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Foreword

The UK's research base is vital to our economy. Research undertaken by the UK's universities supports small and large businesses, develops the skills needed for a 21st century workforce, attracts international investment and improves our quality of life through better public policy and services.

At a time of economic recovery and public sector efficiency drives and reform, the research undertaken in universities has become even more crucial. Investment in research needs to provide returns through generating economic growth and by providing the innovative ideas required to meet the global challenges of the modern world.

This importance was recognised in the relative protection of the science and research budget in the October 2010 Comprehensive Spending Review. The £4.6 billion per annum settlement for science and research protects the budget in 'cash terms' although savings of £324 million will need to be found within this each year. It is clear that this much-vaunted ring-fencing of the research budget does mean a 'real terms' cut of around 10 per cent taking into account inflation. However, in the context of a CSR that set out £83 billion of cuts, research funding fared comparatively well.

For universities and researchers, it is time to prove they were right to argue for the protection of the investment that will secure Britain's future economic growth. For the Government, it is now more important than ever that they make the right decisions when choosing how to prioritise research spending. It is therefore disappointing that Ministers gave an early indication that they would further concentrate research funding. In their letter to the Higher Education Funding Council for England (Hefce) in December 2010, Vince Cable MP, Secretary of State for Business, Innovation and Skills and David Willetts MP, Minister for Universities and Science, indicated that 2* research should no longer receive quality-related (QR) funding. This will remove funding from research that has been recognised internationally in terms of originality, significance and rigour.

It is difficult to see how this will achieve the Government's objectives of promoting innovation and regional and national growth.

The 2008 Research Assessment Exercise (RAE) demonstrated, without a doubt, that world-leading and internationally excellent research takes place across all our universities. It also demonstrated that there is no clear relationship between the size of an academic research team and the excellence of the outputs they produce. This may have surprised some but it clearly underlines the expansion in research capability and excellence achieved by modern universities in spite of funding regimes that have continued to favour older and larger research departments and universities.

At the very time that the Government is seeking to open up undergraduate teaching to a 'market', there is a real risk that research funding may become even more of a 'closed shop' with a further loss of the competition and dynamism that is a feature of other countries' research funding regimes. The acceptance of arguments that prioritise funding for large departments with a so-called 'critical mass' of research will put at risk the huge diversity of the UK's research base as well as smaller and very high quality departments. It is also likely to involve the transfer of research funding to the South and East of England at the very time that regional economies elsewhere require greater stimulus.

"The Government should recognise the value of the quality outputs and the productivity of modern universities and enhance their research funding."

The possibility that research and doctoral funding will also be increasingly concentrated will further jeopardise opportunities for the next generation of researchers and those universities that have been 'fleet of foot' in identifying new curriculum areas, support a more representative postgraduate student population and which, pound for pound, are more productive in their delivery of postgraduate provision.

In many respects the success of modern university research has been 'against the odds' bearing in mind the agenda of research concentration which has dominated funding regimes for 20 years. When value for money is more important than ever, *Research that Matters* provides Government and the funding councils with the evidence that funding research in modern universities delivers greater leverage, more diversity in terms of students and disciplines, boosts the international UK higher education market, adds value to business and meets the needs of civil society. There has never been a better time for Government to recognise the value of the quality outputs and the productivity of modern universities and to enhance their research funding.

Professor Les Ebdon CBE
Chair

Pam Tatlow
Chief Executive

Key Findings

Academic research plays an essential role in the economy and society: Research that seeks to expand the frontiers of knowledge can lead to new scientific discoveries, new historical insights and new ways of living and working. Research that seeks to answer specific questions plays a key role in generating new ideas, solving problems, raising the public stock of knowledge, creating wealth and improving quality of life outcomes in the UK and abroad. The strength of the UK's research base is widely acknowledged.

For universities the benefits of academic research are myriad: Research is a key factor in attracting, retaining and developing the skills of academic staff; it contributes to the quality of teaching and scholarship on university courses; it informs the development of graduate skills such as creative thinking and problem solving; it creates opportunities for partnerships with businesses, not-for-profit organisations and other universities; and it helps universities build and cement their reputations.

Research funding in the UK is very highly concentrated at present and there have been calls to further increase the concentration of research funding: In 2008-09 more than half (50.4 per cent) of all funding council (QR) and research council funding was awarded to just 12 universities and more than three quarters (75.4 per cent) was awarded to just 28 higher education institutions[1] but the concentration of funding has not produced the intended results.

Research excellence is found everywhere: For universities old and modern, research prowess in particular subjects or disciplines remains paramount. The 2008 Research Assessment Exercise proved conclusively that research recognised internationally in terms of originality, significance and rigour is not the exclusive preserve of so-called 'research intensive' universities. A diverse array of subject groups at a diverse array of universities produce research that has been recognised as world-leading and internationally excellent and there is no case to further increase the concentration of research funding in the UK.

Research across a wide spectrum of academic disciplines remains fundamental to the UK: Modern universities frequently have different, complementary research foci to more traditional institutions and demonstrate a balanced commitment to achieving excellence in both research and the teaching that this research informs.

Modern universities leverage more investment from quality-related research and research council funding: For every £1 spent on university research by the higher education funding councils in 2008-09, modern universities leveraged £2.91 from other sources compared to £2.17 leveraged by Russell Group universities and £1.77 leveraged by 1994 Group universities. For every £1 of research council funding, modern universities leveraged £0.32 from UK industry, commerce and public corporations compared to £0.19 by other institutions.

Research links between modern universities, business and SMEs are particularly strong: 60 per cent of all contract research and consultancy contracts for SMEs are provided by modern universities. These universities also supported 67 per cent of all graduate start-ups in 2007-08, many linked to institutional research specialisms.

Modern universities are developing the researchers of the future: 37 per cent of all postgraduate students studying in the UK study at modern universities. Without modern universities the research capacity needed to secure the future of UK plc will be at risk. Modern universities attract the broadest spectrum of students and support 48 per cent of all part-time postgraduates, 75 per cent of postgraduates over 25 years of age, 38 per cent of all postgraduate students from BAME backgrounds and 9.5 per cent of all international doctoral students.

For the very modest amounts of research funding that they have received, modern universities have provided excellent returns for the economy, society and the Exchequer: Rather than a policy of increased concentration, investment in modern university research should be enhanced.

[1] HESA Resources of HEIs 2008-09.

Research Matters

Why is academic research important?
The strength of the UK research base is widely acknowledged. There are however a number of misconceptions about academic research in the UK. In particular there is a misplaced belief that academic research is the sole preserve of 'research intensive' universities.

Research funding in the UK is heavily concentrated in a small number of higher education institutions but research across a wide spectrum of academic disciplines remains fundamental to the existence of all UK universities. Modern universities frequently have different, complementary research foci to more traditional institutions and demonstrate a balanced commitment to achieving excellence in both research and the teaching that this research informs.

For universities old and new, research prowess in particular subjects or disciplines remains paramount. Research in any academic discipline is a complex and uncertain process that often involves a number of different individuals, institutions and sources of funding and frequently produces unpredictable outcomes or has unexpected applications. Yet the benefits of academic research are myriad: research is a key factor in attracting, retaining and developing the skills of academic staff; it contributes to the quality of teaching and scholarship on university courses; it informs the development of graduate skills such as creative thinking and problem solving; it creates opportunities for partnerships with other domestic and international universities, businesses and not-for-profit organisations; and it helps universities build and cement their reputations.

The benefits of academic research extend far beyond universities themselves. Since the publication of the 1993 White Paper, *Realising Our Potential*, academic research has been widely recognised as playing an essential role in the economy and society. Pure or basic research that seeks to expand the frontiers of knowledge can lead to new scientific discoveries, new historical insights and new ways of living and working. Research that seeks to answer specific questions plays a key role in generating new ideas, solving problems, raising the public stock of knowledge, creating wealth and improving quality of life outcomes in the UK and further afield. A strong research culture within universities is vital because it means that teaching and learning take place in an environment that is enquiry-led. This will be of growing importance as the UK continues to shift towards a more knowledge-based economy with an even greater emphasis on critical thinking and the ability to solve complex problems.

