UK-INNOVATION RESEARCH CENTRE

The Dual Funding Structure for Research in the UK: Research Council and Funding Council Allocation Methods and the Pathways to Impact of UK Academics

A REPORT FROM THE CENTRE FOR BUSINESS RESEARCH (CBR) AND THE UK INNOVATION RESEARCH CENTRE (UK–IRC) TO THE DEPARTMENT FOR BUSINESS, INNOVATION AND SKILLS

Alan Hughes
Michael Kitson
Anna Bullock
Isobel Milner

Revised May 2013

CBR

UNIVERSITY OF CAMBRIDGE

Imperial College London

Acknowledgements

This report was commissioned by the Department for Business, Innovation and Skills (BIS). It would have not been possible to complete it without the generous assistance in the identification and interpretation of data sources provided by the staff at HESA responsible for data on the sources of research income and other variables. David Sweeney at HEFCE, Martin Fullerton at DEL, Stuart Fancey of SFC and Linda Tiller of HEFCW provided invaluable and rapid access to disaggregated annual mainstream QR data. Astrid Wissenberg of ESRC facilitated access to public domain data on individual grant holders from ESRC and facilitated contacts with each of the other research councils all of which provided similar data for which we are very grateful. The authors are grateful to Alberto García Mogollón for his excellent research assistance in the detailed data presentation and econometric and statistical analysis of disaggregated data on HESA and mainstream QR funding streams. Finally we wish to record our thanks to Rosa Fernandez of BIS and Ray Lambert (formerly of BIS) for advice and support in carrying out this study and to Paul Hubbard of HEFCE for comments on an earlier draft.

About the CBR

The Centre for Business Research (CBR) is a research institution within the Judge Business School at the University of Cambridge which conducts interdisciplinary research on enterprise, innovation and governance in contemporary market economies. Established in 1994, it is now one of the leading centres for social science research on economics, law and business in the UK, and has a growing European and global reputation. The Centre's current areas of specialisation include the construction and analysis of large and complex datasets on SMEs and innovation, longitudinal analysis of regulatory change affecting business firms, and fieldwork-based studies of corporate governance and organisational practice. The Centre has made a significant contribution to the development of research methods and theory in the analysis of law and finance, enterprise and innovation policy and the nature of university-industry relationships. The Centre's research is disseminated to and used by managers, policy-makers and regulators in numerous countries.

The CBR is a multi-disciplinary centre. Our research is uniquely well informed as it draws on expertise in Cambridge University departments ranging from the Faculties of Economics and Politics, Law, and Human, Social and Political Sciences, to the Departments of Geography, Land Economy and Engineering, and the Judge Business School.

www.cbr.cam.ac.uk

About the UK~IRC

The UK Innovation Research Centre (UK~IRC) is a joint venture between the Centre for Business Research at the University of Cambridge and Imperial College Business School to further research and knowledge exchange on innovation policy practice. The UK~IRC is global in scope and involves a large-scale, multi-year research programme and a Knowledge Hub to engage with and inform policy-makers and practitioners about innovation research. The research programme explores open innovation, service innovation, online communities and innovation policy-making. A further stream of research focuses on the nature of university-industry links and the role of higher education in innovation systems. Through the Hub, our aim is to maximise the effect of the research on policy and practice, so as to help the UK face its social, environmental and economic challenges

The Centre is co-funded by the Department for Business, Innovation and Skills (BIS), the Economic and Social Research Council (ESRC), the National Endowment for Science, Technology and the Arts (NESTA and the Technology Strategy Board (TSB). This support is gratefully acknowledged.

www.ukirc.ac.uk

Table of Contents

Executive Summary

E1. Introduction and summary conclusions

This report analyses the links between research performance, research funding models and the knowledge exchange activities and research motivation of academics in the UK, and the constraints they face in engaging with organisations external to their universities. It focuses in particular on the characteristics of the UK system of Dual Funding Support in which University research funding is provided by the twin routes of institutional block grants from the Funding Councils based on periodic quality assessment exercises and funding won in peer reviewed competition from the Research Councils.

The report provides a statistical analysis of the anatomy of the Dual Funding System and its evolution since the 2001 Research Assessment Exercise (RAE). It also provides a detailed statistical analysis of the pattern of impact pathways of UK academics cross classified both by Research Council grant holding status and by the RAE rankings of their departments. These cross classifications are designed to correspond to the two components of the UK dual funding structure. We also as a robustness check compare the impact pathways of matched samples of grant-holders and non-grant holders where the matching is based on age, gender, seniority, department and university.

The statistical analyses are based on several sources of data. First, detailed data on the impact pathways of individuals contained in the CBR Survey of 22,000 UK academics (Hughes et al. 2010). Second, Research Council data on individual grants awarded over the period covered by the CBR survey (roughly 2006-9). Each of the academics in the CBR survey has been classifiable as the holder or non-holder of a Research Council award and is also assigned to a unit of assessment at their university classified in terms of the proportion of its research designated as of the highest quality (4*) as the result of the Research Assessment Exercise (RAE) 2008. This allows us to compare the pathway characteristics of academics cross classified by whether or not they held a grant and also by the quality profile of their unit of assessment in the RAE of 2008. In addition we collated annual data for 2002/3 to 2010/11 based on the Quality Related (mainstream QR) allocation of research funds arising from the Research Assessment Exercises (RAEs) of 2001 and 2008. This data is at the unit of assessment level for each UK university. Finally we collated data from the Higher Education Statistics Agency (HESA) on the total research income of UK universities disaggregated by source. We then created a panel database linking the HESA and mainstream QR assessment data for the period 2002/3 to 2010/11. We use this to chart the evolution of the dual funding structure over that period.

The report presents, first, a review of the evolution of the Dual Funding System and associated patterns of research income across universities and by sources of income. It then presents an in depth analysis of the academic survey impact pathway indicators with a separate section for each survey question[1].

The Dual Support system of funding for UK university research has delivered a rise in real terms in both the quality (mainstream QR) related Funding Council stream and the Research Council Grant stream. Funding through the Research Council route has grown faster, in part as a result of the introduction of the full economic costs. In 2002 mainstream QR funding was higher than Research

[1] A detailed parallel analysis of the principles for evaluating the impact of publicly funded research generally and a review of existing literature focusing on the impact of research council and HEFCE funding for specific programmes and projects and in aggregate (see Hughes and Martin, 2012).

Council funding. By 2010 the positions had been reversed. Industrial funding for university research has increased less fast than funding from charities, central government, and from overseas and by much less than mainstream QR and Research Council funding. At the same time 'other' QR funding provided by the Funding Councils and linked to the extent to which universities attract Business or Charity Funding and provide PhD Training has increased relative to mainstream QR.

The Dual Support system is associated with a high level of concentration of funding across UK universities. In 2010 the share of the top 10% universities in Research Council funding was 64%, in charitable funding 77%, in industrial funding 60% and overseas funding 62%. It was 53% for mainstream QR, 63% for 'other' QR and 57% for central government funding. There was either no change or a small increase in the level of concentration in most sources of income over time between 2002 and 2010, except for mainstream QR where the degree of concentration fell slightly and 'other' QR where it rose. Thus in terms of the Dual Support mechanism mainstream QR has tended to be a moderating influence on the concentration of research income flows overall.

In general there is a very strong positive relationship between the distribution of Research Council income and mainstream QR income across universities and between the distribution of these and each of the other sources of research income.

An illustrative exercise for the allocation of mainstream QR in the two years 2009-10 and 2010-11 was carried out. It compared the allocation of funds based on the mainstream QR excellence rating algorithm following the 2008 RAE with an allocation based on the shares of institutions in total research council funding summed over the RAE evaluation period. These two processes produced a very similar distribution. The mean change in universities mainstream QR allocated funding was 0. However, a number of institutions would have gained by as much as 2.6% and some would have lost by around 1%. Since Research Council funding is more highly concentrated than mainstream QR funding, the typical gain arising from allocating mainstream QR funds on the basis of Research Council income would have been to those institutions already dominant at the top of the Research Council income distribution.

When we turn to our microeconomic analysis of the pattern of individual academic involvement in impact pathways and academics' motivation for and conduct of research activity, a number of differences emerge between highly rated and less highly RAE rated departments. Differences also emerge between holders and non-holders of Research Council grants.

Our analysis shows that academics in highly rated RAE departments are more likely to report that they are motivated to carry out basic or user-inspired basic research than academics in lower ranked departments. Even so 25% of academics in highly rated departments consider that their research is motivated by applications *per se*. Despite these differences in motivation there is, however, very little difference in the extent to which the research which is carried out by academics in differently rated departments has been applied in a private, commercial or public context or is perceived to be of commercial relevance. Academics in highly rated and less highly rated departments are equally likely to report these outcomes. Moreover, if we focus attention on patenting, licensing and spin-outs, then in the Sciences, where these activities are most prevalent, academics in higher rated departments are more likely to be involved than those in lower rated departments.

It thus appears to be the case that although motivations to carry out research in highly rated departments may be less likely to be concerned with applications *per se*, nonetheless, in terms of commercialisation activities involving patenting, licensing and spin-outs, academics in these departments are more likely to find that their research has these positive impact characteristics.

Patenting, licensing and spin-outs are, however, a small component of the full system of pathways to impact in which UK academics are involved. Our analysis shows that a much higher proportion of academics are involved in a wider range of people-based, problem-solving and community-based interactions with external organisations. In relation to this wide range of pathways academics in highly rated departments tend to be more focused on a somewhat narrower range of research related problem-solving and people-based activities. It is in particular notable that pathways involving academics with external organisations via joint research, joint publications and membership of research consortia are all more frequently cited by academics in more highly RAE rated departments than in lower rated departments.

Motivations to interact with external organisations are, for academics in all types of department, driven, in general, more by research than by teaching. Academics in lower rated departments are, however, more likely to be motivated by teaching, student placements and the pursuit of their home universities outreach mission. Academics in highly rated departments are in contrast more likely to be motivated by developing research activities and less likely to be motivated to interact with external organisations to keep up with research than those in lower rated departments. In general, with little variation across departmental ratings, the impacts of interactions upon teaching and research are universally considered positive.

In terms of constraints on interactions for academics in both high and low rated departments a lack of time and university bureaucracy are top of the list. Academics in lower rated departments are somewhat more likely to feel constrained across each of the various potential constraints identified in the survey. The only area where academics in highly rated departments are more likely to report constraints is in relation to reaching agreement on IP. This is, in general, a constraint which is cited in a very small number of cases, even in the highly rated departments. The tendency for it to be a more frequently reported constraint in highly rated departments reflects the fact that academics in such departments have a greater propensity to patent and license and therefore are more likely to experience such constraints more frequently than academics in low rated departments.

Because there is a close correlation between Research Council grant awards and mainstream QR funding, there is in most cases a similar pattern of variations across academics when we classify them by whether or not they hold grants as when we classify them by their departments' RAE excellence ratings. However, when we use a matched sample to estimate grant holding effects whilst holding departmental excellence ratings constant, a number of findings emerge.

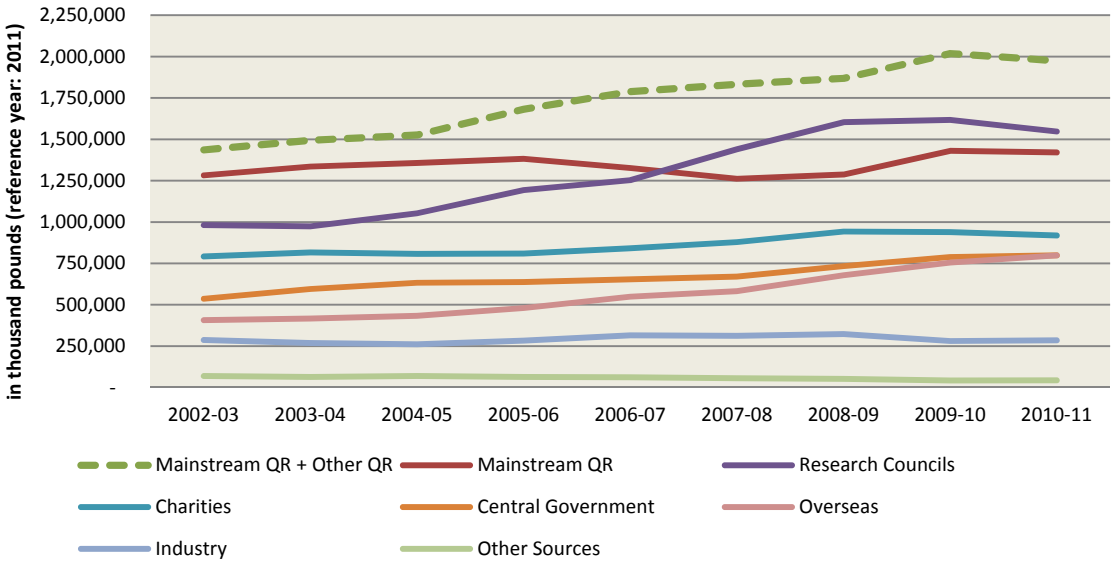
Not surprisingly grant holders in the matched sample emerge as more likely to be carrying out research than non-grant holders. They are also, however, more likely to have had their research applied in a commercial context; to have interactions with private and public sector external organisations; and to be involved in patenting, licensing and spin-outs. Their pattern of wider interactions with external organisations and the motivations for those interactions are more likely to be focused on a range of research and problem-solving pathways. They are less concerned than non-grant holders with teaching and student related pathways. Non-grant holders are also more likely to report a variety of possible beneficial impacts on teaching arising from their external relationships than is the case with grant holders.

Finally, grant holders in the matched sample are more likely than non-grant holders to report constraints arising from: a lack of resources to support their research in external organisations; differences in perceptions of appropriate timescales compared to external organisations; difficulties in identifying partners; and a lack of interest amongst external partners.

The following sections of this Executive Summary provide an overview of the key findings supporting these general summary conclusions.

