host institutions more 'attractive' in a number of ways.

However, a few aspects of these funding models have raised concerns in the higher education sector, particularly the financial risks associated with match-funding commitments, the administrative costs and complexities of managing such models, and the increasing concentration of funding in a smaller number of institutions. The RCs' decision to concentrate their investments in large-scale, world-class centres is seen as drawing funding

[34] House of Lords Science and Technology Committee (2013) *Higher Education in Science, Technology, Engineering and Mathematics (STEM) subjects*; Higher Education Academy (2013) *PRES 2013: results from the Postgraduate Research Experience Survey*
[35] See, for example, EPSRC's mid-term review of CDTs
[36] See, for example, EPSRC (2008) *Review of the Doctoral Training account mechanism*

opportunities away from small pockets of excellence in doctoral training, and may have significant consequences for the sustainability of provision of PGR education in these institutions.

3: Implications for research and postgraduate research training in UK universities

The trends described in the previous two sections are already having an impact on the way higher education institutions organise and manage research and postgraduate training provision. Most importantly, they are likely to have a deeper long-term effect on the vitality and sustainability of the domestic research base. Drawing on the analytical work presented in sections 1 and 2, section 3 discusses the main implications of these trends and patterns for higher education institutions.

3.1 Research funding

The excellence of the UK research base can only be sustained if backed by an ambitious plan for increasing public R&D investment.

As highlighted in this report, the UK is a world leader in research quality and productivity, and has a well-rounded portfolio of research expertise. Nevertheless, the recent stagnation in investment in domestic R&D, combined with the intensification of international competition, threatens to make the UK's current standing as a leading research power less sustainable in the future.

Investment in R&D is at the heart of the success of all high-value, high-growth economies. A recent report by the UK-Innovation Research Centre suggests that a one-off increase in public research funding of 5% (roughly £450 million) leads to a permanent increase in private sector productivity of £90 million per year, which has a present discounted value of £1.8 billion.[37]

We recognise the tight fiscal conditions confronting government at present. However, we also believe that a failure to reverse the current decline in public funding for research would jeopardise the UK's status as global research power and represent a missed opportunity to provide a boost to the economy. The UK invests much less in research, from public sources, than other countries across the OECD. Therefore, there is a strong need for an increase in UK public investment in R&D.

As this report has shown, the higher education sector is a key player in the domestic research base. Its ability to produce ground-breaking research is an essential driver of innovation and growth in the rest of the economy. Nevertheless, the fiscal constraints of the last few years have made the research funding environment confronting universities more challenging. Thanks to sound financial management and a highly productive research base,

[37] UK-Innovation Research Centre (2014) *The Economic significance of the UK Science Base*, a report for the Campaign for Science and Engineering

universities have been able to absorb a real terms decline in research funding without compromising their standards of excellence in research. However, there is a growing concern that further reductions in public research funding will result in an erosion of their research capacity. Raising public investment in R&D and maintaining the science and research budget ring fence in the future would provide an important signal of the importance of supporting the higher education's role in the UK's research base.

The dual support system for research funding and the independent assessment of research remain key to the health and dynamism of the research base.

The strength of the higher education research base can only be ensured through sustained public investment in R&D. At the same time, it also depends crucially on the appropriateness of the guiding principles by which government measures research excellence and organises and allocates funding to university-based research. The dual support system has proven to be an effective way to fund research; we believe that this remains the most appropriate principle for organising research funding, and that the current split of funding between the higher education funding councils and the RCs ensures an adequate balance between supporting specific research projects or programmes of strategic importance and guaranteeing institutional autonomy and long-term research planning. Likewise, given the success of the RAE in promoting excellence, we remain supportive of the principle of independent, impartial assessment of research as the most appropriate approach for allocating mainstream QR funding.

The impact of future research policies on the concentration of funding across the sector should be carefully assessed and monitored.

It will be important for policies that affect the concentration of funding across institutions to consider the impact on the UK's ability to support excellence as well as nurture the world-class departments of tomorrow and the sustainability of the research base over time. The health and dynamism of UK research depends largely on higher education institutions retaining their ability to train and support talented researchers, undertake ground-breaking research, maintain a world-class research environment and invest flexibly in strategic research priorities. A 'departmental clusters' approach to allocating funding (as opposed to the departmental approach currently used) may help ensure that areas of excellence are not overlooked. However, the potential risks for the research base entailed by increasing concentration of funding need to be carefully monitored and evaluated. In particular, concerns have been raised about the decisive shift in funding approaches by some RCs towards limiting participation in some competitions to 'majority funding' recipients. This helps reduce administrative overhead costs, but also makes it more difficult to create the level playing field that is needed to make the research base thrive.

Research collaborations across institutions and across sectors should be further encouraged and incentivised, and any barriers should be identified and removed.

Universities are increasingly engaged in research collaborations with the charity and business sectors. The charity and business support elements of QR funding are a key

financial source underpinning these relationships, without which the current level of engagement would not be sustainable. Therefore, they should be maintained to continue fostering research impact and cross-sector collaboration. The role played by mainstream QR in enabling these interactions should also be recognised; it is only through a combination of funding approaches that universities will be able to maintain the funding capacity necessary to address the economic and societal challenges that form the basis of these relationships. At the same time, research[38] suggests that the economy would greatly benefit from measures that stimulate demand for R&D from businesses and charities, both of which spend considerably less than their counterparts in most of the UK's main international competitors (even after adjusting for industrial structure).