Over time there has been an increasing government emphasis on the links between university research and the innovation and economic growth agendas, and the importance of collaboration between universities and businesses. Research is not always commercially exploitable in the short term but often has the potential to generate new products, services and commercial revenues over a longer timeframe. As set out in this report, there is already a significant degree of interaction between academic researchers and businesses but increasing this level of activity is seen as a way of increasing innovation and business and employment growth.

The importance of public investment in research has been recognised by the Coalition Government. Citing the links between academic research and long-term economic growth, the Chancellor announced in the October 2010 Comprehensive Spending Review that the science and research budget would be protected in cash terms at £4.6 billion per annum, albeit with £324 million worth of efficiency savings per year by 2014-15. However, the Government also intends to increase research concentration and to reform the Higher Education Innovation Fund in order to enhance the incentives for commercial interaction between universities and businesses.

How is academic research funded?

Universities in the UK receive funding for research via a dual-funding system. The first strand of research funding is core or quality-related (QR) research funding, distributed via block grants from the relevant funding council – the Higher Education Funding Council for England (Hefce), the Higher Education Funding Council for Wales (HEFCW), the Scottish Funding Council or the Department for Education and Learning in Northern Ireland – to fund research quality and infrastructure. The second strand of funding for research is distributed competitively via seven research councils, in line with relevant thematic priorities.[2] Both strands of the dual-funding system for research are entirely separate from the distribution of funding to support teaching which is currently allocated by the funding councils via a separate block grant.

Core or QR funding for research is allocated on the basis of universities' results in the Research Assessment Exercise or RAE. The RAE, which grades the quality of university research during this period across a number of subject areas, is undertaken jointly by all four higher education funding bodies in the UK approximately every five years. The most recent RAE results were published in 2008.

In 2007 the previous Labour Government announced that a new method of assessing research quality would be developed following the 2008 RAE. This new assessment, known as the Research Excellence Framework or REF, is intended to improve on the current RAE system and to measure more clearly the societal benefits of university research. The first REF assessment is currently scheduled to be held in 2014.[3]

The current QR budget is allocated on the scores institutions received in the 2008 RAE which graded research at five levels:[4]

4*	Quality that is world-leading in terms of originality, significance and rigour
3*	Quality that is internationally-excellent in terms of originality, significance and rigour but which nonetheless falls short of the highest standards of excellence
2*	Quality that is recognised internationally in terms of originality, significance and rigour
1*	Quality that is recognised nationally in terms of originality, significance and rigour
Unclassified	Quality that falls below the standard of nationally recognised work or work which does not meet the published definition of research for the purposes of this assessment

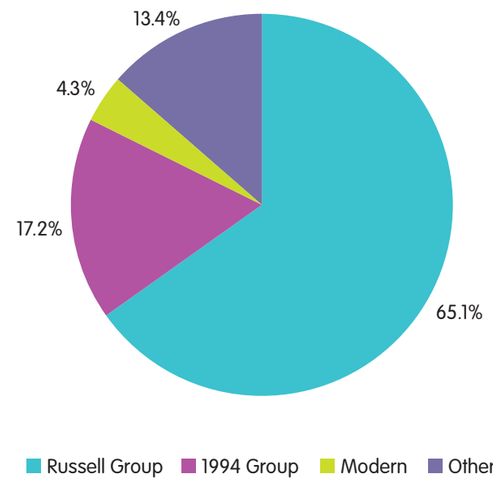
[2] The seven UK research councils are Arts and Humanities Research Council (AHRC), Biotechnology and Biological Sciences Research Council (BBSRC), Engineering and Physical Sciences Research Council (EPSRC), Economic and Social Research Council (ESRC), Medical Research Council (MRC), Natural Environment Research Council (NERC) and Science and Technology Facilities Council (STFC).

[3] http://www.timeshighereducation.co.uk/story.asp?sectioncode=26&storycode=412384&c=1.

[4] Taken from the RAE2008 Website: http://www.rae.ac.uk/results/intro.aspx.

[5] HESA Resources of HEIs 2008-09.

Figure 1: QR and Research Council Funding Allocations (2008/09)



At present research funding in the UK is very highly concentrated. In 2008-09 more than half (50.4 per cent) of all funding council (QR) and research council funding was awarded to just 12 universities and more than three quarters (75.4 per cent) was awarded to just 28 higher education institutions[5]. The overwhelming concentration of public research funding can clearly be seen in Figure 1.

There have been calls from some to further increase the concentration of research funding within a small number of higher education institutions. Proponents of greater concentration[6] tend to focus on the notion of a 'critical mass' of researchers, funding and research activity as preconditions of research excellence. Research in departments and universities that have obtained a level of critical mass is assumed to be excellent, whilst research that takes place without it is assumed to be mediocre.

Yet contrary to these arguments the evidence suggests that extreme concentration of research funding is not the optimum situation for the United Kingdom.

> Research excellence is widely distributed across higher education institutions and not confined to the institutions that receive the greatest quantities of funding – which implies that the concentration of funding is not having the intended results.
> Maintaining public investment in a diverse array of departments and institutions is important because proximity facilitates the development of research partnerships between universities, businesses and public and third sector organisations.
> Universities that receive less research funding are very effective in using this as a platform to undertake collaborative research with businesses and not-for-profit organisations.
> A diverse research base enhances flexibility and dynamism and enhances the ability of universities to respond to new challenges and opportunities and develop research in new and emerging disciplines and markets.

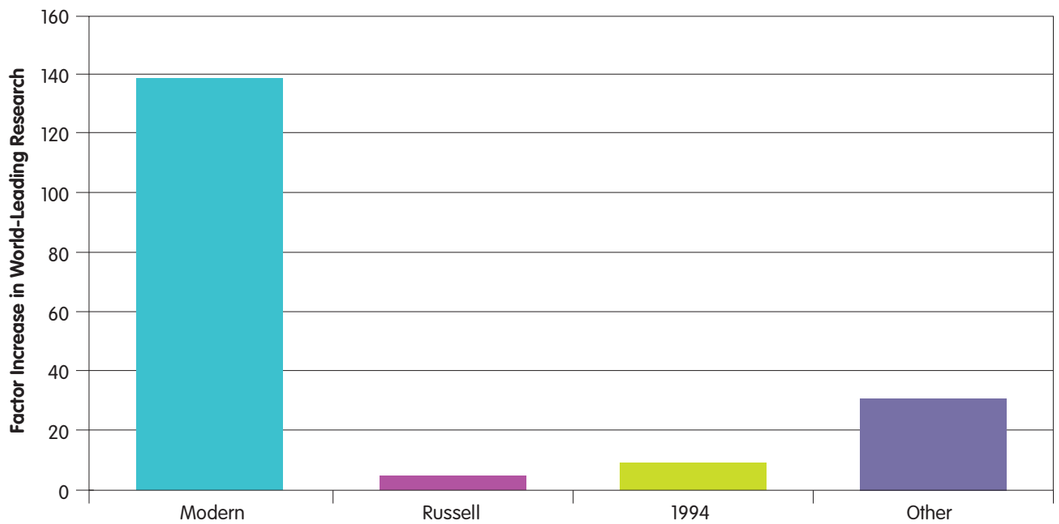
[6] See for instance:
Russell Group (2010) *The concentration of research funding in the UK: driving excellence and competing globally* http://www.russellgroup.ac.uk/uploads/Concentration-of-research-funding.pdf.

Wellings, P. *Intellectual Property and Research Benefits* http://www.bis.gov.uk/policies/higher-education-debate.

Thrift, N. *Research Careers in the UK: A Review* http://www.bis.gov.uk/policies/higher-education-debate.

Arthur, M (2009) *Focus Research Cash or Mediocrity Awaits* Times Higher Education 22 October 2009 http://www.timeshighereducation.co.uk/story.asp?storycode=408770.

Figure 2: Factor increase in the number of units of assessment carrying out world-leading research between 2001 and 2008



Research Excellence is Found Everywhere

Whilst research funding is highly concentrated, research excellence is found everywhere. In the 2008 Research Assessment Exercise – the most recent and comprehensive assessment of university research quality in the UK – at least 5 per cent of the submissions of 150 out of the 159 higher education institutions that participated were judged to be of world-leading quality. Within the 62 modern universities, the research of more than 400 subject groups was recognised as world-leading, whilst a further 663 subject areas in modern universities were judged to be carrying out internationally-excellent research.