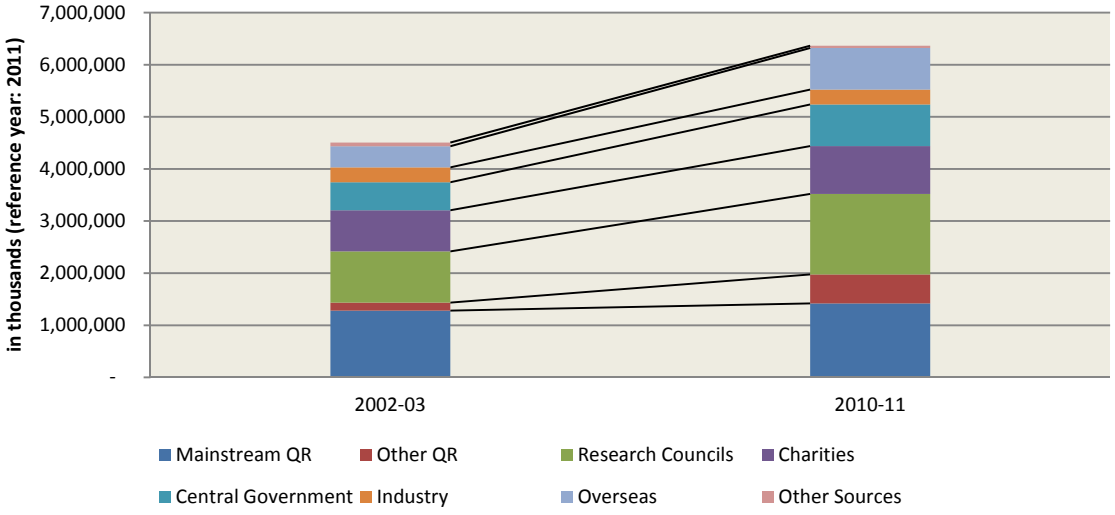
E2. The Dual Support System

Exhibit E1 **The Funding of UK University Research: Dual Support and Other Sources 2002-3 to 2010-11 (in 2011 Prices)**



Source: Authors' calculations based on HESA Financial Statistics

Exhibit E2 **The Level and Distribution of Total University Research Income by Funding Source in 2002-3 and 2010-11**



Source: Authors' calculations based on HESA Financial Statistics

- Exhibit E1 shows trends in all 8 sources of University Research Funding in real terms.
- Exhibit E2 shows the percentage breakdown of these 8 sources of funds for research in UK in 2002 and 2010.

- In 2002 the mainstream QR, 'other' QR and Research Council Funding accounted for 53% of the total sources of funds available. This was little changed in total by 2010 when these combined sources accounted for 55%. The UK therefore has an overall funding system for research in which the combined elements of the dual system account for approximately half of the total funds available and this has remained relatively stable over the period analysed in this report.

- Within the Dual Support system the share of Research Council funding has risen and that of mainstream QR funding has fallen so that the former is now greater than the latter whilst 'other' QR has risen from 3% to 9%.

- The most significant increase in other non-Research Council and non-Funding Council income sources was the share from overseas which rose from 9% in 2002 to 13% by 2010.

E3. The Concentration of HEI Research Funding in the UK University Sector

- Exhibit E3 provides an analysis by decile of research income for each of the main sources of income; mainstream QR, other QR, research councils, charities, central government, industry, overseas and other.

Exhibit E3 **The Distribution of Research Income across UK Universities by Main Source of Income in 2002-3 and 2010-11**

	Mainstream				Research				Central						Other	
Research Income	QR		Other QR		Councils		Charities		Government		Industry		Overseas		Sources	
Decile	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Top 10%	55%	53%	55%	63%	64%	64%	75%	77%	46%	57%	63%	60%	58%	62%	67%	55%
2	19%	20%	18%	17%	20%	20%	17%	15%	24%	22%	20%	21%	19%	18%	17%	20%
3	12%	11%	12%	8%	10%	10%	4%	4%	13%	9%	7%	9%	10%	9%	8%	12%
4	7%	7%	7%	5%	4%	4%	2%	2%	8%	5%	5%	5%	6%	5%	5%	7%
5	4%	4%	5%	3%	2%	2%	1%	1%	4%	3%	3%	2%	4%	3%	2%	4%
6	2%	2%	2%	2%	1%	1%	0%	1%	3%	2%	1%	2%	2%	1%	1%	2%
7	1%	1%	1%	1%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	0%	1%
8	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bottom 10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Authors' calculations based on HESA Financial Statistics

- There is a striking concentration of research funding in the top 10% of universities ranked in terms of research income.
- In 2002 the top 10% accounted for 55% of all mainstream QR income received by UK universities. This degree of concentration had declined somewhat by 2010, but only marginally to 53%. Concentration in 'other' QR rose from 55% to 63%.
- The data for research council income shows a higher level of concentration than mainstream QR income. In 2002 and in 2010, the top 10% of recipients of research council funding accounted for 64% or nearly two thirds of all the funds allocated by councils.
- The charitable distribution is the most concentrated of income sources. In 2002, the top 10% of universities receiving charitable income accounted for 75% of all the charitable income and that had risen to 77% by 2010.

- The data for central government shows a significant increase in concentration. In 2002 the top 10% accounted for 46% and by 2010 57% of central government income.
- The data for industry reveals a small decline in the share of the top 10% of industry income from 63% to 60%.
- The movement in the share of overseas income shows a significant increase from 58% in 2002 to 62% in 2010.
- A detailed analysis of patterns of rankings over time shows that the highly skewed distribution of research income across universities is associated with the persistent dominance of a small number of universities. Moreover within the top decile the leading 5 or 6 institutions dominate over time and across most sources of income.

E4. The relationship between different sources of income

- There is a strong positive correlation between the distribution of research council income and mainstream QR funding across universities, and between the distribution of these and each of the other sources of research income.
- It is sometimes argued that the fact that there is a close correlation between research council income and mainstream QR implies that a simpler process for allocating mainstream QR than the periodic Research Assessment Exercises or Research Excellence Framework would be to use, for example, past success in obtaining research council grants as a basis for the allocation of mainstream QR.
- As an illustrative exercise we took the total value of mainstream QR allocated in the two years 2009-10 and 2010-11 (which followed the 2008 Research Assessment Exercise) and distributed it across institutions on the basis of the shares of each of those institutions in total research council funding summed over the period 2002-3 to 2008-9.
- By comparing the distribution of mainstream QR on the basis of this hypothetical allocation rule with the actual allocation of mainstream QR in the two years following the 2008 RAE, we were able to obtain estimates of what the effect of replacing the RAE exercise by the simple research council share rule would have been.
- The mean difference between the actual and hypothetical allocation of mainstream QR allocation was zero. This might be taken to imply that it would have been simpler and cheaper to have used the research allocation rule than the much costlier and resource intensive RAE process.
- However, there is skewness in the distribution of hypothetical percentage impacts around the zero mean effect.
- In a number of cases the absolute effect of using the hypothetical allocation would have been quite substantial. The biggest loser would have suffered a decline of 0.9% whilst the maximum gain for an institution (which was already at the top end of mainstream QR allocation) would have been 2.6%.
- In general, because of the extreme skewness in the underlying distribution of mainstream QR and research council income, those in receipt of major mainstream QR and RC income would have been disproportionately affected. This would have been particularly so for a number of universities which were even more dominant in the research council funding arena than in the actual allocation of mainstream QR. Research council funding is more highly concentrated than mainstream QR so that a switch to an allocation rule based on

past research council funding would increase the overall concentration of research funding in the hands of the top handful of research income receiving institutions.

E5. Academic Activity by RAE Rating

- The proportion of all respondents to the CBR academic survey reporting that they are research active is around 93%, with a higher proportion (97%) in highly rated departments. This pattern is consistent across broad disciplinary groups.
- The proportion of all academics reporting that they teach is around 85%. The proportion of academics in highly rated departments reporting that that they teach is slightly lower (82%). This pattern is broadly consistent across broad disciplinary groups.
- The proportion of all academics reporting that they undertake administrative activities is around 63%.The proportion is marginally lower in highly rated departments (61%).
- The proportion of all academics reporting that they undertake outreach activities is around 36% compared with 34% in highly rated departments.
- The proportion of academics undertaking outreach activities in highly rated departments are: 45% in the Arts and humanities compared with 30% in the Sciences and 32% in the Social sciences.

E6. Academic Activity by grant status

- The proportion of grant recipients that are research active is not surprisingly 100% compared to 92% for those not currently in receipt of a grant.
- Grant recipients are more likely to teach than those who have not received a grant (91% compared to 84%).
- Grant recipients are more likely to report that they undertake administrative activities compared to non-recipients (78% compared to 61%).
- Grant recipients are more likely to engage in outreach activities compared to those who have not received a grant (45% compared to 34%).

E7. Basic, Applied and User Inspired Research by RAE rating

- The academic respondents to the CBR survey were asked to self-classify their research as being either basic, applied or user inspired basic or none of those.
- The proportion of academics in highly rated departments who describe their research as basic (34%) is higher than those in medium-rated (27%) or low rated departments (21%). The proportion is highest (59%) in the Arts and humanities and lowest (25%) in the Sciences.
- User-inspired basic research is reported more frequently in highly rated departments (31%) than in low rated (27%) departments.
- The proportion of academics motivated by applications alone is highest in low rated departments (52% compared with 42% in medium rated and 35% in high rated) and

conversely academics in high rated departments are more likely to be motivated to pursue basic (34% compared with 27% in medium rated and 21% in high rated) and user inspired basic research (31% in high and medium compared to 27% in low).

E8. Basic, Applied and User Inspired Research by grant status

- Academics who are grant recipients are more likely to describe their research as basic (34%) compared to those who have not received a grant (26%).
- The proportion of academics who are grant recipients who undertake basic research is highest in the Arts and humanities (55%) and lowest in the Social sciences (23%) with the Sciences occupying an intermediate position (33%).
- Grant recipients (37%) are more likely to describe their research as user-inspired basic compared to those who have not received a grant (28%).
- The proportion of academics who are grant recipients who undertake user-inspired research are: 28% in the Arts and humanities; 37% in the Sciences; and 42% in the Social sciences.
- Academics who have not received a grant (46%) are more likely to describe their research as applied compared to those who are grant recipients (29%).

E9. Relevance of research by RAE score

- Respondents to the CBR academic survey could describe their research as of no relevance to external organisations, of general commercial relevance, relevant for non-commercial organisations or applied in a commercial context.
- The two least common answers were that research was of no relevance or that it had been applied commercially. Relevance for non-commercial organisations was most frequent with commercial relevance in an intermediate position.
- Overall, 18% of academics have had their research applied in a commercial context and this proportion is highest in Sciences, followed by Social sciences and the Arts and humanities.
- 35% of academics consider that their research is of commercial interest to business which is almost twice as high as research which academics report as having been applied. This proportion is highest in Sciences, followed by Social sciences and then Arts and humanities.
- Research relevance to non-commercial external organisation, is most frequently reported in the Social sciences and for the sample as a whole 72% of academics consider that their research falls into this category.
- A small minority of academics believe that their research has no relevance for external organisations.
- There is very little variation in these patterns across departments with low, medium or high RAE ratings.

E10. Relevance of research by grant status

- Grant recipients are more likely to have their research applied in a commercial context compared to those who have not received a grant (26% compared with 17%).
- In the Sciences, grant recipients are much more likely to have their research applied in a commercial context than those who have not received a grant (31% compared to 20%)
- In the Social sciences, grant recipients are more likely to have their research applied in a commercial context compared to those who have not received a grant (20% compared to 15%).
- Academics who are grant recipients are also more likely to consider that their research is of commercial interest to business compared to those who have not received a grant (45% compared 33%).
- Academics who are grant recipients are slightly less likely to consider that their research is of relevance for non-commercial external organisations compared to those who have not received a grant (70% compared 73%).

E11. Partners that academics interact with by RAE rating

Private Sector interactions

- 41% of academics report engagement with private sector companies.
- In the Arts and humanities academics in low ranked departments are more likely to engage with the private sector than those in medium and high ranked departments (37% compared 29% and 28% respectively).
- In the Sciences academics in high ranked departments are marginally *more* likely to engage with the private sector compared to academics in medium and low ranked departments (47% compared to 46% and 44% respectively).

Public Sector Interactions

- 53% of academics interact with public sector organisations.
- Engagement is highest of all amongst academics in high ranked Social science departments (66%) compared with departments that are medium ranked (64%) and low ranked (61%).

Charitable Sector

- 44% of academics interact with the charitable sector
- Social science academics are to the fore with individuals in low and medium ranked departments (both 51%) more likely to engage with the third sector compared to those in the high ranked departments (47%).

E12. Partners that academics interact with by grant status

Private Sector interactions

- 52% of academics with a grant interact with the private sector compared to 39% who do not have a grant.
- In Sciences academics with a grant (61%) are more likely to engage with the private sector compared to academics without a grant (43%).
- In the Social sciences academics with a grant (41%) are more likely to engage with the private sector compared to academics without a grant (38%).

Public Sector interactions

- 59% of academics with a grant interact with the public sector compared to 52% who do not have a grant. The proportion is highest in the Social sciences where 78% of academics with a grant engage with the public sector compared to 62% of those without a grant.

Charitable Sector interactions

- Grant holding has little or no impact on the likelihood of interacting with the charitable sector.

E13. Commercialisation activities by RAE score: Patenting, Licensing, Spinouts and Consultancy formation

- In the three years up to the CBR survey date 14% of academics formed a consultancy, 7% took out one or more patents, 5% licensed research output, and 4% formed a spinout company.
- In all cases except consultancy (where Social scientists have a marginally greater propensity than scientists) these forms of activity are most common in the Sciences.
- In the Sciences, patenting is highest by academics in the highly rated departments (16%) compared to those in the medium ranked (13%) and low ranked departments (10%). The same pattern holds in a more muted way for licensing and for spin out formation.
- In the Social sciences and in the Arts and humanities there is little variation across RAE ratings.