Furthermore, over the last few years, universities have also shown a greater propensity to engage in multi-institutional collaborations, which enable them to share research expertise and access to facilities. Because of the recent funding restraints, partnership working has turned from a welcome development to an absolute necessity for many institutions. In recognition of the contribution of these collaborations to the vitality, efficiency and sustainability of the research base, it is important to ensure that they are further encouraged and that the funding mechanisms currently in place do not create barriers to engagement.

3.2 Postgraduate research training

Prospective PGR students with the ability and motivation to undertake doctoral programmes should be provided with opportunities to seek financial support.

PGR students are crucial to the strength of the UK's world-leading research base, which delivers far-reaching benefits to the wider economy and society. They are also a key part of the future highly-skilled workforce, increasing the absorptive capacity of UK firms (ie their ability to recognise, assimilate, apply and exploit external knowledge) and becoming the researchers who make the major breakthroughs of tomorrow.

Beyond its positive economic and societal impacts, PGR training also generates substantial benefits for the individual. This makes it reasonable for PGR students without access to suitable funding opportunities to contribute, in some part, towards the cost of their study. However, to ensure maximum economic and societal impact, it is fundamental that students with the ability and motivation to undertake PGR study are provided with opportunities to seek financial support.

Ensuring the availability of RC-funded opportunities is essential to allow talented UK students to overcome financial barriers. By contrast, a persistent decline in RC studentships may further depress demand for PGR training, affecting the supply of doctoral graduates in research areas that are pivotal to the success of the UK research base and the economy.

[38] Department for Business, Innovation and Skills (2014) *Insights from international benchmarking of the UK science and innovation system*, a report by Tera Allas

Furthermore, it will be important to monitor whether changes in the undergraduate and postgraduate taught fee regimes have a knock-on effect on the number of students wishing to undertake PGR training, recognising that the relative impact of each may vary depending on the standard academic progression that students are expected to undertake in a specific discipline. Students in STEM are more likely to make a direct transition from undergraduate study to PGR training, while students in AHSS tend to undertake PGT study prior to joining doctoral programmes; any future evaluation of the impact of changes in undergraduate and postgraduate fee regimes on demand for PGR training should take these differences into account.

High-quality PGR provision needs to be built on sustainable foundations.

Despite the decline in public funding from the RCs, demand for PGR study has held up well for a number of years and UK universities have been able to preserve their role as high-quality providers of PhD graduates on a global scale. However, the stagnation in student numbers seen in the last academic year may be a sign that demand for PGR study is slowing down and may settle on a path of decline over the next few years, particularly if funding opportunities from the RCs continue to shrink and if demand for PGT qualifications continues to weaken.

The growing demand observed until the 2011–12 academic year has been underpinned by a strong rise in PGR student numbers from overseas and a commitment by institutions to invest their own resources in PGR scholarships that would otherwise have been cut. While the growth in international students is to be welcomed, we are concerned that, as the student statistics from the 2012–13 academic year would suggest, this approach to supporting demand is unlikely to be sustainable in the long term. Demand for doctoral training may start reducing more sharply if government investment continues to decline, with adverse consequences for the skills ambitions of the UK as well as the sustainability of high-quality PGR provision across the sector.

A further important factor behind the sustainability of high-quality PGR provision is the ability of institutions to meet the costs associated with training doctoral students in different subjects. In particular, the extent to which the allocation method for the RDP supervision fund reflects each institution's subject mix has a strong impact on this.

Public funding needs to recognise the importance of maintaining the excellence, diversity and sustainability of the UK's research doctoral training system.

The competition to attract the top PGR students and researchers is increasingly global. To compete effectively, the UK higher education sector needs to cultivate its strengths, which lie in the diversity, excellence and long-term sustainability of the domestic research environment. Public funding for PGR provision should reward excellence, but should also be sufficiently flexible to ensure that high-quality provision is sustained in the longer term.

Public funding needs to recognise not only excellence in provision today, but ensure that the overall funding environment for PGR remains competitive to support excellence in the

future. The evidence suggests that mechanisms such as the DTP and CDT funding models have helped raise the quality of training; provide students with better access to world-class research facilities, resources and expertise; and promote collaboration across institutions and across sectors. However, it should also be recognised that those institutions that failed to secure funding under the new models may face significant challenges in funding provision – possibly affecting their future ability to compete for funding, and the dynamism of the UK research base as a whole.

Another aspect of the DTP and CDT models that will require further consideration is the financial pressures and risks associated with taking part in these bids, and the impact that these have on the long-term planning and sustainability of doctoral training provision. To be eligible to bid, institutions must commit to match-funding a minimum number of scholarships, a requirement which may or may not materialise in the medium term depending on the outcome of their bid. This increases the uncertainty and risks deriving from doctoral training provision, and may prevent some high-quality research centres from applying. We believe that, to continue fostering the excellence of the domestic doctoral training system, it is essential to ensure that the allocation of DTPs and CDTs is made on a level playing field and that the ability of institutions to participate in bids to become DTPs and CDTs reflects their research expertise and is not hindered by a high degree of financial risk.

4: Conclusion

This report has identified and discussed a number of key trends in research and PGR training funding and how they could potentially impact on the funding environment for institutions. It has argued that, although UK universities start from a position of strength in research and PGR training, this can only be maintained with the support of a proportionate, adequately resourced and sustainable public funding system which rewards their excellence but also allows them to nurture the world-class researchers of tomorrow. The benefits of a strong research base are long-lasting and flow throughout the economy and society, fostering economic growth and advancing social objectives. Given the importance of research in enabling the UK to achieve its economic and social ambitions, it is crucial that government takes a long-term strategic perspective on policy and investment in this area.

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