This represents an outstanding and progressive enhancement of research excellence within modern universities. In the 2001 Research Assessment Exercise only three modern universities were carrying out world-leading research.[7] A further 40 subject areas, across 20 modern universities, were carrying out internationally-excellent research. The magnitude of this improvement in world-leading research is clearly shown in Figure 2.

Contrary to theories around critical mass, the 2008 RAE also demonstrates that there is no clear relationship between the size of an academic research team and the excellence of the outputs they produce. In the RAE 60 per cent of research by the 3.5 full-time equivalent (FTE) History researchers at Anglia Ruskin University was deemed world leading and internationally excellent; so too was 60 per cent of General Engineering related research by 17.06 FTE researchers at London South Bank University, 60 per cent of Art and Design research by 34.50 FTE researchers at Birmingham City University, 60 per cent of Physics research by 69.50 FTE researchers at the University of Durham and 60 per cent of Biological Sciences research by 213.69 FTE Biological Sciences researchers at the University of Cambridge.

The findings of the 2008 RAE further enhance the argument that modern universities produce a diversity of excellence in specialist areas which results in a wide distribution of QR funding for research graded "internationally-excellent" or "world-leading". A large number of modern universities exhibited excellent performance in the RAE 2008, despite having small to medium sized research groups. For instance in Drama, Dance and Performing Arts 55 per cent of Roehampton University's subject area were carrying out research at a world-leading standard.

Research by the Higher Education Policy Institute using an alternative measure of international excellence in research further reinforces the idea that high quality research is widely distributed across the higher education sector.[8] Based on analysis of citations of UK authored articles in the Thomson Reuters database,[9] the HEPI research identifies good research throughout the system and points to the existence of 'archipelagos of excellence' and 'a curve of relative excellence' across all types of higher education institution.

"Concentrating support into ever fewer, larger research groups does not provide the best return on public investment."

In addition, the findings of a study carried out by Dr Ralph Kenna at Coventry University and Professor Bertrand Berche at Nancy Université in France suggest that, whilst critical mass is important with respect to research groups in any discipline, research quality does not improve significantly above an upper threshold of critical mass. The Kenna and Berche research analysed the quality assessments taken from the UK's RAE 2008 and its French equivalent[10] and developed a mathematical model that posits interactions between researchers as the key drivers of quality. In addition to a lower critical mass below which research groups are unstable, the model predicts an *upper* threshold of critical mass, defined as the "maximum number of colleagues with whom a researcher can communicate meaningfully", beyond which research quality does not improve significantly with greater numbers of researchers. They found that optimum research group size varies between subject disciplines, with lower critical masses ranging from 15 researchers in Law and Geography research groups to three for Foreign Languages and about two for Pure Mathematics. They also confirmed a law of diminishing returns beyond an upper threshold of critical mass which clearly suggests that concentrating support into ever fewer, larger research groups does not provide the best return on public investment.

The Importance of Proximity

Research prowess, then, is not the exclusive preserve of so-called 'research intensive' universities. A diverse array of subject groups at a diverse array of institutions produce research that is world-leading and internationally excellent.

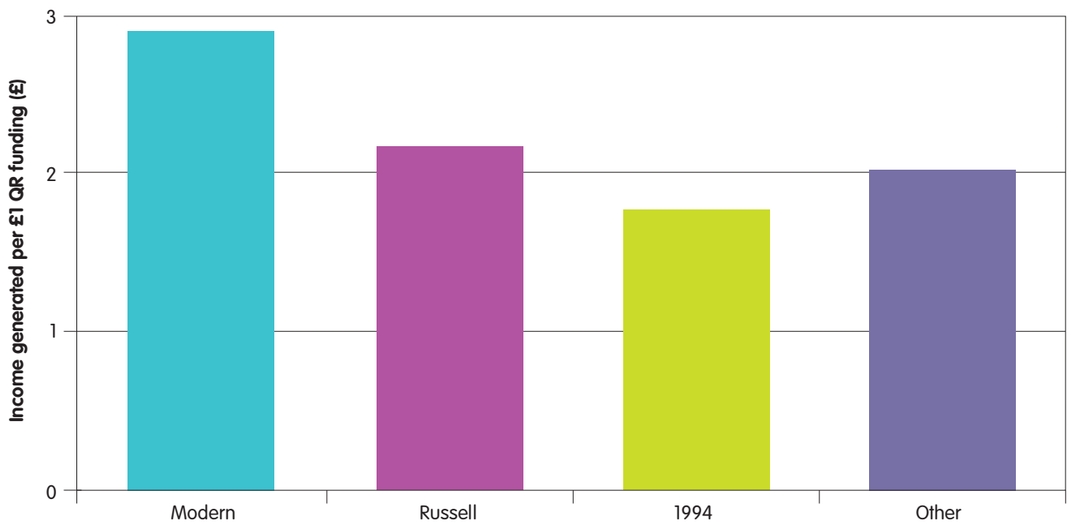
[7] In RAE 2001 research that was deemed to be world-leading was classified as 5* and internationally-excellent research was classified as 5. In RAE 2008 world-leading research was classified as 4* and internationally-excellent research was classified as 3*.

[8] Citations do not directly measure research excellence and are skewed towards STEM rather than the arts, humanities and social sciences. HEPI account for these factors by comparing observed citation counts with the global average for an article in that year and field of publication, and focusing on the distribution of more and less well cited articles.

[9] Adams, J & Gurtney, K (2010) *Funding selectivity, concentration and excellence – how good is the UK's research?* Higher Education Policy Institute.

[10] The papers are published in *Europhysics Letters* 90 (2010) 58002 and *Scientometrics* (7 September 2010), pp. 1-14 http://arxiv.org/abs/1004.3155; http://arxiv.org/abs/1006.0928.

Figure 3: Additional income generated per £1 received from Quality Related funding (2008/09)



This, in and of itself, provides a clear rationale for continuing to fund research at a diverse array of institutions. Yet there are also other reasons to do so, not least the importance of proximity in the creation, maintenance and success of research partnerships between universities and other organisations. The significance of proximity to the development of relationships and collaborative partnerships between university research departments and businesses was repeatedly highlighted in the 2003 Lambert Review[11] and it remains a critical factor despite the growth and spread of high speed communications networks.

As Richard Lambert highlighted, small and medium sized businesses in particular frequently do not have the capacity to identify relevant expertise at distant universities. Where they do, they often find it difficult to sustain informal networks and formal partnerships over long distances. Large businesses also often find it more convenient and more rewarding to work with researchers from nearby universities.

Collaborative research partnerships are recognised as vital to innovation, economic growth and the future success of the United Kingdom[12]. It is therefore vital that businesses of all sizes continue to have access to research departments with specific and relevant expertise that are located within reasonable distance from the business itself. This necessitates a broad distribution of research funds among higher education institutions based on the quality of research outputs. To echo Richard Lambert, the cause of collaboration between universities and businesses, vital as it is to the development and commercialisation of new ideas, would not be well served by the further concentration of research funding.

[11] HM Treasury (2003) *Lambert Review of Business-University Collaboration.*

[12] H Hauser (2010) *The Current and Future Role of Technology and Innovation Centres in the UK.*

"Modern universities leverage much more investment from quality-related research funding."

Leverage and Value for Money

Modern universities receive very modest quantities of public research funding but what little investment they are currently awarded provides a vital structure and platform from which these institutions can seek and bid for research grants and contracts from a diverse range of alternative sources. Commissioned or competitively won university research differs markedly in the sense that it is procured on the basis of needs and requirements that are often specific to the commissioning organisation and it therefore may not lend itself to publication in quite the same way as publically funded research. It is nonetheless a vital component of the UK's research base and modern universities successfully use quality-related research funding to leverage research funding from other sources.