E14. Commercialisation activities by grant status: Patenting, Licensing, Spinouts and Consultancy Formation

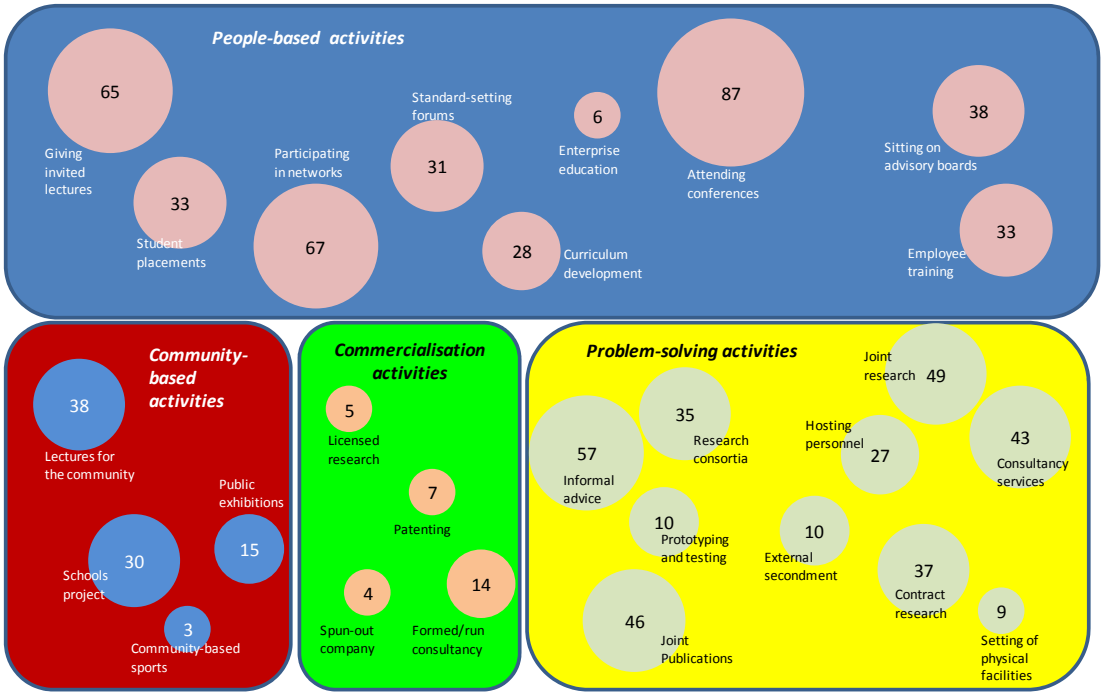
- In the sample as a whole and each disciplinary group grant holding is associated with greater involvement in each of the four forms of commercialization activity.
- For the sample as a whole 17% of academics who are grant recipients have taken out a patent in the last three years; compared to 5% of academics who did not have a grant. In the Sciences, 25% of grant holding academics have taken out a patent in the last three years compared to 10% of non-grant holders.
- 10% of grant holding academics have licensed research output in the last three years; compared to 4% of non-grant holders.

- 7% of grant holders formed a spinout company; compared to 3% of non-grant holders academics.
- 19% of grant holders formed a consultancy compared to 13% of academics who did not have a grant.
- Similar patterns emerge in the 3 disciplinary sub-groups.

E15. Modes of interaction: people based, problem solving and community based activities

- Respondents were asked whether they had taken part in a wide range of pathways to impact to the CBR academic survey grouped into people based, problem solving and community based activities. The broad picture which emerges is shown in Exhibit E4 which also includes for completeness the four commercialisation pathways examined in the previous section.

Exhibit E4 Pathways to Impact: People based, Problem solving, Community based and Commercialisation activities



- Exhibit E4 serves to emphasise the breadth and intensity of academic pathways to impact with external organisations. It also places the pathways based on commercialisation per se in perspective as a small part of the pathway landscape. Academics are in particular heavily involved in problem solving and people based modes of interaction.

E16. People based, problem solving and community based activities by RAE score

- Academics in low ranked departments are more likely to engage in people based modes of interaction compared to academics in high ranked departments.
- Joint research, joint publications and membership of research consortia tend to be slightly higher for academics in medium and high ranked departments. This suggests a clearer link between high ranking and research based pathways.
- Engagement in community based activities is broadly similar for academics from departments with different RAE rankings. Academics from highly ranked departments are, however, more likely to provide lectures for the community; and academics from low ranked departments are more likely to help school projects and community based sports.

E17. People based, problem solving and community based activities by grant status

People Based Interactions

- For some modes – such as participating in networks and sitting on advisory boards – there is a higher propensity for academics in receipt of a grant. Whereas for other modes – such as employee training and curriculum development - there is higher propensity for academics not in receipt of a grant.

Problem Solving Interactions

- Academics in receipt of a grant are more likely to engage in problem solving activities compared to academics not in receipt of a grant.
- This pattern is generally consistent across the broad disciplinary groups.

Community Based Interactions

- In general, academics in receipt of a grant are more likely to engage in community based activities compared to academics not in receipt of a grant (with the exception of community based sports).

E18. High interaction intensity by RAE score

- We define highly intensive interacting academics as: those with 6 or more out of 9 possible people modes of interaction; or those with 6 or more out of 10 possible problem solving modes; or two or more out of four community based modes; or 12 or more of all interactions taken together.

All interactions

- For the sample as a whole and across all disciplines and for each group of interactions and all interactions taken together low rated departments are associated with high intensive people interaction although the differences are relatively small.
- Academics in higher rated departments are thus slightly more likely to be specialised in a few pathways in each group of activities and all activities taken together.

E19. High interaction intensity by grant status

People Based interactions

- In terms of people based interactions, high intensity is slightly more frequent amongst academics in receipt of a grant (23%) compared to those not in receipt of a grant (21%).

Problem Based interactions

- In terms of problem solving interactions, high intensity is more frequent amongst academics in receipt of a grant (31%) compared to those not in receipt of a grant (16%).

Community Based interactions

- In terms of community based interactions, high intensity is more frequent by academics in receipt of a grant (28%) compared to those not in receipt of a grant (21%).

All interactions

- In terms of all interactions, high intensity is more frequent amongst academics in receipt of a grant (30%) compared to those not in receipt of a grant (19%).
- It thus appears to be the case that grant holders are more likely to be interacting across multiple pathways.

E20. The Role of the Knowledge Transfer Offices (KTOs)

E20.1 Contact with institution's Knowledge Transfer Offices by RAE

- 43% of academics had some contact with their KTO.
- The level of contact is lower for academics from top rated departments, and this pattern is consistent across the three broad disciplines.
- Lack of awareness of the services of the KTO was highest amongst academics from top rated departments (24%) compared to academics from medium rated (18%) and low rated (20%) departments.

E20.2 Contact with institution's Knowledge Transfer Offices by grant status

- The share of those having some contact with the KTO is higher for academics with a grant (60%) compared to those without a grant (41%). This pattern is consistent across the three broad disciplines.
- A lack of awareness of the services of the KTO was higher for academics without a grant (23%) compared to those with a grant (10%). This pattern is consistent across the three broad disciplines.
- It thus appears that whereas being a member of a high ranked department is more likely to be associated with somewhat less contact with the KTO when we hold that constant in the matched sample we find that grant holding is associated with more contact.

E20.3 Initiation of interactions by RAE score

- The most frequently cited initiators were individuals associated with the external organisations – with 80% of all academics citing this channel. This pattern is similar for departments with different research rankings.
- The second most frequently cited initiator was mutual actions following from informal contact – with 69% of all academics citing this channel and very small differences across research rankings with the proportions for low, medium and high ranked departments being 70%, 69% and 68% respectively. Thus there is a strong demand pull associated with external relationships and substantial use of informally initiated pathways.
- The lowest cited initiator was the KTO – with only 24% of all academics citing this channel. Academics in low ranked departments (29%) tend to cite the KTO channel more than those in medium (24%) and high ranked departments (18%).
- Taken as whole the relatively low frequency of links initiated through KTOs reflects the very wide range of external interactions many of which do not involve KTO mediation.

E20.4 Initiation of interactions by grant status

- Academics with a grant (83%) are more likely to cite individuals associated with the external organisations as initiators compared to academics without a grant (79%). Demand pull is therefore stronger for this group.
- This pattern is driven by the results for Sciences and Social sciences.
- Academics with a grant (68%) are more likely to cite own actions by the academic as the indicator compared to academics without a grant (63%).
- Academics with a grant (25%) are marginally more likely to cite the KTO compared to academics without a grant (24%).
- Taken as a whole these results suggest that grant holders are somewhat more likely to cite each pathway and marginally more likely to cite KTO involvement. This may reflect their tendency to be more likely than non-grant holders to be involved in external problem solving activities and is also consistent with their relatively higher likelihood of having had some contact with their KTO.

E21. Motivations for participating in interactions by RAE score

- Respondents were asked to indicate their motivation for participating in interactions with external organisations by scoring each of 11 motivations on a scale of 1 to 5 (where 1 is of no importance and 5 is very important).
- The main motivations to engage with external organisations were concerned with developing the research activities of academics. The highest scores were 4.2 for academics from the Social sciences in medium and high ranked departments.
- The second highest scoring factor was to keep up to date with research in external organisations. This scored 3.6 by all academics and was scored highest by academics in low ranked departments.
- The third highest scoring factor was to test the practical application of research. This scored 3.5 by all academics. This was particularly scored highly (3.7) by academics from the Sciences.
- The fourth highest scoring factor was to further the institution's outreach mission. This scored 3.2 by all academics and was scored highest by academics in low ranked departments.
- Academics in low ranked departments were more motivated than those in higher ranked departments by outreach mission, teaching, student placements, and the pursuit of business opportunities.

E21.1 Motivations for participating in interactions by grant status

- The highest scoring factor is to gain insights in the area of the academic's research area. Here the highest score was 4.3 for academics from the Social sciences that are in receipt of grants.
- The second highest scoring factor was to keep up to date with research in external organisations. This was scored highest by Scientists (3.6), and lowest by academics from the Arts and humanities in receipt of a grant (3.2).
- The third highest scoring factor was to test the practical application of research. This was scored highest by Scientists and Social scientists in receipt of a grant (3.7).
- The fourth highest scoring factor was to further the institutions outreach mission. This was scored highest by academics from the Arts and humanities not in receipt of a grant (3.5), and lowest by Scientists in receipt of a grant (3.0). It appears that both lower rated RAE status and not having a grant are associated with a higher motivation to interact externally based on the university's outreach mission.
- Securing access to external expertise was scored highest by Scientists in receipt of a grant (3.4), and lowest by academics from the Social sciences not in receipt of a grant (2.8).
- The first equal seventh highest scoring factor was to secure access to specialist equipment. This was scored highest by Scientists in receipt of a grant (3.1), and lowest by academics from the Arts and humanities (2.5).
- Gaining knowledge useful for teaching was scored more highly by academics not in receipt of a grant. This is consistent with the finding that research excellence rating is inversely linked to external interaction motivated by teaching needs, as is the finding that student projects and placements tended to be scored highly by academics not in receipt of a grant.
- The third seventh equal highest scoring factor was to secure funding for researchers and equipment. This was scored highest by Scientists in receipt of a grant (3.7), and lowest by academics from the Arts and humanities not in receipt of a grant (2.3).
- The tenth highest scoring factor was concerned with looking for business opportunities linked to research- this was scored highest by Scientists (2.5), and lowest by academics from the Arts and humanities in receipt of a grant (1.7).
- The lowest scoring factor was concerned with raising personal income and non-grant holders scored this factor more highly than grant holders.

E22. Impact of interactions

E22.1 Impact of interactions on research by RAE score

- 73% of academics who engage with external organisations believe that it has given them new insights into their research work. This is marginally higher for academics in low ranked departments (74%), which is mainly due to the responses from academics in the Arts and humanities.
- 71% of academics who engage with external organisations believe that it has led to new contacts in the field. Once again this is slightly higher for academics in low ranked departments in the Arts and humanities (73%) as well as for those in medium ranked departments in the Social sciences (73%).
- 58% of academics who engage with external organisations believe that it has strengthened their reputation. This is broadly similar across different disciplines and different ranked departments.
- Around 11% of academics who engage with external organisations believe it has had very little or no impact on their research with little systematic variation by RAE status.

E22.2 Impact of interactions on research by grant status

- Gaining new insights into their research is highest for academics from the Social sciences in receipt of a grant (83%) compared to 73% in the sample as a whole.
- The proportion of academics who believe that it has led to new contacts in the field is highest for academics from the Social sciences in receipt of a grant (77%) compared with 70% for the sample as a whole and 71% for social science non-grant holders.
- The proportion of academics who believe that it has led to new research projects is 72% for those with a grant compared to 60% for those not in receipt of a grant. These differences are highest for Scientists (in receipt of a grant 74%, not in receipt of a grant 66%) and in social science (grant holder 73%, non-grant holder 58%).
- Overall, 58% of academics who engage with external organisations believe that it has strengthened their reputation. This is broadly similar across different disciplines and between grant and non-grant holders.
- The proportion of academics who engage with external organisations and believe it has had very little or no impact on their research varies very little by grant status.

E22.3 Impact on interactions on teaching by RAE score

- 50% of academics who engage with external organisations believe it has had an impact on their teaching through the way that they present their material. The proportion is highest for academics in low ranked departments (56%) compared to those from medium (47%) and high ranked (46%) departments.
- In general all types of teaching impacts are higher in lower RAE rated departments and this is consistent with the earlier finding that external interactions in low rated

departments are more frequently motivated by gaining knowledge that could be useful for teaching and for developing student projects and placements.