In fact modern universities leverage comparatively more investment from quality-related research funding than either the Russell Group or the 1994 Group. Echoing the findings of 2005 report by Arthur D Little,[13] Figure 3 shows that for every £1 spent on university research by the higher education funding councils in 2008-9, modern universities leveraged £2.91 from other sources of research funding. This compared to only £2.17 leveraged by the Russell Group universities and £1.77 leveraged by the 1994 Group universities. In other words, the public investment that modern universities receive is made to work harder.

Responsiveness and Dynamism

The third core reason to resist concentrating research funding even further relates to the need for a diverse research base to enhance the responsiveness and dynamism of higher education institutions. A recent report by Universities UK[14] drew attention to the role of diversity in the research base in enhancing the capacity of departments and institutions to respond to new opportunities and unforeseen circumstances. Whilst specialisation and resource concentration can provide short-term boosts to performance in a few select areas, this is not always sustained as priorities shift. Universities UK argue that the UK's research base is characterised by a high degree of diversity and that it is this diversity that has helped to sustain competitiveness and dynamism with the higher education sector and the UK as a whole. Since new opportunities and new challenges often arise from unforeseeable events, the need to maintain a diverse research base remains paramount.

There is No Case to Further Increase the Concentration of Research Funding

There is a clear argument for the UK and its universities to retain and improve its research diversity and flexibility. Whilst it appears that there is a lower limit for concentrating research activity there is also an upper limit beyond which research quality does not significantly improve, directly contradicting the assumption that ever-increasing concentrations of research funding and therefore research activity will lead to increased excellence.

Research by modern universities is not as well funded but these universities undertake research across a diverse range of academic disciplines that helps to generate new ideas, solve problems, increase the public stock of knowledge, create wealth, improve quality of life outcomes and develop the researchers of the future. The research outputs of modern universities comprise an important and essential part of the UK's research base and this report highlights the wide ranging impacts of some of the research that modern universities have recently undertaken.

[13] Arthur D Little (2005) *The Social and Economic Impact of Publicly Funded Research in 35 Participating Universities.*

[14] Universities UK (2010) *The Future of Research* http://www.universitiesuk.ac.uk/Publications/Documents/TheFutureOfResearch.pdf.

Modern Universities and Research That Matters

Modern University Research Drives Business Innovation and Growth

The United Kingdom has an enviable position as a global leader in research and innovation and punches well above its weight internationally, ranking second only to the USA in traditional research metrics such as citations of academic research papers.[15]

In recent years there has been growing emphasis on collaboration between university research departments and businesses at both government and institutional level. For government, higher levels of collaboration between academic researchers and businesses are seen as means of increasing the commercial exploitation of academic research and bolstering long-term rates of innovation and economic growth in the United Kingdom[16]. To this end the October 2010 Comprehensive Spending Review announced £200 million of funding for the creation of a series of national technology and innovation centres, to be managed by the Technology Strategy Board, that will work in partnership with universities and businesses to commercialise the results of research in specific areas with significant market potential.[17]

For universities, developing links with businesses and undertaking research collaboratively is a way of expanding research horizons and increasing the impact and applications of the research they undertake. Modern universities, such as the University of Greenwich, already have strong connections with industry, having developed their own distinct research missions and as universities are focused on transferring the benefits of their research into the real world.

University of Greenwich and the Powder Flowability Tester

It is common for powdery materials to form blockages in industrial machinery leading to the loss of valuable manufacturing time. However, collaboration between the Wolfson Centre for Bulk Solids Handling Technology at the University of Greenwich and a number of industrial partners including Cadbury's, United Biscuits, Kerry Ingredients, Glaxo-SmithKline and Brookfield has produced a new instrument which has the potential to transform the processing of everyday powdered products, such as foods and pharmaceuticals. The Powder Flowability Tester, which is about the size of a domestic coffee maker, assesses how well powders will flow through factory hoppers, chutes, feeders, blenders and other processing machinery. The Powder Flowability Tester has the potential to reduce costs in the manufacture of foods, cosmetics, pharmaceuticals, minerals and many other products. It went on sale worldwide in January 2010.

Modern universities are very successful in leveraging the small amounts of public research funding that they are awarded to obtain research grants and contracts from business and industry. As highlighted in Figure 4, for every £1 of funding from the research councils, modern universities leveraged £0.32 from UK industry, commerce and public corporations in 2008-09 compared to £0.19 leveraged by other universities.

Modern universities play a pivotal role in undertaking commercially focussed research that helps drive industrial innovation and business growth and providing research commercialisation assistance through knowledge transfer mechanisms such as Knowledge

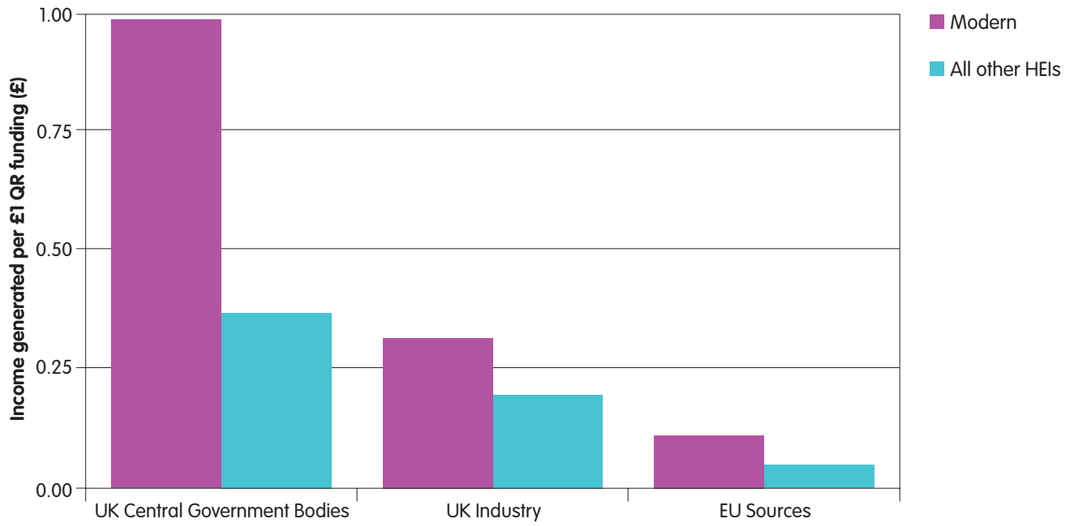
[15] Universities UK (2010) *The Future of Research.*

[16] See for instance Dyson. J (2010) *Ingenious Britain: Making the UK the Leading High-Tech Exporter in Europe* March.

[17] Technology Strategy Board (2011) *Technology and Innovation Centres Prospectus: Maximising the Commercial Impact of UK R&D.*

"Modern universities provided 60% of all contract research and consultancy contracts to SMEs in 2007-08."

Figure 4: Additional income generated from UK government, UK industry and EU sources per £1 received from Quality Related funding (2008/09)



Transfer Partnerships (KTPs). Knowledge Transfer Partnerships are a UK-wide programme enabling businesses to improve their competitiveness, productivity and performance with the help of universities and their graduates. For businesses, the average benefits achieved by a single KTP include an increase of over £220,000 in annual profits before tax, the creation of three new jobs and an increase in the skills of existing staff.

There are myriad examples of commercially successful research collaborations between modern universities and businesses of all sizes and all across all sectors of the economy, for instance between the University of Sunderland and BP and Martechnic and the University of the West of Scotland and Variable Message Signs Ltd (see overleaf).

In 2007-08 modern universities carried out nearly 34,000 collaborative research, contract research and consultancy contracts (30 per cent of all reported contracts) with external organisations[18] as shown in Figure 5 (see overleaf). Links between modern universities and small and medium sized enterprises are particularly strong with modern universities providing 60 per cent of all contract research and consultancy contracts to SMEs in 2007-08.

Research, collaboration and innovation are vital for the future prospects of the UK. Modern universities have developed strong links with industry and undertake research in a wide array of disciplines.

[18] Data source: HEBCI 2007-08.