E22.4 Impact on interactions on teaching by grant status

- 50% of academics who engage with external organisations believe it has had an impact on their teaching through the way that they present their material. For those not in receipt of a grant, the proportion is 53% compared to 38% for those in receipt of a grant.
- In all teaching impacts non-grant holders are generally much more likely to report positive impacts and are less likely to report no or little impact.

E22.5 Weight given to factors in career advancement by RAE score

- Research and publications is considered by far the most important factor in terms of promotion (4.4). This is consistent across disciplines and is more important for academics from high (4.7) and medium ranked (4.6) departments compared to those from low ranked departments (4.0).

E22.6 Weight given to factors in career advancement by grant status

- The weight given to the factors varies little in absolute terms between the grant holding and non-grant holding groups.

E23. Barriers to interaction

E23.1 Constraints on interactions by RAE score

- The most frequently cited constraints are a lack of time (66%) and bureaucracy and lack of flexibility in university administration (31%).
- Academics in low ranked departments are more likely to cite constraints.
- In the case of lack of time the differences are quite large (71% in low compared to 60% in the top ranked departments).
- The same is true for bureaucratic problems (39% in low ranked departments compared to 30% in medium ranked departments and 24% in high ranked departments); insufficient resources from the university (33%, 24% and 19% respectively) and poor marketing and other university skills (23% low, 16% medium and 11% high).
- The only cases in which high and medium rated departments have a higher reported frequency of constraint is in relation to reaching agreement on IP where academics in the medium rated departments score highest (9% low, 12% medium, 10% high) and cultural differences which are most frequently cited in high rated departments (6% low, 7%

medium, 8% high). These constraints are however at the bottom of the list for academics in all types of department.

- Academics in the Sciences in highly rated departments are, as might be expected given their relatively high propensity to patent, most likely to cite IP difficulties (12% low rated departments, 15% medium and 16% high rated departments).

E23.2 Constraints on interactions by grant status

- Academics with grants are generally more likely to report constraints, especially lack of resources in external organisations (29% compared to 23%) and lack of interest by external organisations (26% compared to 19%).
- A number of constraints are, however, less frequently cited by academics with a grant. Thus constraints arising from bureaucracy and inflexibility, are lower for academics with a grant (29%) compared to those without a grant (32%); as are insufficient internal resources (20% compared to 27%); insufficient rewards which is slightly lower for academics with a grant (28%) compared to those without a grant (29%) and poor marketing (15% compared to 17%).

1. Introduction

This report analyses the links between research performance, research funding models and the knowledge exchange activities, motives and constraints of academics in the UK. It focuses in particular on the characteristics of the UK system of Dual Funding Support in which University research funding is provided by the twin routes of institutional block grants from the Funding Councils based on periodic quality assessment exercises and funding won in peer reviewed competition from the Research Councils.

The report provides a statistical analysis of the anatomy of the Dual Funding System and its evolution since the 2001 Research Assessment Exercise (RAE). It also provides a detailed statistical analysis of the pattern of impact pathways of UK academics cross classified both by research council grant holding status and by the RAE rankings of their departments. These cross classification are designed to correspond to the two components of the UK dual funding structure. We also, as a robustness check, compare the impact pathways of matched samples of grant-holders and non-grant holders where the matching is based on age, gender, seniority, department and university. Each of which may have an effect upon the range and breadth of impact pathway activity carried out by an individual academic irrespective of the RAE standing of his or her Department and whether or not a grant is held.

The statistical analyses are based on several sources of data. First, detailed data on the interaction pathways of individuals contained in the CBR Survey of 22,000 UK academics (Hughes et al. 2010). Second, research council data on individual grants awarded over the period covered by the CBR survey (roughly 2006-9). Each of the academics in the CBR survey has been classifiable as the holder or non-holder of a research council award and is also assigned to a unit of assessment at their university classified in terms of the proportion of its research classified as of the highest quality (4*) as the result of the Research Assessment Exercise (RAE) 2008. This allows us to compare the pathway characteristics of academics cross classified by whether or not they held a grant and also by the quality profile of their unit of assessment in the RAE of 2008. In addition we collated annual data for 2002/3 to 2010/11 based on the Quality Related (mainstream QR) allocation of research funds arising from the Research Assessment Exercises (RAEs) of 2001 and 2008. This data is at the unit of assessment level for each UK university. Finally we collated data from the Higher Education Statistics Agency (HESA) on the total research income of UK universities disaggregated by source. We then created a panel database linking the HESA and mainstream QR assessment data for the period 2002/3 to 2010/11[2]. We use this to chart the evolution of the dual funding structure over that period.

The report presents first a review of the evolution of the Dual Funding System and associated patterns of research income across universities and by sources of income. It then provides an in depth analysis of the academic survey impact pathway indicators with a separate section for each survey impact pathway question.

2. The Dual Support System

Public funding for research in the university sector in the UK is provided through two main routes. The first part of the dual support system is the allocation of funds through the Funding Councils for England, Scotland and Wales and the Department for Employment and Learning in Northern Ireland based upon periodic Research Assessment Exercises. This is the mainstream QR or quality related component of research funding. The Funding Councils have also in recent years allocated further

[2] Annex 1 provides an overview of the data collation process and the problems overcome in creating a disaggregated panel data set.

sums based not on research quality assessment but on the attraction of business or charity funding and the scale of PhD training provision[3]. The second element of the dual support system is research funding allocated through the research councils and which covers the whole of the UK.

Seven research councils are responsible for allocating their funding via peer review of grant applications. They are the Arts and Humanities Research Council (AHRC), the Biotechnology and Biological Sciences Research Council (BBSRC), the Economic and Social Research Council (ESRC), Engineering and Physical Sciences Research Council (EPSRC), the Medical Research Council (MRC), the Natural Environment Research Council (NERC), and the Science and Technology Facilities Council (STFC).

The dual support system combines forward and backward looking allocation methods. The research council element is in principle an essentially forward looking exercise since funding is based on proposed research activities. Awards will however inevitably reflect research reputation and be based to some degree on past work. In contrast the mainstream QR element is based on a periodic backward assessment of research performance.

Research Assessment Exercises (RAE) have been carried out in the UK periodically since 1986 with two since the turn of the century in 2001 and 2008 respectively. Successive assessment exercises have varied in the precise way in which ratings of quality have been defined and in the way in which the weights attached to quality grades for resource allocation purposes have been determined[4]. They have focussed centrally on the assessment of the quality of research output in the form of publications. Initially the motivation behind assessment was to concentrate resources on high quality research institutions and to raise overall quality (Adams and Gurney 2009, Geuna and Martin 2003, Hare 2003). Concerns about overconcentration of funding in a few dominant institutions after successive rounds of assessment and the consequent potential underfunding of high quality research led in 2008 to research quality profiling instead of single overall assessment grades for units of assessment (Adams and Bekhradnia 2004, Barker 2007, Hare 2003, Roberts 2003). The debate over whether and to what extent research concentration has or should be increased or decreased continues as does debate over its impact in different disciplines (London Mathematical Society 2010, Ramsden 2009, Russel Group 2010, Universities UK 2009, Adams and Gurney 2009, HEFCE 2010, Brown 2009, Gilroy and McNamara 2009). Given the cost of the RAE at £47.3 million for RAE 2008 or c£600K per HEI (PA Consulting group 2009) debate over how a more simple metrics based mainstream QR might compare with the current peer evaluation of submissions has also continued (see for example Hare 2003, Sastry and Bekhrandia 2006, Diggle and Chetwynd 2006). The next assessment is to be carried out in 2013. This will incorporate for the first time (and after extensive consultation) an assessment of wider impacts beyond publications based on impact case studies. These will be assessed and weighted alongside publications in deciding the allocation of mainstream QR across units of assessments and hence between institutions (HEFCE 2011a). This change too is not without its drawbacks (see for example Martin 2011). Although the assessments are carried out at the level of individual departments (units of assessments) and the amount each university is awarded is essentially based upon the sum of the amounts awarded to each of their departments, the funding is awarded as block grant. There is no requirement that universities allocate the block of mainstream QR they receive to the departments 'earning' it. As a result mainstream QR is distinguished from research council funding both by being backward looking and by decentralizing to

[3] In addition the English councils also make additional awards based on London weighting and National Libraries (see Annex 1).

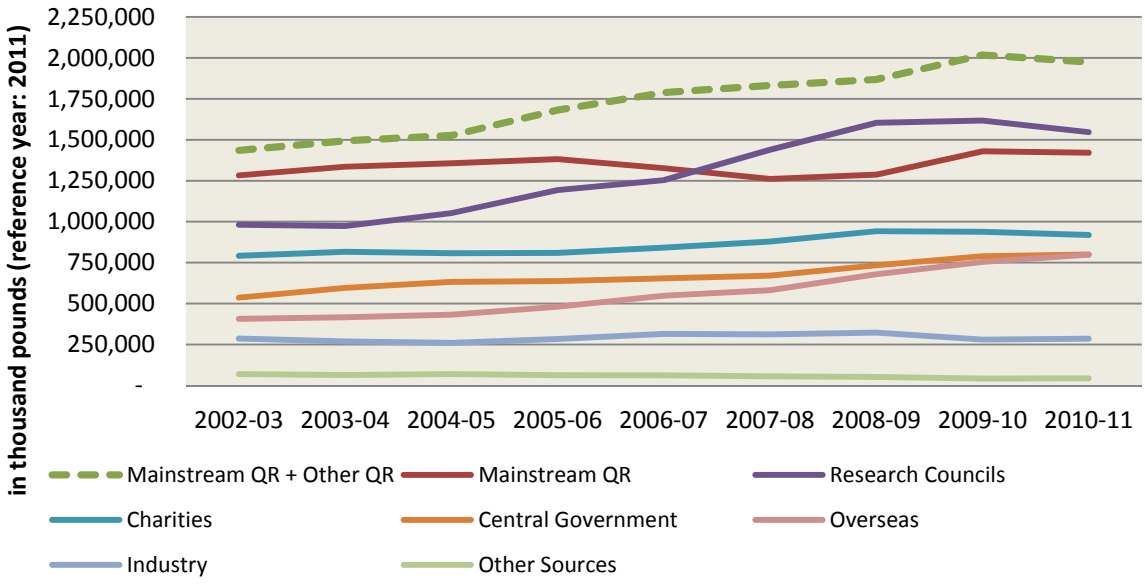
[4] Annex 1 sets out the process and the allocation procedure used in the last assessment exercise in 2008. For the allocation outcome of the 2008 RAE in a wider science funding context see BIS 2010b and for discussions of earlier years and comparisons with other countries see Barker 2007, Box 2010, Hicks 2012, Hare 2003 Guena and Martin 2003).

universities the allocations of resources across departments and hence individual researchers and research groups.

In addition to funding through the dual support system individual universities may receive funding for research from a variety of other sources. These may be grouped by source into charities; central government; industry; overseas funders, including EU sources; and other sources. Trends in these sources from 2002-2010 are shown in relation to the Funding Council and Research Council data in Exhibit 2.1[5]. The exhibit shows a significant increase in real terms in both mainstream QR and especially research council funding which reflects in part the enhancement of this source of funding from 2004 onwards to include the Full Economic Costs of Research[6]. There have also been significant increases in income from overseas sources, from the central government and from charities. There has been a much lower rate of increase in funding for university research from industrial sources. Industrial sources are also significantly lower than funding from charities, central government and overseas. The miscellaneous other sources group has remained relatively constant in real terms. The exhibit also shows the increase in the importance of 'other' QR relative to mainstream QR since 2005.

In the analysis which follows we focus on the period shown in Exhibit 2.1 which begins with the mainstream QR allocations of 2001 in place and includes in its final two years the mainstream QR allocations following the 2008 exercise.

Exhibit 2.1 The Funding of UK University Research: Dual Support and Other Sources 2002-3 to 2010-11 (in 2011 Prices)



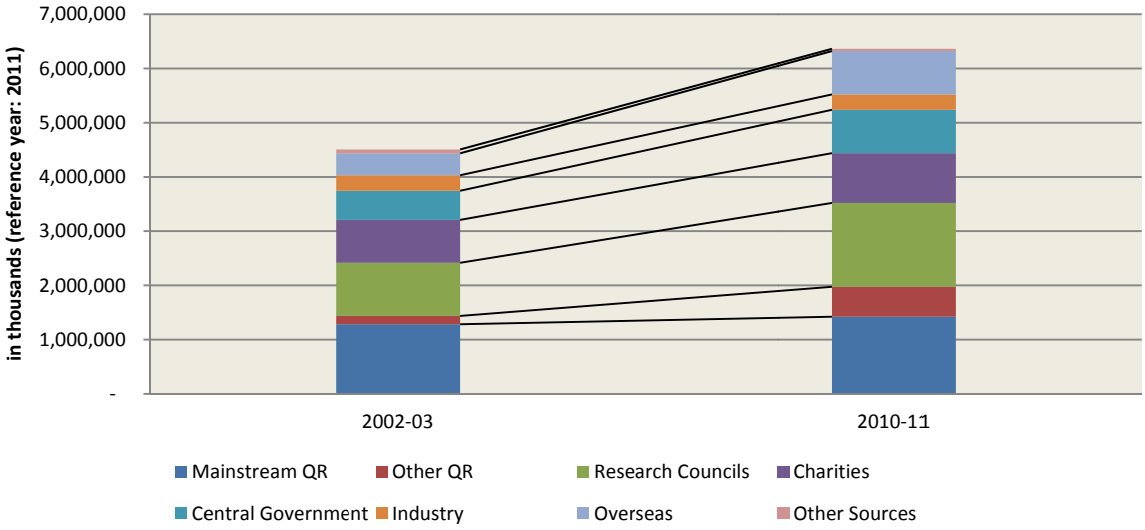
Source: Authors' calculations based on HESA Financial Statistics

[5] The data shown in Exhibit 2.1 begin in 2002/3 which is the first year in which the mainstream QR allocation arising from the 2001 RAE is reflected in the allocation. The effects of the 2008 RAE are reflected in the mainstream QR allocations for the last two years in the series (2009/10 and 2010/11). The periodic nature of the mainstream QR allocation process relating to the outcome of RAE analyses means that mainstream QR levels and patterns change slowly between RAE exercises and will show some discontinuities in the immediate aftermath of such exercises.