University of Sunderland: POSSEIDON – Progressive Oil Sensor System for Extended IDentification ONline

Lube oil is a critical shipping fluid and any reduction in oil quality leaves the vessel, its cargo and crew at the mercy of hostile operating conditions. However, precise analysis of engine lube oil can only be performed on-shore leaving operators with extended periods of time when oil quality is not accurately known. The University of Sunderland worked with BP and Martechnic to solve the problem by developing the *Posseidon* system which continuously monitors the ship's lubrication system via a sensor-based processing unit attached to the ship's main engine. A bespoke software programme also monitors the oil and provides a traffic light warning system, informing crews of potential problems and suggested solutions.

The research will extend the life of shipping engines, avoid loss of performance and prevent catastrophic failures such as a ship floundering through loss of propulsion or a power blackout. The technology also has major environmental and ecological benefits in reducing the risk of oil spills at sea if a ship breaks down. The system has reduced the potential losses to shipping companies caused by interrupting a ship's service, which can be crippling.

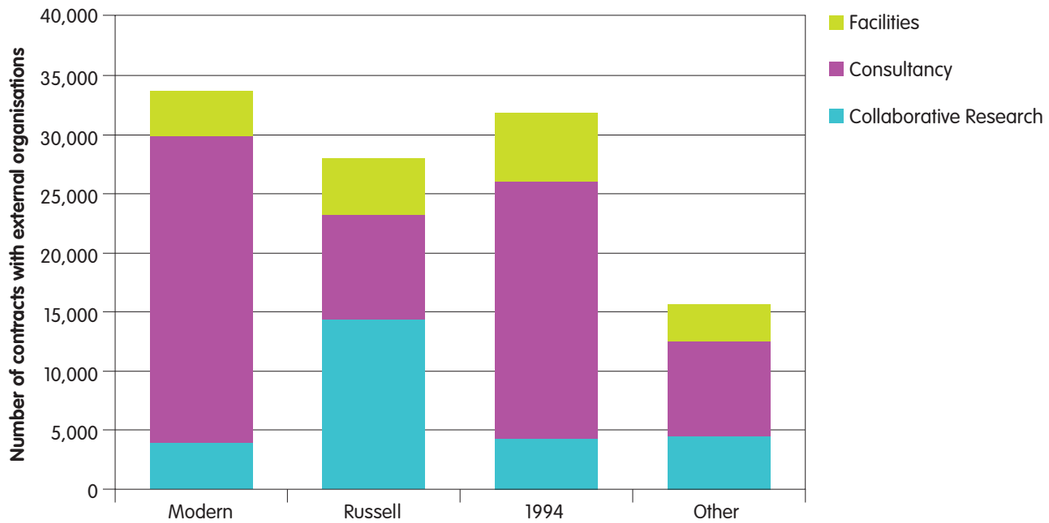
University of the West of Scotland: Lighting the Way Ahead

Variable Message Signs Ltd are market leaders in urban traffic information and management systems. However, the company was reliant on one external supplier for optical product design resulting in high consultancy costs and a significant business risk. The company embarked on a Knowledge Transfer Partnership with the University of the West of Scotland (UWS), drawing on the University's research expertise in design methodology in electronics and optoelectronics. The project resulted in the creation of an optical design and testing facility for the company, including a full-optical testing laboratory, design software and documentation. This allowed the company to bring expertise in optical design and testing in-house and thus eliminate design costs and license fees.

The partnership was instrumental in developing two new products for the company that are expected to yield revenue of £5 million over the next five years. One products provides improved capability in reducing congestion in Active Management System areas such as the M42 in the West Midlands; whilst the other is an innovative sign for the rail network which will allow the company to expand into the rail signage market.

"In 2007-08 modern universities supported 67% of graduate start-ups, 24% of staff spin-outs and 27% of all other spin-outs."

Figure 5: Number of contracts carried out with external organisations (2007/08)



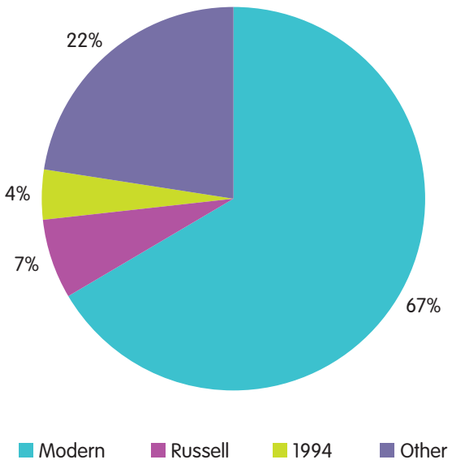
Modern University Research Supports Entrepreneurship

As the UK economy continues to recover from the recession of 2008-09, economic growth and enterprise represent two of Government's foremost priorities. Research by modern universities has clear links to enterprise and entrepreneurship amongst both university staff and students. In 2007-08, for instance, modern universities supported 67 per cent of all graduate start-ups (see Figure 6 overleaf), 24 per cent of total staff spin-outs and 27 per cent of all other spin-outs, many of which were linked to institutional research specialisms.

Academic research is an inherently uncertain process but research by modern universities can, directly or indirectly, lead to the development of innovative new products and processes such as the Powder Flowability Tester devised by the University of Greenwich in collaboration with industrial partners (see page 12) and the FitFlop range of footwear produced collaboratively at London South Bank University (see overleaf).

Modern Universities and Research That Matters
continued

Figure 6: Number of graduate start ups (2007/08)



FitFlop and London South Bank University

The FitFlop range of footwear is the product of collaboration between Martha Kilgore and researchers within the Human Performance Centre at London South Bank University. Groundbreaking research and development by Dr David Cook and Darren James at LSBU produced FitFlop's unique 'Microwobbleboard Technology' which is biomechanically designed to slightly destabilise the foot during the loading phase of walking and challenge the support and balance muscles of the foot and leg.

Independent research has shown that the technology in FitFlop shoes:

> Increases the work performed by the legs and lower back by approximately 53 per cent and 30 per cent
> Helps reduce aches in hips and knees by increasing leg and bottom muscle activity by up to 30 per cent
> Absorbs up to 22 per cent more shock than a normal shoe
> Reduces foot pressure and pain from heel spurs and plantar fasciitis

Since going on sale in 2007 the FitFlop has grown in popularity, being sold in 22 countries and attracting a large celebrity fan base, based on the validity of the research which informs the product design. FitFlop has also been approved by the American Podiatric Medical Association.

"Modern universities have developed strengths in particular scientific fields with the potential to directly benefit millions of people worldwide."

Modern University Research Helps Solve Complex Scientific Problems

In the public mind academic research is often equated with research on major science-related issues such as healthcare and disease, ageing, climate change and cutting edge communications technologies. Academic research in fact covers a very broad spectrum of disciplines but scientific research at modern institutions remains a vitally important component of this.

Scientific research is capital and resource intensive. In spite of the concentration of research funding, modern universities have developed strengths in particular scientific fields. For instance seven universities affiliated to million+ submitted Nursing and Midwifery related research in the 2008 RAE and more than 30 per cent of all submitted research was rated world leading or internationally excellent.

Research by modern universities such as Middlesex University and Anglia Ruskin University in the sphere of healthcare has led to the development of new ways of detecting, diagnosing and treating health problems.

Middlesex University: Fighting Cancer

Researchers in biomedicine at Middlesex University discovered that certain cancers, including bladder cancer, produce a fragment of the hormone hCGβ which encourages aggressive activity by cancerous cells. This discovery has led to pioneering research in the field of cancer treatment and to the development of a vaccine which targets and neutralises the cells producing hCGβ before these cells have the chance to attack other, healthy cells, thus neutralising the effects of tumour derived hCGβ and increasing patient survival.

The research has led to the development of an anti-hCGβ cancer vaccine by Celldex Therapeutics, a US-based immunotherapy company, aimed at treating colorectal, pancreatic, bladder, ovarian and breast cancers. This research has the potential to directly benefit millions of cancer patients worldwide every year, leading to quicker treatment of aggressive cancers with fewer side-effects. Middlesex University are also working with Celldex to develop a UK trial of the vaccine.

Anglia Ruskin University: Treating Glaucoma

Glaucoma is one of the leading causes of irreversible blindness and finding practical, efficient solutions for the provision of care in the community is critical in enabling healthcare providers to maximise the benefits from new techniques that enhance the ability to detect and treat glaucoma. Researchers at Anglia Ruskin have pioneered the use of imaging and psychophysical technologies in detecting the presence of glaucoma and monitoring change in patients. This has led to the development of a better methodology for glaucoma detection, helped develop guidelines for safe usage of equipment used in the examination of the anterior eye and influenced health care policies for management of diabetic patients in West Yorkshire by consultant ophthalmologists.

Modern Universities and Research That Matters
continued

Modern University Research Influences Public Policy and Helps Meet the Needs of Civil Society

Modern universities undertake research across the full spectrum of academic disciplines and academic research plays a key role in identifying and finding solutions to major socio-economic challenges. For example the University of Northampton has undertaken research that addresses important civic issues such as youth unemployment.

University of Northampton: Reducing Unemployment via Social Enterprise

The University of Northampton's Business School has formed a new social enterprise to develop and implement new strategies for reducing unemployment among 16 – 24 year olds who are not in employment, education or training (NEETS); recent graduates; and executives (those aged 35 or over with experience in management or senior technical roles). The social enterprise provides clients with one to one support, accredited training and work placements.

It is intended that the social enterprise will achieve financial self-sufficiency by the end of the project in July 2011. The impact of the social enterprise is currently being studied but 53 unemployed people have gained full time jobs and 112 companies have had their performance improved through placement activities. Initial results indicate the social enterprise has a strong, positive effect on client's attitude to enterprise and that a high percentage of clients who have completed their programme have gained new jobs or gone back into full time education. The University of Northampton is also developing new undergraduate and postgraduate programmes for people working in or wishing to become involved in social enterprise.

Modern universities are particularly successful in securing research funding from UK central government bodies, local authorities and hospital authorities that helps to meet civic and societal needs. For every £1 of public research council funding investment, modern universities leverage £0.99 from UK central government bodies, local authorities and hospital authorities compared to £0.37 leveraged by all other universities. This reflects the strong links between modern universities and public sector bodies and the strength of public policy related research undertaken by universities such as Kingston University and the University of East London.

Kingston University: Supporting Small Businesses and Entrepreneurship

Kingston University's Small Business Research Centre was commissioned by the Department for Business, Innovation and Skills (DBIS), to examine the impact of regulation on small enterprises in England. Regulation is widely regarded as having an adverse impact upon small business activities and performance, with consequences for entrepreneurship and the UK economy as a whole. During the project researchers adopted a new approach to studying the impact of regulation on small business performance by collecting evidence through face-to-face interviews with 124 SME owners as the best way to explore fully the contradictory effects of regulation. The key findings of the research clearly demonstrated that regulation does not have a uniform effect on small business performance - the effects are instead dependent on the broader context within which a business operates. The resulting report *The Impact of Regulation on Small Business Performance* is now part of a growing evidence base that informs sound policy decisions in this field, and the research has fed into Kingston University's highly successful business degrees.

"Research undertaken in modern universities plays a key role in finding solutions to major socio-economic challenges."

University of East London: Techniques for Smarter Policing and Crime Prevention

The University of East London was invited by the Metropolitan Police to study the effectiveness of crime analysts using geographical information systems (GIS) for crime mapping. Limited information often prevents the police from using GIS effectively. UEL's research team designed a new system which enabled the police force to map up to 95 per cent of crimes in an automated and consistent way allowing analysts to work with a fuller, more robust set of data. This research has also allowed the police force to map and analyse victims and offenders in relation to each other, for example in cases featuring repeat victimisation and prolific offenders.

The system was trialled in the London Borough of Newham where it is now in daily use. It has led to significant improvements in crime detection and profiling in the trial area and it is expected that these will be repeated when the programme is rolled out across the entire Metropolitan Police force area. The Metropolitan Police are now in discussions about implementation of the repeat victimisation and prolific offender tools centrally.

The lead researcher provides advice to the civil service on the production and publication of crime statistics and has become a Director of the British Society of Criminology.

Encouraging and promoting community involvement is an essential part of the Government's 'Big Society' agenda which seeks to create strong communities involving citizens, government, business and the voluntary sector. Modern universities already utilise their often unique positions within a local community to bring together students, local government, business and the public sector to improve service delivery and community interaction. Community based projects, in modern universities such as Leeds Metropolitan University and the University of Bedfordshire, have improved health care services to young people and the multi-ethnic and multi-faith population (see overleaf). At the University of Derby an award-winning project has increased the understanding of faith communities and helped to ensure that public policy in relation to religious groups is informed by accurate information (see overleaf).

Leeds Metropolitan University: Embedding the "Getting Sorted" Workshops in Mainstream Health Provision

The 'Getting Sorted' programme is a collaboration between Leeds Metropolitan University and NHS Primary Care Trusts in the Yorkshire and Humber region. The project undertook research to create new models of care for young people with long term health conditions, including type 1 diabetes and asthma, uniquely involving young people in both design and delivery. 'Getting Sorted' enables young people to manage their diabetes and asthma, thereby reducing the risk of long term complications. The original research has developed to inform and reshape service delivery within the Yorkshire and the Humber region and beyond.

The project won the Child Health Category in the 2007 Nursing Times Awards and reached the final of the NHS Medipex awards. 'Getting Sorted' is a recognised trademark and the project's potential for being developed as a spin-out company is currently being investigated.

University of Bedfordshire: Healthcare Research Informing Policy and Practice for the UK's Multi-Ethnic and Multi-Faith Population

The University of Bedfordshire's Institute for Health Research investigates sociological and social policy work on health inequalities, with an emphasis on the health needs of the UK's multi-ethnic and multi-faith population. A recent project, in partnership with Kidney Research UK, developed practical research to explore diabetes and kidney care pathways for South Asian patients. As a result of this research the IHR has provided substantial input into policy matters related to kidney and organ donation including: the Department of Health's policy guidelines on organ donation and transplantation; NHS Kidney Care's End-of-life care guidelines implementation and NHS Blood and Transplant's Organ Donation promotional campaigns.

The research has attracted additional funding of £450,000 from the Big Lottery Fund to explore end-of-life care pathways for South Asian renal patients over 4 years (2009-2013). The project director has also been commissioned to undertake a series of research studies related to organ donation and diversity issues.

University of Derby: The Religions in the UK Directory – Contacting and Consulting Religions in a Research-Informed Way

The Religions in the UK Directory has been developed over the past 20 years by Professor Paul Weller at Derby University and has become established as a standard work of reference on religious traditions and their communities and organisations in the UK. The directory provides a reliable and accessible 'one stop shop' that can be used by non-expert professionals in a range of fields who are concerned to develop policy, consultation and practice in relation to religious groups in ways that are informed by accurate research and scholarship-informed interpretation.

The 2001 edition of the directory won the Shap Working Party on World Religions Prize for "an outstanding contribution to the teaching of world religion". The 2007 edition of the directory formed part of the University's highly rated (35% at 'world class') entry in the Communication, Cultural and Media Studies section of RAE 2008.

This project has facilitated other high profile research based on an extensive and reliable knowledge of the religious organisations of the UK funded by the AHRC and the ESRC.

"Modern universities have undertaken internationally-focused research with global impacts."

Modern University Research is Internationally Relevant

Modern universities have wide and forward looking outlooks. Many have led the way in building strong partnerships with international universities and multinational businesses at both institutional and departmental level. In turn these partnerships help to inform and fund the internationally-focused research with global impacts that modern universities undertake. This includes, for instance, the pioneering work of the University of Greenwich in tackling diseases in Sub-Saharan Africa (see overleaf) and:

> The global study of factors associated with eye disease at Anglia Ruskin University is funded by the Gates Foundation and involves collaboration with 45 international partners. The research has provided new insights into the burden of eye disease worldwide, highlighting high risk population groups and informing government health policy in countries worldwide.

> Kingston University was funded by the European Commission to investigate the online grooming behaviours of sexual offenders, in collaboration with partners in Italy, Belgium and Norway. The resultant research is informing internet safety practice across the EU, improving treatment of sexual offenders and helping law enforcement agencies worldwide.