[6] See for example Alexander 2009 and Wakeham 2010.

Exhibit 2.2 shows the breakdown of all sources of funds for research in UK universities by source of funding in 2002 and 2010. The first point to note is that in 2002 the dual funding system provided 53% of the total sources of funds available. This was little changed in total by 2010 where these combined sources accounted for 55%. The most significant increase was the share accruing from overseas funding which rose from 9% in 2002 to 13% by 2010. Within the Funding Council element of the Dual Support System the 'other' QR component grew from 3% in 2002 to 9% in 2010 while the mainstream QR share fell from 28% to 22%. The UK therefore has an overall funding system for research in which the combined elements of the dual system account for approximately half of the total funds available and this proportion has remained relatively stable over the period analysed in this report.

Exhibit 2.2 The Level and Distribution of Total University Research Income by Funding Source in 2002-3 and 2010-11



Source: Authors' calculations based on HESA Financial Statistics

2.1 The Distribution of Research Funding across Higher Education Institutions in the UK

It is possible to analyse the distribution of each of the sources of income examined in the previous exhibits by individual institution on a consistent basis for the period 2002/3-2010/11. In the exhibits which follow we provide a detailed analysis of the nature of that distribution and changes in it over time.

One way of summarising the overall distribution of research funding by universities is to use the Herfindahl Index which is calculated using information on each university. The Herfindahl Index is defined as

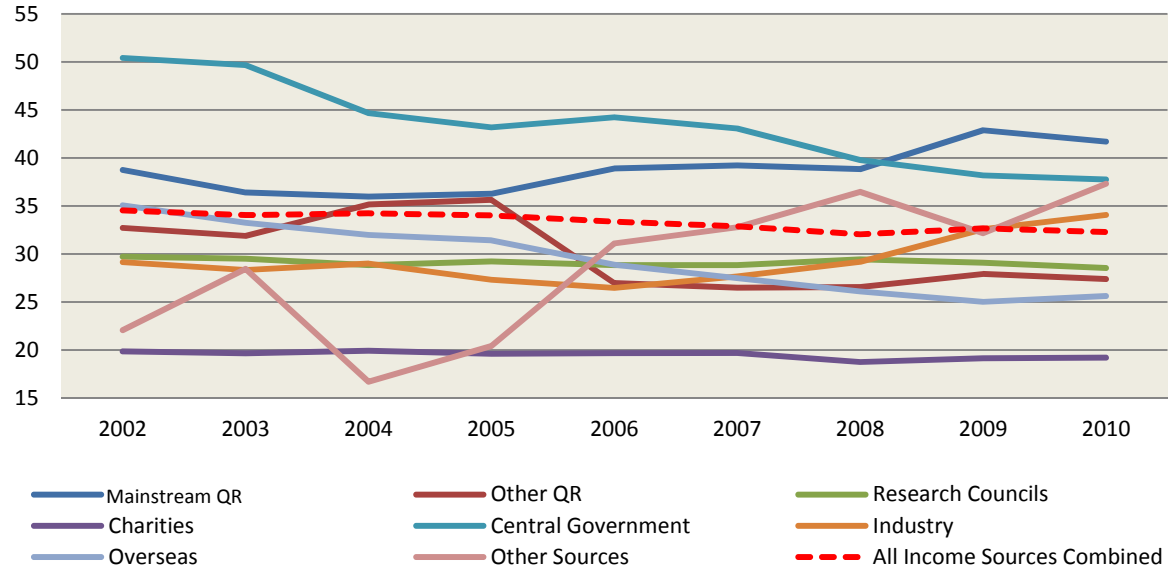
$$H = \sum_{i=1}^{N} s_i^2$$

where S_i is the share of university i in total research income, and N is the number of universities. A high value of the index indicates a high level of concentration of research income in the hands of the universities with the largest research income. A more easily interpretable value associated with the Herfindahl Index is based on the value of its reciprocal. The reciprocal of the Herfindahl Index may be interpreted intuitively as the number of equal sized universities measured in terms of research

funding which would account for the total amount of funding being considered. The lower this number is the more concentrated is the distribution.

Exhibit 2.3 plots the Inverse Herfindahl Indices for all sources of income together and each separate component. The dotted line is for all income taken together. It shows that there has been a slight fall. Thus it would take a smaller number of equal sized universities to account for total funding at the end of the period than at the beginning and this indicates an increase in the concentration of overall funds between 2002 and 2010. This overall change is the net outcome of the weighted movements in the Inverse Herfindahl Index for each of the other sources. As Exhibit 2.3 shows these follow different trends.

Exhibit 2.3 The Inverse Herfindahl Index – funding of UK HEIs 2002-2010



Source: Authors' calculations based on HESA Financial Statistics

The most significant increase in concentration across universities has come in central government income sources where the number of equivalent universities fell from 50 to less than 40. Overseas funding also showed an increase in concentration with the Inverse Herfindahl Index falling from the mid-30s to the mid-20s. In both cases therefore the distribution of these sources of income across universities became more concentrated over the period. There was little change in the pattern of concentration of charitable funding which nonetheless has the lowest Inverse Herfindahl Index and therefore is the most concentrated of the funding sources in this allocation across universities. This reflects the disciplinary concentration of charitable funding itself and the particular focus on medical and biotechnological funding through the Wellcome Trust. The pattern of concentration of industrial funding rose in the first half of the decade under consideration, but from 2006 onwards there has been some increase in the Inverse Herfindahl Index and therefore a decrease in concentration of industrial funds across the universities. The most significant decrease in concentration, but also the most volatile in its movement is the miscellaneous other sources of income.

The Dual Funding components show opposite movements to each other. In terms of mainstream QR funding the data shows a pattern of increased concentration in the first part of the decade, followed by a decrease. Concentration of mainstream QR funding across institutions has tended to become

more evenly spread and by 2010 it was the least concentrated of all sources.[7] The increase in concentration (shown as a fall in the Inverse Herfindahl Index in Exhibit 2.3) between 2009 and 2010 reflects of the change in the weighting given to the profiling of research based on the 2008 RAE between those years. The weighting used in 2010/11 gave more weight to the highest category of quality assessment than used for 2009/10. This had the effect of rebalancing the allocation towards the most research intensive universities which had more of their research profile in the higher grades. The result was an increase in concentration between 2009 and 2010 reflected in the movement of the index in Exhibit 2.3. In contrast to movements in mainstream QR, research council funding has become somewhat more concentrated over time, but the change is quite small. By 2010, however, it ranked only below overseas and charitable funding in its degree of concentration as represented by the Inverse Herfindahl Index.

Exhibit 2.4 The Distribution of Research Income across UK Universities by Main Source of Income in 2002-3 and 2010-11

	Mainstream				Research				Central						Other	
Research Income	QR		Other QR		Councils		Charities		Government		Industry		Overseas		Sources	
Decile	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010	2002	2010
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Top 10%	55%	53%	55%	63%	64%	64%	75%	77%	46%	57%	63%	60%	58%	62%	67%	55%
2	19%	20%	18%	17%	20%	20%	17%	15%	24%	22%	20%	21%	19%	18%	17%	20%
3	12%	11%	12%	8%	10%	10%	4%	4%	13%	9%	7%	9%	10%	9%	8%	12%
4	7%	7%	7%	5%	4%	4%	2%	2%	8%	5%	5%	5%	6%	5%	5%	7%
5	4%	4%	5%	3%	2%	2%	1%	1%	4%	3%	3%	2%	4%	3%	2%	4%
6	2%	2%	2%	2%	1%	1%	0%	1%	3%	2%	1%	2%	2%	1%	1%	2%
7	1%	1%	1%	1%	0%	0%	0%	0%	1%	1%	1%	1%	1%	1%	0%	1%
8	0%	1%	0%	0%	0%	0%	0%	0%	1%	0%	0%	0%	0%	0%	0%	0%
9	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Bottom 10%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Source: Authors' calculations based on HESA Financial Statistics

Note: Mainstream QR includes the Research Development Framework grant for individual Scottish Universities in 2002. Other QR in 2002 excludes the Strategic Research Development Grant for Scottish universities which is not available disaggregated by institution.

The Inverse Herfindahl Index provides a useful overview of the whole size distribution of income across universities. It is, however, revealing to look more directly at the pattern of concentration by examining the distribution of research income received by universities in terms of the decile of universities grouped by research income from highest to lowest. Exhibit 2.4 provides an analysis by decile of research income in each of the main source of income categories analysed in Exhibit 2.3, namely mainstream QR, 'other' QR, research councils, charities, central government, industry and overseas. This exhibit reveals the striking concentration of research funding in the top 10% of universities leading in terms of research income. Thus, if we look first at the data for mainstream QR, in 2002 the top 10% accounted for 55% of all mainstream QR income received by UK universities. In keeping with the evidence shown in the Inverse Herfindahl Index data series, this degree of concentration had declined somewhat by 2010, but only marginally to 53%. The data for 'other' QR shows that the introduction of funding streams linked to HEIs research funding from business and charitable sources and their PhD research activities has been associated with a rise in the share of the top 10% from 55% to 63%. The data for research councils confirm the relatively high

[7] On the other hand, the 'other' QR component shows a tendency to increased concentration. It reflects the introduction of additional grant and to universities from 2005 lined to levels of business and charity income and PhD degree programme supervision (see Annex 1).

concentration of this income compared to mainstream QR. Thus in 2002 and in 2010, the top 10% of recipients of research council funding accounted for 64% or nearly two thirds of all the funds allocated. The charitable distribution, as we might expect given the Inverse Herfindahl Index data in Exhibit 2.3, is the most concentrated of income sources. In 2002, the top 10% of charitable income received accounted for 75% of all the charitable income and that had risen to 77% by 2010. The data for central government again confirms the insights provided by the Inverse Herfindahl Index. There has been a significant increase in the concentration of central government income into the hands of the top 10% recipients of central government funding. Thus in 2002, the top 10% accounted for 46% and by 2010 57% of central government income. The data for industry reveals a small decline in the share of the top 10% of industry income from 63% to 60%. Finally, the movement in the share of overseas income, again mirroring the insights provided by the Herfindahl analysis, shows a significant increase from 58% in 2002 to 62% in 2010.

It is possible of course that different universities occupy different rankings in relation to each of these different sources of income. In order to probe this question further Exhibit 2.5 lists the top decile universities in 2002 in terms of total income. In addition, the table shows the position in the rankings occupied in each year by those who were ranked 1-16 in 2002 for total income and each source[8]. In Annex 2 we provide similar analyses for each income source.

Exhibit 2.5 for overall research income reveals a remarkable stability in rankings within the top decile of 16 universities. Thus the highly skewed distribution of research income across universities revealed by the Herfindahl and decile analyses is associated with the persistent dominance of a small number of universities. Even within the top decile the leading 5 or 6 institutions dominate. The stability in rankings within the top 16 is reflected in the value of Kendall's Coefficient of Concordance (W) [9] which is reported below Exhibit 2.5 and in each subsequent exhibit. The value of W for total income rankings over time is close to 1 and is highly significant.

The analysis for each separate source of income reported in Annex 2 Exhibits A2.1-A2.8 also reveals stability in rankings overtime[10]. Kendall's W is above 0.8 in all cases except Government income and in all cases is statistically significant at the 1% level. There are some differences in detail and other sources. These emerge when individual rankings from year to year are inspected. Thus within the dual support system mainstream QR rankings are, as might be expected, more stable than those for research council funding. This is because changes in mainstream QR patterns tend to occur only after the periodic research assessment exercises. An analysis for research council funding shows that several universities in the top decile in 2002 fall out of the top decile in one or more subsequent years and some go out and come back. Overall however very few alter their relative rankings within the original top decile so that taking all years together there is considerable stability within this

[8] It should be noted that because these tables track a constant list of universities over time their total share of a given income source in any year need not be the same as the actual top decile of universities in that year. Thus if a university which was in the top decile in total income 2002 drops out in say 2006 then the total income share shown in the table will include the share of the university which dropped out but not the share of the one that replaced it.

[9] Kendall's W (Coefficient of Concordance) is a useful non-parametric summary measure which provides a test of the degree to which the rankings of an attribute (e.g. university research income rankings) across multiple 'judges' (in our case years) are similar. Its value is bounded between 0 and 1. A high value in our case would mean that the income rankings of universities are very stable across years and a very low value would indicate substantial changes in rankings between years (Siegel and Castellan 1998 pp. 262-272)

[10] Exhibits 2.5 and Annex 2 Exhibits A2.1-A2.7 report Kendall's W for rankings within the original top deciles in 2002. We also calculated Kendall's W for all universities across all years. The respective values of W were all significant at the 1% level and ranged between 0.81 and 0.93 for all sources apart from 'other sources' where the value was 0.48 and government sources where it was 0.70.This is a remarkable pattern of stability across years. In this analysis the values of W were corrected for ties and we excluded 4 universities which had missing values for one or more sources of income in three or four years in the data series.

group as shown by the high value of Kendall's W. The least stable rankings, in terms of entry and exit from the top decile and the lower value of Kendall's W, arise in relation to income from government and the miscellaneous other sources category. This implies greater fluidity in the allocation of government research funding across institutions compared to other income sources. The analysis taken as a whole reveals some variation in the identity of the top 16 universities across different sources of income. There are, for instance in relation to charities income, a number of institutions not present in other listings because of their specialisation in medical and biopharmaceutical research (e.g. the Institute of Cancer Research and the University of Dundee).