> Coventry University's collaboration with NP Aerospace on the new Mark VI explosives ordnance disposal (EOD) suit is designed to protect bomb disposal operatives whilst ensuring the physical pressures of wearing the suit are reduced by utilising advanced sensor technologies. The new suit provides enhanced protection and increased mobility to bomb disposal experts in armed forces around the globe.

University of Greenwich: Tackling Diseases in Sub-Saharan Africa

Tsetse flies cause a range of diseases afflicting humans and livestock across sub-Saharan Africa. The human forms of this disease, commonly called 'sleeping sickness', currently kill about 30,000 people a year and the diseases affecting livestock kill about 1-2 million cattle a year with an estimated annual economic cost of $4billion. Pioneering work by The University of Greenwich, which began in the 1970s, showed that tsetse flies use odours to find their hosts. The researchers discovered that odour-baited targets ('artificial cows') can be used against the cattle-biting tsetse to control the disease.

The research has led to the elimination and control of cattle-biting tsetse populations and shown that insecticide-treated cattle have an impact on malaria mosquitoes, a discovery which may prevent one of Africa's most deadly human diseases.

DNA fingerprinting was used to target applications of insecticide to the legs of older animals with consequent reductions in cost and environmental impact.

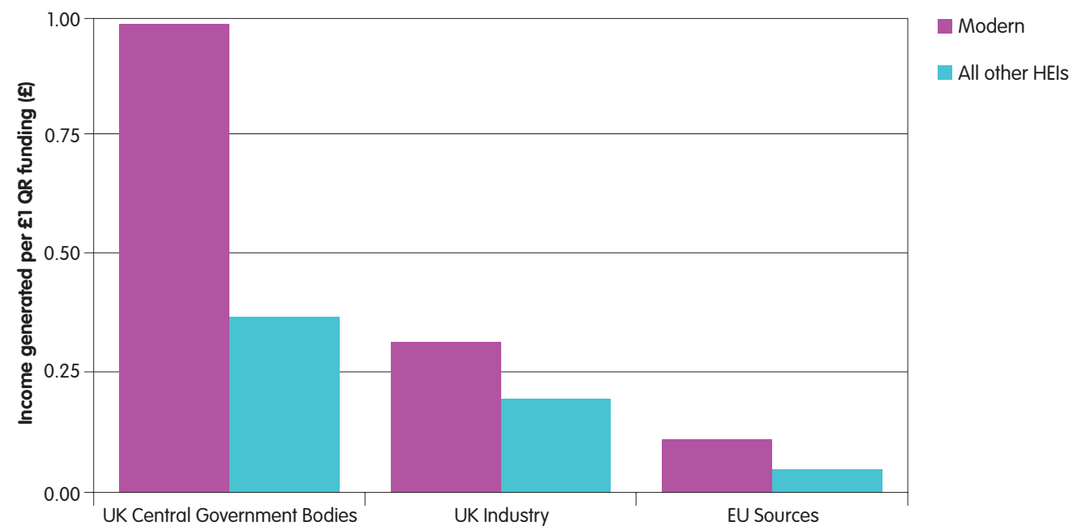
The research has received numerous international awards and in 2010 was voted one of the ten most important discoveries to be made in a UK university over the past 60 years.

In addition, modern universities show a high rate of participation in EU research programmes, compared to the amount of core research funding they receive from funding councils, and are highly effective in bringing EU and international funding to the UK for example Southampton Solent University's 'Project Horizon'. Modern universities are also more successful in using public money to leverage research funding from European sources[19] (Figure 7).

[19] From European sources, modern universities leverage £0.11 compared to other universities that leverage £0.05 per £1 public funding invested.

"Modern universities are also more successful in using public money to leverage research funding from European sources."

Figure 7: Additional income generated from UK government, UK industry and EU sources per £1 received from Quality Related funding (2008/09)



Southampton Solent University: 'Project Horizon' – The Impact of Fatigue on the Cognitive Performance of Ship's Watch Keepers

Project Horizon is a €3.78m European Commission-funded project developed and led by Southampton Solent University and supported by a consortium including Bureau Veritas and a stakeholder group from the shipping industry. The project will provide a better understanding of the way in which fatigue can affect the cognitive performance of ships' watch keepers by making extensive use of simulators in Sweden and the UK to examine the decision making and watch keeping performance of officers during a range of real-time, realistic voyage scenarios. The scenarios replicate a variety of seagoing conditions and will be undertaken by a total of 90 officers during the life of the project. Researchers are using various means of measuring fatigue during both on-watch and off-watch periods.

Due to be completed in December 2011, the research programme will improve safety at sea by developing a fatigue management toolkit. The project will also provide recommendations for improving work patterns at sea allowing operators to check schedules for fatigue, and make changes before operations commence, ultimately leading to increased safety at sea and in port. Although the research project is still in the data collection phase, it is expected to have an international impact on the working environment and health of thousands of seafarers. It is also envisaged that the UN agency for maritime affairs may influence policies globally for the mitigation of fatigue on the basis of this research.

Modern Universities and Research That Matters
continued

Modern University Research Helps Tackle New and Global Challenges

New challenges such as climate change, healthcare and food security will require international solutions developed in partnership with organisations in developed and developing economies worldwide. The UK has a long standing reputation for research excellence but will require the expertise of modern universities and their partners to carry out the applied and translational research that will help address these global challenges.

Climate change is thought by many to present the biggest threat to human habitation of the Earth. The results of scientific studies worldwide have showed the potential devastation that even a two degree increase in global temperature could cause by the middle of the twenty first century and it is imperative that the research being undertaken into ways to combat climate change can be utilised quickly and effectively. Modern universities are at the forefront of research and development in this area: from the University of Central Lancashire's investigations into ways to make public buildings more energy efficient to Coventry University's ground-breaking research into decarbonising aluminium production.

University of Central Lancashire: Increasing Energy Efficiency in DWP Buildings

A Knowledge Transfer Partnership (KTP) between UCLan and Telereal Trillium has identified the potential for savings of carbon dioxide and a reduction in energy bills for the Department of Work and Pensions (DWP) across their estate of 1100 buildings in the UK. UCLan helped Telereal Trillium meet the challenges of reducing the energy consumption of the DWP estate by using a KTP Associate to apply UCLan's research in this area to develop a tool that could simultaneously appraise the 'energy efficiency' of each building in the estate, and show which sites were the least efficient allowing the company to direct resources towards them.

The outcomes of this KTP benefits to the public sector and the property industry as a whole via cost savings and a reduced carbon footprint. The KTP has also had direct input into teaching and research at UCLan with input into the MSc Building Services course and an undergraduate module on Advanced Energy Systems.

"Hundreds of research projects taking place in modern universities are drawing on a unique foundation of cross-disciplinary research expertise."

Coventry University: Decarbonising Industrial Processes

The production of aluminium consumes about 2 per cent of all electricity generated worldwide. However much of this energy is lost during the production process, representing a considerable level of waste and needless emissions of carbon dioxide. To tackle this problem maths researchers at Coventry University, in collaboration with aluminium manufacturer Rio Tinto Alcan, undertook a research project to investigate methods of reducing the energy consumption of the aluminium smelting production process. Their research demonstrated that the application of an alternating magnetic field reduced instabilities in the smelting process – thus reducing the amount of energy required by up to 15 per cent. This scientific breakthrough represents a huge opportunity to decarbonise a heavily polluting industry.

Staffordshire University: Using Artificial Intelligence to Improve Water Quality

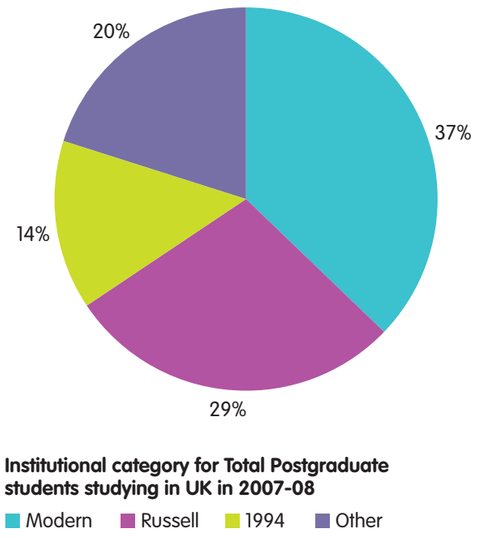
This research project was undertaken by Staffordshire University's Centre for Intelligent Environmental Systems and funded by the Environment Agency. The project developed a 'River Pollution Diagnostic System' which applied artificial intelligence techniques to identify the causes of poor river quality in the UK. This system has been used to address some of the issues involved in the implementation of European legislation on water quality and will enable environmental agencies to monitor more effectively the quality of river water. The system also has the potential for a much wider commercial use in other sectors. The research was recognised in the 2008 RAE and has been commended by the Environment Agency's Principal Scientist.