Exhibit 2.5 UK University Top Decile Rankings by Total Research Income

University	Rank 2002	Total UK University Research Income* (£000s) 2002	% Total UK University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Total UK University Research Income (£000s) 2010	% Total UK University Research Income 2010
The University of Cambridge	1	277,216	6.2%	1	1	2	3	2	3	4	2	398,103	6.3%
Imperial College of Science, Technology & Medicine	2	277,088	6.1%	4	4	3	2	3	2	2	3	394,806	6.2%
The University of Oxford	3	276,133	6.1%	2	2	1	1	1	1	1	1	493,909	7.8%
University College London	4	275,464	6.1%	3	3	4	4	4	4	3	4	391,558	6.2%
The University of Manchester	5	193,160	4.3%	5	5	5	5	5	5	5	5	279,183	4.4%
The University of Edinburgh	6	167,214	3.7%	6	6	6	6	6	6	6	6	257,825	4.1%
King's College London	7	159,161	3.5%	7	7	7	7	7	7	7	7	205,470	3.2%
The University of Glasgow	8	134,872	3.0%	10	10	14	8	8	8	8	8	175,871	2.8%
The University of Southampton	9	124,245	2.8%	8	9	8	13	13	13	15	15	139,021	2.2%
The University of Leeds	10	123,769	2.7%	9	11	10	9	9	9	9	9	173,848	2.7%
The University of Birmingham	11	121,568	2.7%	12	12	11	11	12	11	13	14	146,159	2.3%
The University of Sheffield	12	113,748	2.5%	11	8	9	10	10	12	14	13	147,205	2.3%
The University of Nottingham	13	110,033	2.4%	15	15	15	15	14	14	10	11	151,729	2.4%
The University of Bristol	14	107,891	2.4%	13	14	12	12	11	10	11	10	160,557	2.5%
Cardiff University	15	100,948	2.2%	14	13	13	14	16	15	16	16	125,631	2.0%
The University of Liverpool	16	95,742	2.1%	17	16	16	16	15	16	12	12	147,904	2.3%
Subtotal All Sources (top 10%)		**2,658,250**	**59.0%**									**3,788,779**	**59.5%**
Total All Sources (in thousands)		**4,506,203**										**6,363,644**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.919^{++} significant at the 1% level

Source: *Authors' own calculations based on HESA Financial Statistics*

Note: The Strategic Research Development Grant for Scottish universities is not available disaggregated by individual university. It is therefore not included in the shares of the Scottish universities in the top 10% in 2002.

The skewed distribution of research income and its persistence over time is the outcome of a dual support process of allocation in which, as we have seen, part of income accrues as a result of mainstream QR allocation based on retrospective assessment of research output quality (through Research Assessment) and partly through forward looking judgements on projects supported through the research councils. It is of interest to see, therefore if these different processes of forward and backward looking judgements lead to different resource allocation patterns. To examine this we have carried out an analysis of the evolution of patterns of income across universities comparing mainstream QR with research council and other sources of income more generally.

We begin by comparing the pattern of change in income from 2002/3 - 2010/11 for each university for each income source. This pattern can be summarised by comparing the results of regressing each university's income in the final year of our data with its income at the beginning of the period. This can be done for each income source. Since the data on income is highly skewed we use a standard logarithmic transformation of the income variables and estimate the following equation[11] across institutions where *i* indexes institutions (*i=l-n*) for each source of research income.

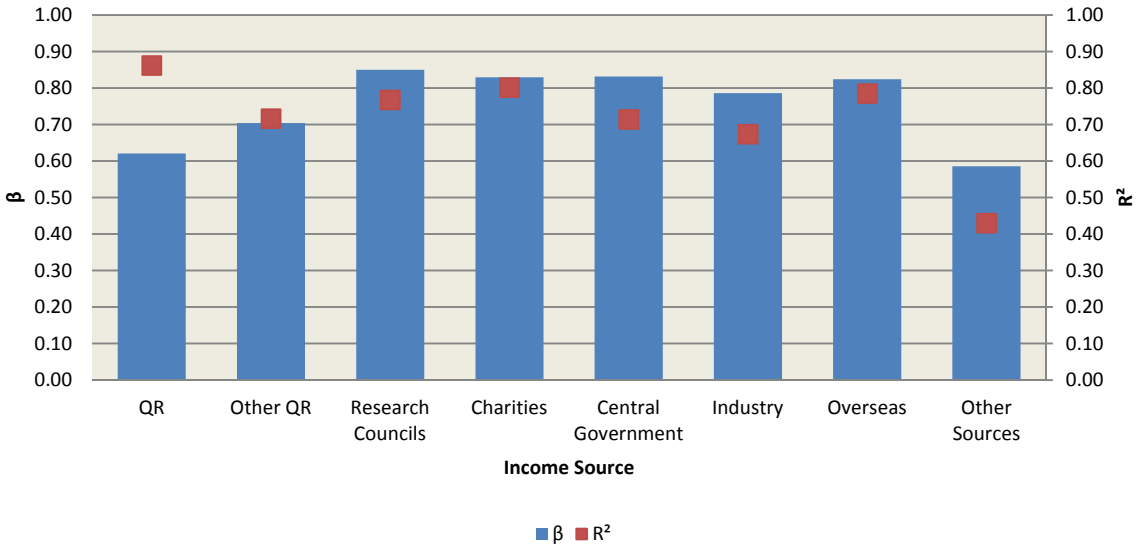
$$Eq.\ 1 \qquad Log\ (Income\ Source\ 2010/11)_i = \alpha + \beta\ Log\ (Income\ Source\ 2002/3)_i$$

Estimating this equation enables us to see the extent to which the various retrospective and forward assessments have produced different changes in the pattern of the distribution of income across universities over time. The β coefficient in this equation has a convenient interpretation. If the coefficient is equal to 1 then the best prediction of 2010/11 income is simply 2002/3 year income plus a random variable. If the coefficient is greater than 1 then universities which already had a high income in 2002/3 will be more likely to have a high income in year 2010/11. Conversely if the coefficient is less than 1 the universities which had relatively low income in 2002/3 will have gained relatively to those which had high income in 2002/3.

Exhibit 2.6 summarises graphically the result of estimating Eq. 1 across each source of income between 2002/3 and 2010/11.

[11] This equation is frequently estimated in analyses of business growth as a way of testing the Law of Proportionate Effect (LPE) or Gibrat's Law. The LPE states that growth is independent of size. If it holds then the growth process for a constant population of businesses typically yields highly skewed size distributions such as those which characterise the distribution of income across universities. These skewed distributions arise because of the *variance* in growth rates even though *mean* growth rates may not differ between size classes. The tendency for skewness to rise will be offset if universities in smaller income size classes on average grow faster and will be reinforced if universities in higher income size classes grow faster (see for example the discussion in the context of business growth in Dunne and Hughes (1994)).

Exhibit 2.6 The Relationship between Opening and Closing Year Research Income by Income Source 2002/3 to 2010/11[12]



Note: The bars show the beta coefficient and the squares the R^2 from the regression equation $\log(\text{Source 2010/11})_i = \alpha + \beta\log(\text{Source 2002/3})_i$

Exhibit 2.6 shows the estimated β and the R^2 from the estimated equations. In every case the estimates shown are statistically significantly different from 1 at the 1% level and in each case except other income sources a very high percentage of the variation across universities in final year income is explained by opening year income. This indicates that the stability in pattern we have examined within the top decile is true for the population of universities as a whole. The β coefficient is less than 1 for each type of income source. It was lowest in mainstream QR and other sources and closest to 1 for research council funding. This implies in each case that universities with smaller levels of research income in 2002/3 on average had a tendency to experience faster growth in income over the period analysed. In all except mainstream QR and other sources this tendency was slight (i.e. β was closer to 1). From the perspective of the dual support system there is a notable difference between the relationship for mainstream QR and that for research council funding with β for the former much lower than the latter. This tendency for smaller mainstream QR income universities at the beginning of the period to have gained relative to large income recipients is one of

[12] *The regression results underlying Exhibit 2.6 are*

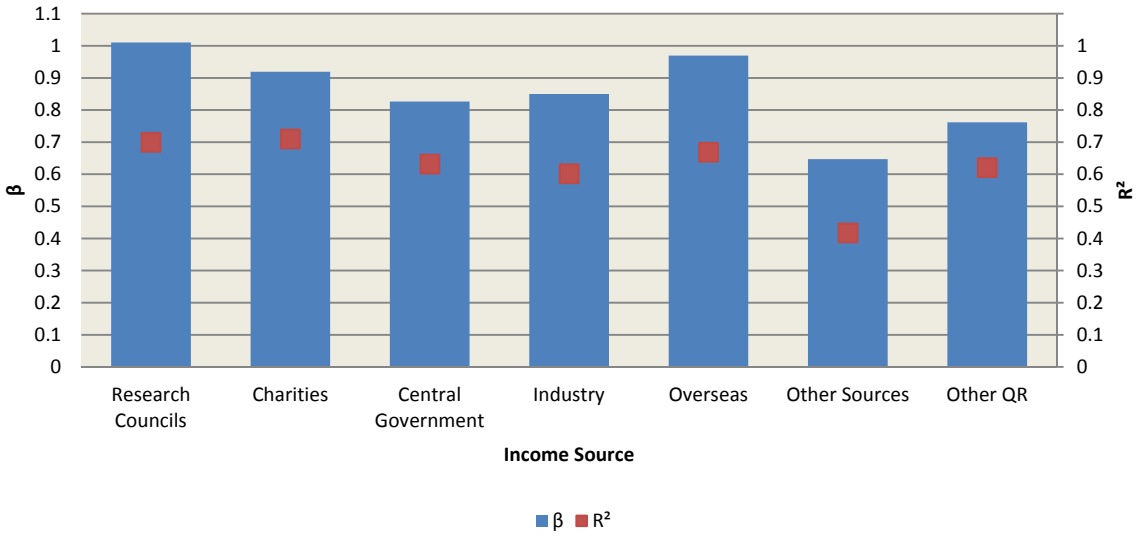
Log Income Source 2010/11	β Log Income Source 2002/3)	R^2
Mainstream QR	0.621	0.862
'Other' QR	0.704	0.716
Research Councils	0.850	0.768
Charities	0.829	0.801
Government	0.832	0.714
Industry	0.786	0.674
Overseas	0.824	0.785
Other	0.586	0.430

the reasons why research income concentration in mainstream QR has fallen slightly in absolute terms and relative to research council concentration (which as we have seen in our earlier decile analysis rose over the period)[13].

So far we have concentrated on differences in the distribution of research income across universities. We now turn to the relationship between these types of source and in particular the relationship between the elements of the dual support system.

Exhibit 2.7 summarises the results of a regression equation in which we regressed the value of each type of income source in 2002/3 against mainstream QR in 2002 (which is the first year which reflects the mainstream QR allocation arising from the 2001 RAE). Exhibit 2.8 repeats the analysis for the final year in our data series which is 2010/11 and which reflects the position two years after the 2008 RAE allocation exercise.

Exhibit 2.7 The Relationship between Mainstream QR and other Types of Income Source in 2002/3

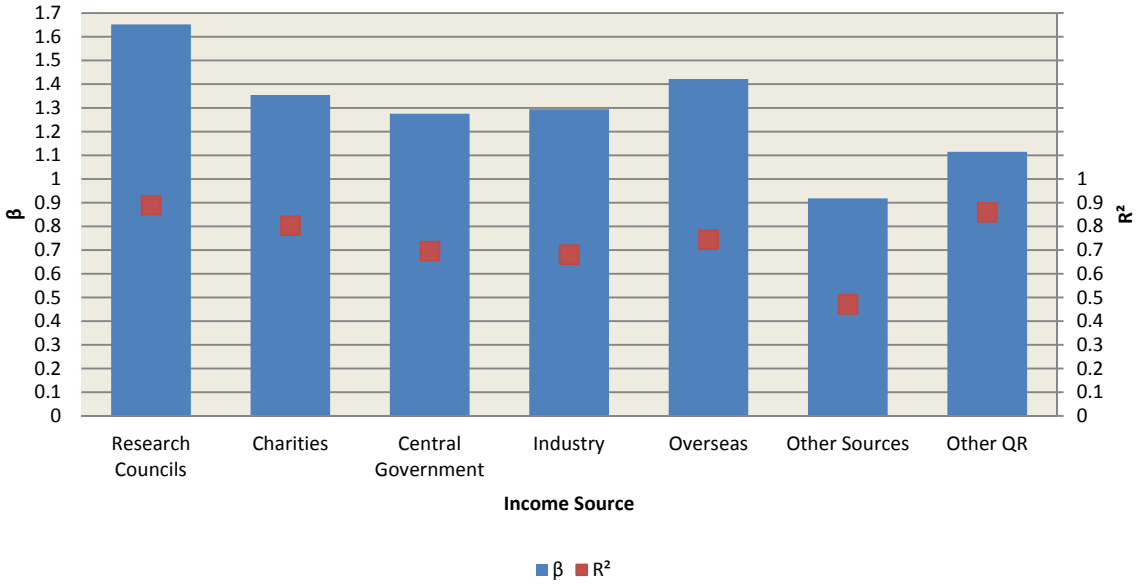


Note: The bars show the beta coefficient and the squares the R^2 from the regression equation

$$\log(\text{Source } 2002/3)_i = \alpha + \beta \log(\text{mainstream QR } 2002/3)_i$$

[13] The skewness or concentration of research Income can rise even if β is less than one because of the variance across universities in growth rates of research income. Even though on average smaller income recipients at the beginning grow faster than large income recipients some of the large income recipients nonetheless experience high growth rates which push them even further out at the top end of the size distribution and some of the lowest size class experience slow or negative growth and get pushed further out at the bottom of the distribution. The larger the variance of growth rates the further must β be below 1 to offset the effect of the variance in increasing the skewness of the size distribution of income.