Modern universities are also using innovative methods of environmental protection and improvement, for example Staffordshire University's use of artificial intelligence to improve water quality. These and hundreds of other research projects taking place at modern universities and drawing on a unique foundation of cross-disciplinary research expertise are making a real difference to the environment in which we live.

Modern Universities Develop the Researchers of the Future

Maintaining and increasing the proportion of UK-domiciled postgraduate students is vitally important to UK plc and will play a crucial part in securing future research capacity. This simply will not be possible without modern universities who provide 37% of all postgraduate provision in the UK. This is significantly more than any other part of the sector as illustrated in Figure 8.

Figure 8: University destination for all postgraduate students studying in the UK in 2007-08



Recent recruitment statistics show the number of domiciled doctoral researchers has been static over the last five years.[20] This lack of growth may lead to higher-level skills shortages in key disciplines, including science, technology, engineering and mathematics but also in other areas vital to the economy of the future such as the newer creative industries. It is also imperative that the UK is seen as an attractive base for UK-domiciled students to develop a career in research.

Research Council block grant schemes have concentrated funding in a small number of universities, often focused on research and postgraduate provision in traditional disciplines. Schemes often assume critical mass and favour institutions with higher levels of research funding to the detriment of other institutions. This has the effect of both reducing opportunities for students and the funding available for innovation in postgraduate provision in new subject areas vital to the economy. Moves to increase the concentration of QR funding, coupled with the possibility that PhD training funds might in the future only go to few universities, puts at risk the next generation of researchers and will undermine the potential diversity of the UK's own postgraduate and research profile.

The ageing profile of academic workforce – over 30 per cent of academic staff were over 51 in 2007-08, an increase of 3 per cent on the previous year[21] – needs to be urgently addressed. In Australia, which faces similar problems, the Australian Government is funding the development of academic staff with postgraduate qualifications in *all* universities.

Currently, relatively little monitoring of the diversity of the postgraduate student cohort is undertaken. This makes it difficult to identify, let alone tackle, the barriers to postgraduate study that are faced or perceived to exist by under-represented groups. However, it is clear that modern universities play a key role in widening participation in research.

In 2007-08, modern universities supported almost half (48 per cent) of the total part-time postgraduate student population and 76 per cent of all postgraduate students considered as mature (aged 25 years or more). In addition, modern universities have a high proportion of female postgraduate students (57 per cent female to 43 per cent male in 2007-08) and play a very significant role in ensuring opportunities at postgraduate level for students from minority ethnic (BAME) backgrounds who are under-represented among research students.[22]

In the academic year 2008-09, 38.3 per cent of postgraduates studied at modern universities and 38.1 per cent of all minority ethnic students studied at these universities. In comparison, the Russell and the 1994 Groups supported 25.1 per cent and 24.7 per cent of the overall postgraduate market respectively, but only 21.4 per cent (each) of minority ethnic postgraduates.[23]

The UK is also highly competitive in the international postgraduate market and UK universities attract a significant market share of international postgraduate students. However, there is a risk that this market will be increasingly squeezed over the coming decade with competition from institutions and countries which are investing and developing excellence in

[20] Artess, J et al (2008) Higher degrees: postgraduate study in the UK 2000/01 to 2005/06, pp17–18, Tables 1.11a and 1.13.

[21] ECU Equality in HE Statistical Report 2009.

[22] Are Ethnic Minorities Under-represented in UK Postgraduate Study? Paul Wakeling, Higher Education Quarterly, Volume 63, No. 1, January 2009, pp 86–111.

[23] million+ analysis of HESA statistics: breakdown of postgraduate students by ethnicity, level of study, UK-domicile and institutional grouping from 2007/08 – 2008/09.

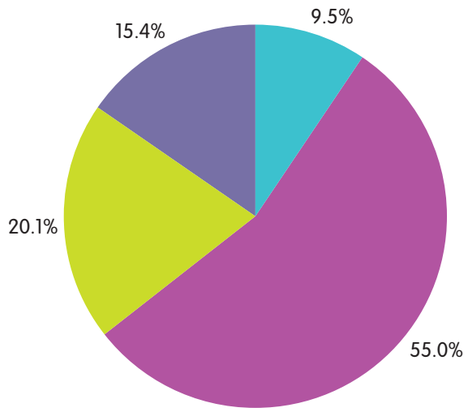
"Modern universities play a very significant role in ensuring opportunities at postgraduate level for students from minority ethnic backgrounds."

higher education. Universities will need to provide flexible, transnational delivery models, extend the subject and discipline range of programmes as well as leading teaching and research across the board if the UK is to retain its competitive edge.

International postgraduate research student numbers have been growing at a rate of 4 per cent per year and, as of July 2008, the UK had 15 per cent of the global market for postgraduate research students.[24] In 2007-08, modern universities supported 30 per cent of the total number of international postgraduate students from 118 countries[25] and 9.5 per cent of doctoral international studied at modern universities as illustrated in Figure 9. This is a high level of productivity and rate of return given the relatively modest levels of QR funding received by these universities. This delivery is critical to the UK's international competitiveness and the attractiveness of the UK as a destination of choice.

Modern universities provide an attractive mix of flexibility, accessibility and innovation. Combined with a firm commitment to widening participation, they appeal to and attract the broadest spectrum of the UK population and international students and have student bodies which reflect a similar diversity. Any policy to concentrate doctoral study in just a handful of universities would have the obvious consequence of limiting opportunities for doctoral study to a smaller and much less representative section of the UK population. It also risks the loss of some of the most responsive and innovative postgraduate provision which is a key feature of UK Higher Education 'global brand' and could undermine the capacity of UK universities to attract the brightest international researchers.

Figure 9: University destination of international postgraduate research students studying in the UK in 2007-08



Institutional category for international research postgraduate students studying in the UK in 2007-08

Modern Russell 1994 Other

[24] Kemp, N. et al The UK's Competitive Advantage: The Market for International Research Students (July 2008) p.1. www.international.ac.uk/our_research_and_publications/index.cfm.

[25] Source: HESA 2007-2008 data.

Conclusions

The higher education sector is facing unprecedented challenges brought about by the contraction of public spending following over a decade of investment and expansion. It is therefore disappointing that the role and ability of modern universities to deliver research excellence and value for money from public investment continues to be called into question by vested interests. As *Research that Matters* shows, arguments for increased concentration of funding within traditional universities are based on very limited evidence. Conversely, *Research that Matters* provides clear evidence of the successful track record of modern universities; it showcases a selection of world-leading research projects and demonstrates the vital role that modern universities play, via their research, in contributing to economic growth and addressing global challenges. As Westminster and the devolved Governments seek to develop strategies to rebuild the economy, they cannot afford to put at risk the vital contribution modern universities make to our economy and society of the future.

Much of the research presented showcases past projects undertaken by modern universities that have made a real difference to the international agenda, to businesses and industry, to local and national government and to not-for-profit organisations. However this is only a tiny fragment of the wide range of research undertaken by these institutions. Research is a vital ingredient for modern universities in creating dynamic, relevant courses that equip students with the skills they need for the future; in sustaining the UK's position as a leading centre for research, innovation and investment; and in driving economic growth. *Research that Matters* shows projects that have already contributed to this goal but the research portfolio of modern universities continues to grow and the research they are undertaking today may be the key to tackling the problems that business, government and society as a whole will face in the future. All the evidence suggests that the funding of research in modern universities should be enhanced.

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