Exhibit 2.8 The Relationship between Mainstream QR and other Types of Income Source in 2010/11



Note: The bars show the beta coefficient and the squares the R^2 from the regression equation

$$\log(\text{Source } 2010/11)_i = \alpha + \beta \log(\text{mainstream QR } 2010/11)_i$$

The estimated equation which is summarised in these two exhibits takes the form of regressing the log of each source of income in the year in question against the log of mainstream QR in that year. The logarithm of the underlying values of income is taken because of the extreme skewness in the size distribution of university income.[14] A higher value of β implies a higher responsiveness of the source of income to a change in mainstream QR. Exhibits 2.7 and 2.8 reveal that there is a high correlation in general between income obtained through the research assessment mainstream QR route and other sources of income in both 2002/3 and 2010/11[15]. In both Exhibits 2.7 and 2.8 the proportion of the variability in each source of income which is explained by variation in mainstream QR lies between around 40% and 90% (shown by the value of R^2 in the exhibit). In some cases this still means that a substantial amount of variation in each source of income remains unexplained by mainstream QR. Thus, for example, in the case of the relationship of mainstream QR and research council funding in 2002, the proportion of the variation in RC Funding explained by mainstream QR is over 70% leaving 30% of the variation unexplained by mainstream QR alone. In 2010/11 the proportion of the variation in income sources accounted for by mainstream QR has become closer (as represented by the higher value R^2 in Exhibit 2.8 compared to Exhibit 2.7). In general these results suggest a strong pattern of correlation between income sources and between research council funding and mainstream QR in particular.

[14] For some sources of income some universities had no relevant income in the years in question. Since it is not possible to take a logarithm of zero, we followed conventional practice in this area and added an arbitrary unit value of 1 to each of the cases of zero so that a logarithm could be taken and no observations were lost.

[15] All of the beta coefficients are statistically significant at the 1% level. We carried out this regression analysis for each year with similar results to those reported in the text. We focus on post RAE years in the text because mainstream QR allocation is most significantly reallocated in those years.

It is sometimes argued that the fact that there is a close correlation between research council income and mainstream QR implies that a simpler process for allocating mainstream QR would be to use past success in obtaining research council grants as a basis for its allocation[16]. As an illustrative exercise therefore we took the total value of mainstream QR to be allocated in the two years 2009-10 and 2010-11 (which followed the 2008 Research Assessment Exercise) and distributed it across institutions on the basis of the shares of each of those institutions in total research council funding summed over the period 2002-3 to 2008-9. By comparing the distribution of mainstream QR on the basis of this hypothetical allocation rule with the actual allocation of mainstream QR in the two years following the 2008 RAE, we were able to obtain estimates of what the effect of replacing the RAE exercise by the simple research council share rule would have been.

The mean difference between the actual and hypothetical allocation of mainstream QR allocation was zero. This might be taken to imply that it would have been simpler to have used the research allocation rule than the much costlier and resource intensive RAE process. However, there is skewness in the distribution of percentage impacts around the zero mean effect. In a number of cases the absolute effect of using the hypothetical allocation would have been quite substantial. The biggest loser suffered a decline of 0.9% whilst the maximum gain for an institution was 2.6%. In general, because of the extreme skewness in the underlying distribution of the mainstream QR and research council funding, those in receipt of major mainstream QR and RC income would have been disproportionately affected. This was particularly so for a number of universities which were even more dominant in the research council funding arena than in the actual allocation of mainstream QR. As we have seen, RC funding is more highly concentrated than mainstream QR so that a switch to an allocation rule based on past research council funding would increase the overall concentration of research funding in the hands of the top handful of research income receiving institutions.

[16] For a review of these and related arguments see for example Hare 2003 and Diggle and Chetwynd 2006.

3. The Academic Survey: Pathways to Impact and the Dual Funding Structure

3.1 Overview

Each of the academics in the CBR survey (Hughes et al. 2010[17]) has been classified as the holder or non-holder of a research council award and is also assigned to a unit of assessment at their university classified in terms of the proportion of its research classified as of the highest quality (4*). This allows us to capture the two core elements of the dual funding system and link them to our academic survey datasets. It also allows us to begin to look at the interaction between individual researcher performance and outcomes and the excellence framework which is used to allocate mainstream QR funding.

The detailed evidence is presented in successive sections below. Each of these sections corresponds to a research and impact pathway variable derived from the academic survey. Each section contains a set of graphical exhibits showing, first, a cross- classification of academic responses by RAE rating of departments, and then a cross classification by whether or not an academic holds a grant. In each case the results are shown for the academic sample as a whole and for the three broad disciplinary groupings of Arts and humanities; Sciences; and Social sciences. A full set of tables showing the data underlying each graphical exhibit is contained in Annex 2. The tables in Annex 2 also report the levels of statistical significance of differences between academic groups either in terms of RAE rating or grant holding status.

In each section reporting the results of cross-classification based on grant holding, we also report the results of an analysis of matched samples of grant holders and non-grant holders. The matching is based on discipline, age, gender and seniority. By removing the possible effects of these variables on impact pathway activity the effect of grant holding per se is better identified and in particular we can assess whether grant-holding has an independent or different effect from disciplinary RAE rating since each grant holding academic is matched with a non-grant holder in the same university unit of assessment. The matched sample analysis is carried out for all respondents as a group; for Arts and humanities and for Social sciences and for a breakdown of Sciences into Health sciences; Biology Chemistry and Veterinary science; Physics and Mathematics; and Engineering and Materials science. For reasons of space we discuss, but do not present the graphical or tabulated results of the matched sample analysis in the main text. The tables and graphical exhibits for the matched sample are reported in full in Annex 3. In the full non-matched sample the large sample sizes typically produce differences which are statistically significant even when absolute differences are very small. The smaller sample size in the matched sample analysis produces fewer statistically significant results. In both cases it is important to consider the economic as well as the statistical significance of the differences reported.

[17] The CBR Survey covered all academics in all disciplines in all universities in the UK. The survey was conducted on-line between September 2008 and June 2009. There were 22,170 respondents representing 17.8% of the population of 126,120 individuals approached. This is the largest academic survey in the world to date and the most comprehensive in disciplinary coverage. The respondents are broadly representative of the academic population surveyed, with a slight tendency for respondents to be on average more senior than the population, somewhat less likely to be drawn from the medical sciences and somewhat more likely to be drawn from the biosciences, physical sciences and administrative business and social studies. For a full discussion see Hughes and Kitson (2012).

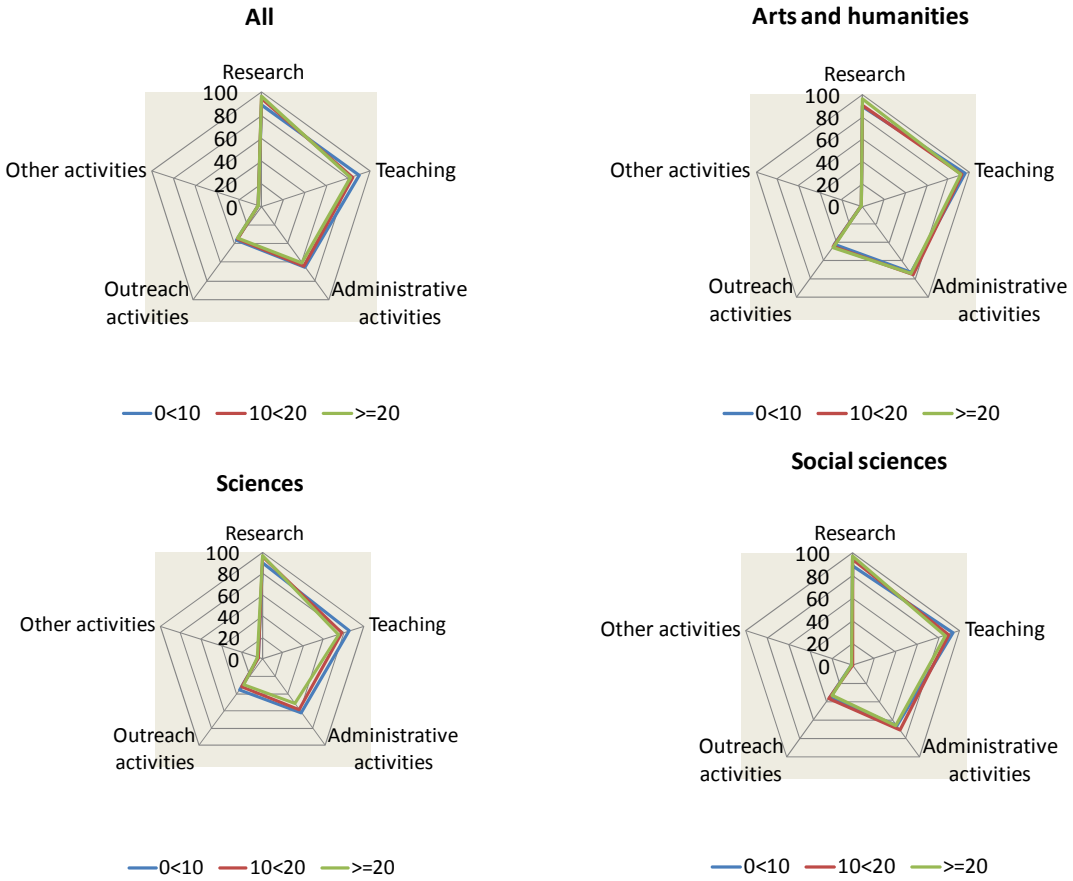
4. Academic Activity and Basic, Applied and User Inspired Research

For comparison of proportions across categories the statistical test in the Chi-Square Test. He test for pairs of scores in the Mann-Whitney U-Test and for comparisons across 3 or more categories the test for score is the Kruskal-Wallis Test.

4.1 Activity by RAE score and RAE score within discipline subgroups (%)[18]

Academic respondents were asked to indicate whether or not they were involved in research, teaching, administrative and outreach activities. The responses cross classified by % of publications rated as 4* in the 2008 RAE are shown in Exhibit 4.1.

Exhibit 4.1 Self-reported academic activity by RAE score



The exhibit shows that the proportion of all academics reporting that they are research active is around 93%, with a higher proportion (97%) in highly rated departments. This pattern is consistent across the broad disciplinary groups. Thus the proportions of research active academics in highly

[18] The fully tabulated results and tests of significance associated with the charts which can be found in Annex 2 and Annex 3 are for ease of reference numbered to correspond to the number of the corresponding chart in the main text. Thus A2(4.1) for the full sample in Annex 2 and A3(4.1) for the matched sample correspond to Exhibit 4.1 in the main text.

rated departments are: 96% in the Arts and humanities; 97% in the Sciences; and 97% in the Social sciences.

The proportion of all academics reporting that they teach is around 85%. The proportion of academics in highly rated departments reporting that they teach is slightly lower (82%). This pattern is broadly consistent across the disciplinary groups, although academics in top rated Arts and humanities departments are more likely to be teaching compared to those in other disciplines especially compared to those in Sciences. The proportion of academics teaching in highly rated departments is: 92% in the Arts and humanities; 75% in the Sciences; and 86% in the Social sciences. Thus the result of lower teaching for highly rated departments for the sample as a whole seems to be driven by the Sciences.

The proportion of all academics reporting that they undertake administrative activities is around 63%.The proportion is marginally lower in highly rated departments (61%).

The proportion of all academics reporting that they undertake outreach activities is around 36% compared with 34% in highly rated departments. Outreach is thus substantially less common than the other activities across all departmental ratings. There is however substantial variation across disciplines. Thus the proportion of academics undertaking outreach activities in highly rated departments are: 45% in the Arts and humanities but only 30% in the Sciences and 32% in the Social sciences.

4.2 Activity by grant status and grant status within discipline subgroups (%)

Patterns of activity cross classified by whether or not the academic held a grant are shown in Exhibit 4.2.

Exhibit 4.2 Self-reported academic activity by grant status

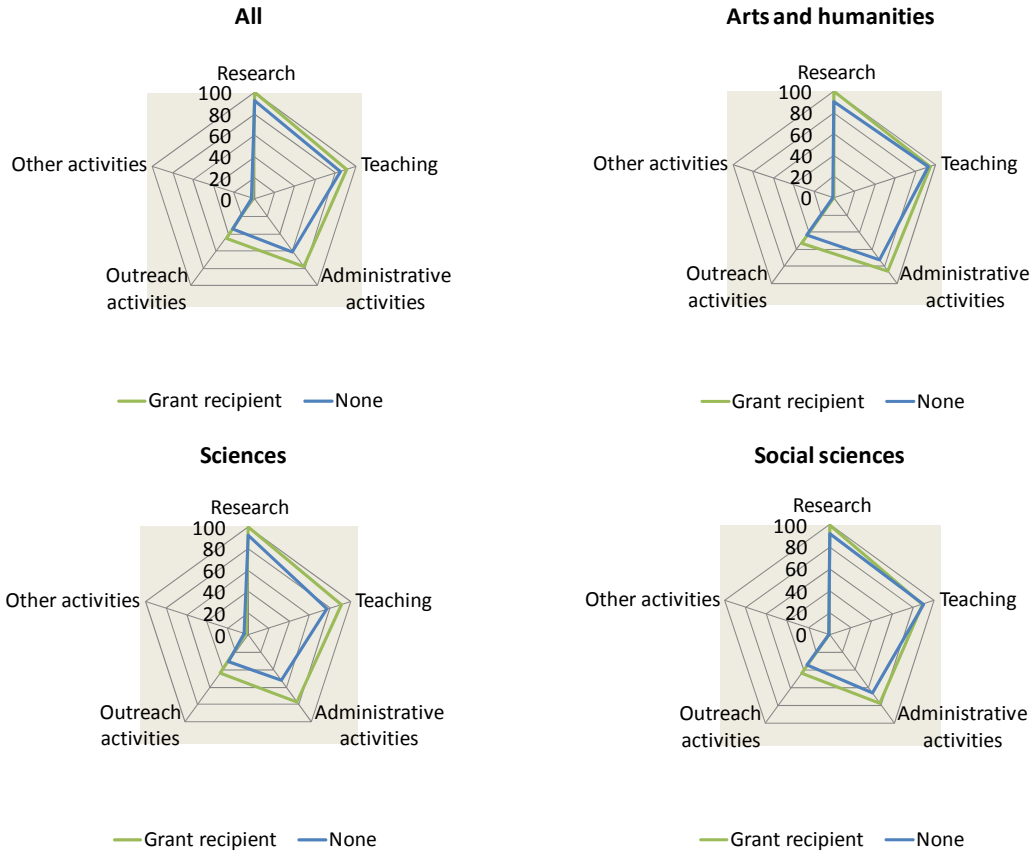


Exhibit 4.2 shows that the proportion of grant recipients that are research active academics is not surprisingly 100% compared to 92% for those not currently in receipt of a grant. This finding holds across the broad disciplinary groupings and is confirmed by the matched sample analysis (although the absolute differences are typically smaller).

Grant recipients are more likely to teach than those who have not received a grant (91% compared to 84%). This pattern is apparent in the Arts and humanities and especially in the Sciences – but is not the case in the Social sciences. These patterns are confirmed by the matched sample analysis although the absolute differences are typically smaller and the difference is statistically significant only for Biology, Chemistry and Veterinary science.

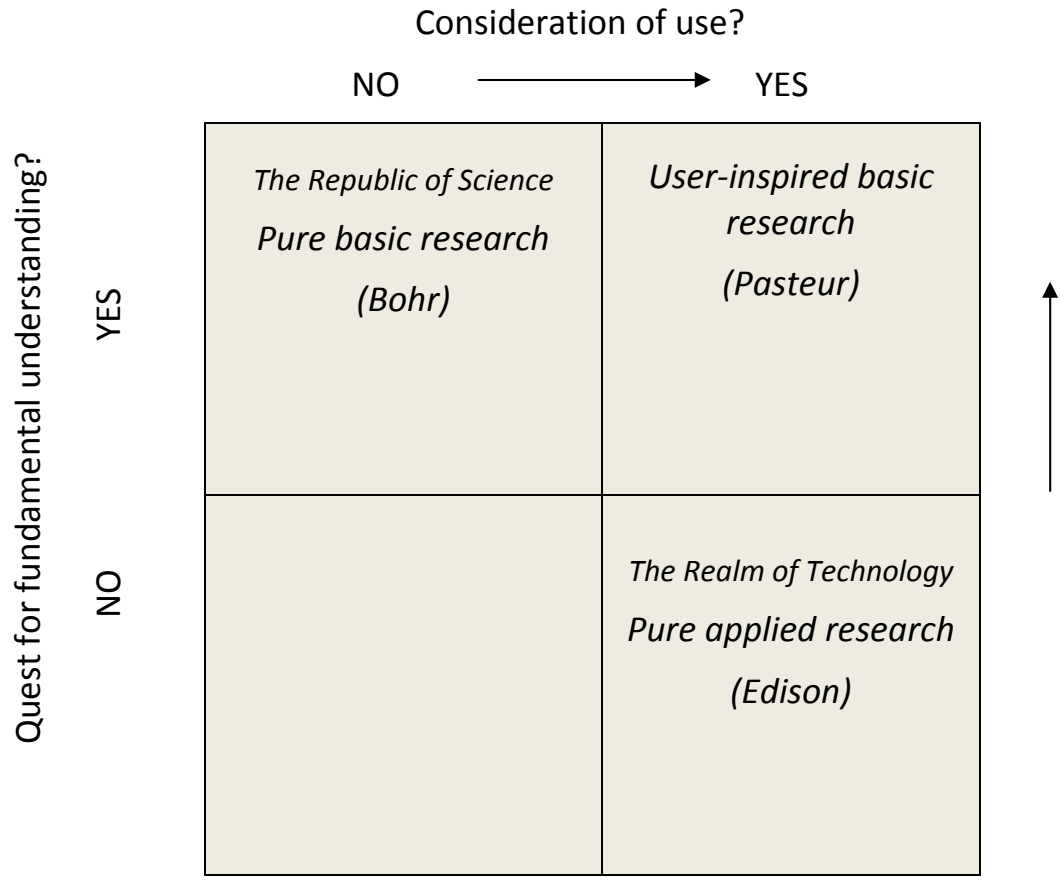
Grant recipients are more likely to report that they undertake administrative activities compared to non-recipients. This is broadly consistent across all three disciplinary groups – and may reflect the administrative responsibilities attached to a grant. This is confirmed in the matched sample analysis although the absolute differences are typically smaller and are statistically significant only for Physics and Mathematics.

It is interesting to note that grant recipients are more likely to engage in outreach activities compared to those who have not received a grant (45% compared to 34%). Moreover this pattern is consistent across the broad disciplinary groups. This is confirmed in the matched sample analysis and is especially marked in the cases of Health, Sciences and Physics and Mathematics. Research Council funding is thus positively associated with outreach.

4.3 Basic, Applied and User Inspired Research by RAE score and RAE score within discipline subgroups (%)

The academic respondents were asked to self-classify their research as being either basic, applied or user inspired basic or none of those. They were offered definitions of these types of research in terms of the well-known Stokes Quadrant diagram shown below in Exhibit 4.3. Basic research is motivated by the quest for fundamental understanding only (Bohr's Quadrant or in Dasgupta and David's (1994) terminology *The Republic of Science*). Applied research is concerned with use alone (Edison's Quadrant or in Dasgupta and David's (1994) terminology *The Realm of Technology*) and user inspired basic research is concerned with both (Pasteur's Quadrant).

Exhibit 4.3 Stokes' Quadrants

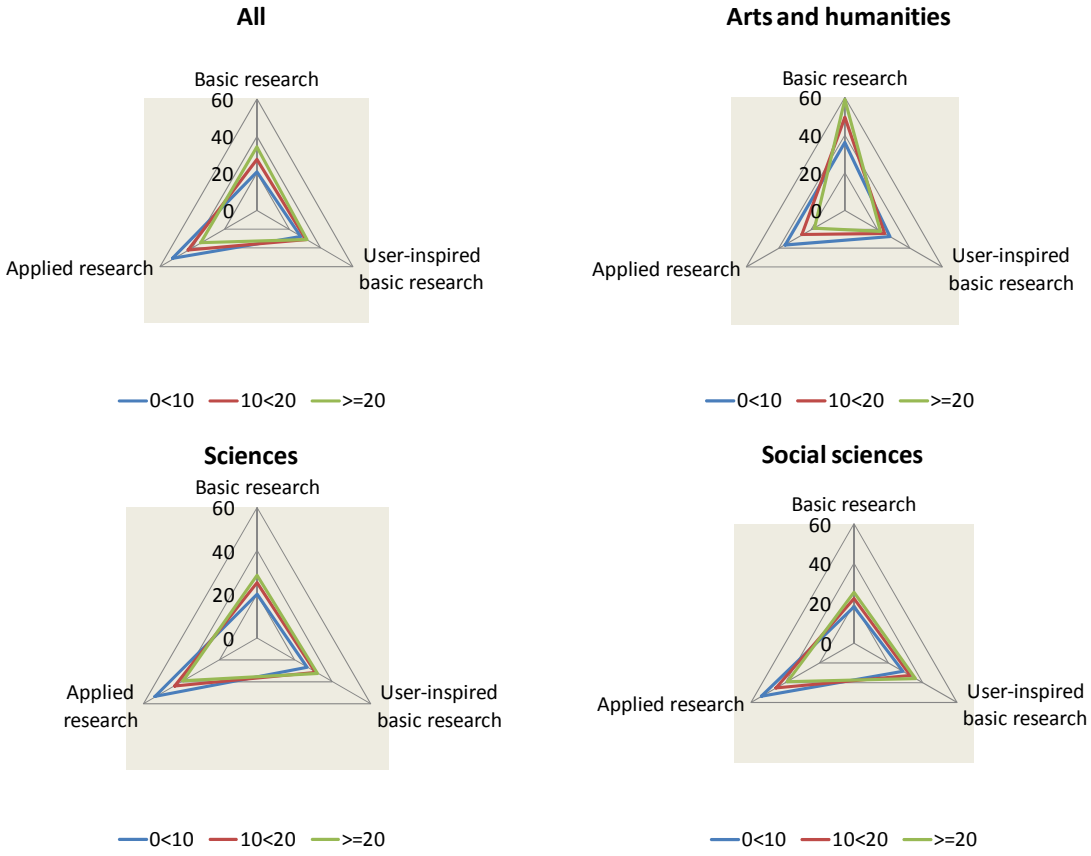


Source: Adapted from Stokes (1997) and Dasgupta and David (1994)

The results of self-classification by academics using this categorisation and cross classified by their departmental RAE rating are shown in Exhibit 4.4.

4.4 Basic, Applied and User Inspired Research by RAE score and RAE score within discipline subgroups (%)

Exhibit 4.4 Which statements most closely describes the research you undertake by RAE score



The exhibit shows that the proportion of academics in highly rated departments (34%) are more likely to describe their research as basic (34%), is higher than those in medium-rated (27%) or low rated departments (21%). The proportion of academics in highly rated departments who describe their research as basic is highest (59%) in the Arts and humanities and lowest (25 %) in the Social sciences. Thus Social scientists are *least* likely to regard themselves motivated purely by the pursuit of fundamental understanding alone. In the Sciences pure basic research in the high rated departments is reported by 29% of the respondents.

User-inspired basic research is reported more frequently in highly rated departments (31%) than in low rated (27%) departments. As a consequence of these patterns of basic and user inspired motivation academics in low rated departments are more likely to describe their research as applied (52%) compared to those in medium-rated (42%) or highly rated (35%) departments.

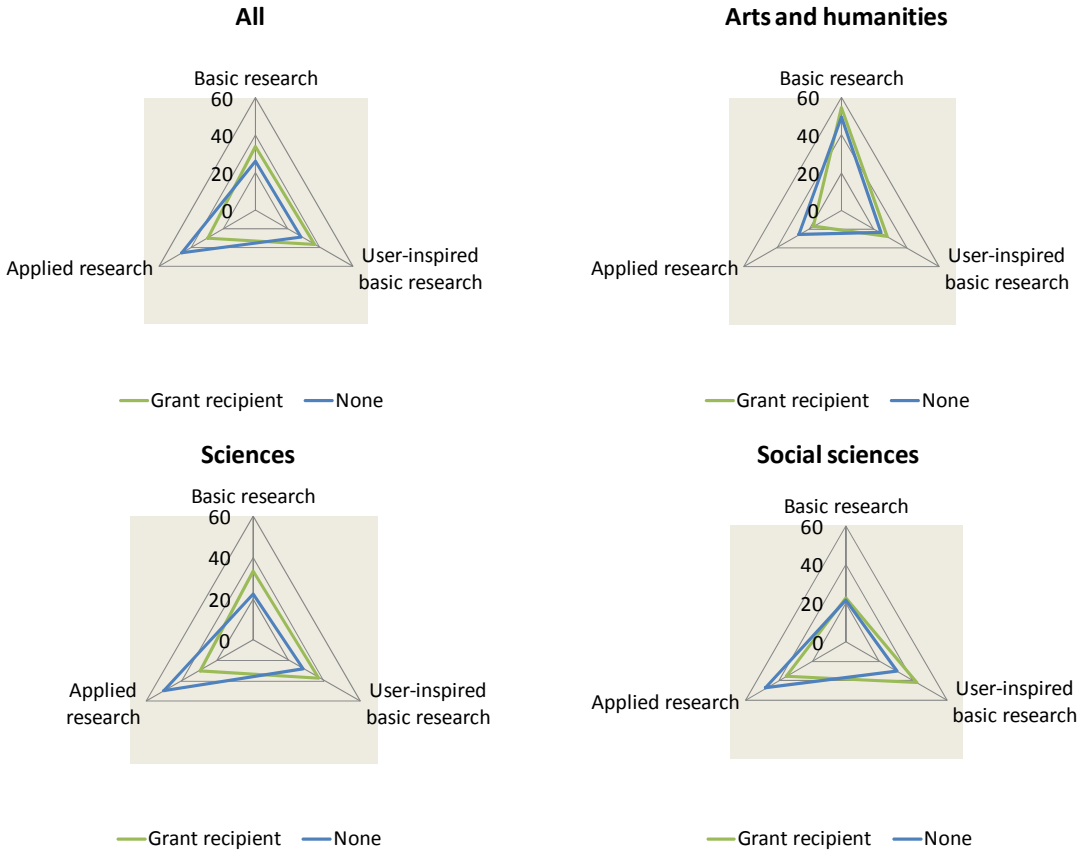
This relative pattern is consistent across the broad disciplinary groups shown in Exhibit 4.4 but the absolute levels vary. Thus the proportions of academics in low rated departments who undertake applied research are: 36% in the Arts and humanities; 54% in the Sciences; and 54% in the Social sciences.

These results taken together suggest that the proportion of academics motivated by applications alone is highest in low rated departments and conversely academics in high rated departments are more likely to be motivated to pursue basic and user inspired basic research.

4.5 Basic, Applied and User Inspired Research by grant status and grant status within discipline subgroups (%)

Exhibit 4.5 shows the results of cross-classifying research motivations by whether or not an academic holds a Research Council grant.

Exhibit 4.5 Which statements most closely describes the research you undertake by grant status



The exhibit shows that academics who are grant recipients are more likely to describe their research as basic (34%) compared to those who have not received a grant (26%). This is confirmed in the matched sample analysis although the absolute differences are typically smaller. Moreover, this pattern is broadly the same across the three disciplinary groups. The absolute levels do however vary across discipline. Thus the proportion of academics who are grant recipients who undertake basic research are at 55% highest in the Arts and humanities and lowest at 23% in the Social sciences with the Sciences occupying an intermediate position at 33%. Academics who are grant recipients (37%) are also more likely to describe their research as user-inspired basic compared to those who have not received a grant (28%). This relative pattern is broadly consistent across the broad disciplinary groups although the absolute levels vary across disciplinary groups. Thus, the proportions of academics who are grant recipients who undertake user-inspired research are: 28% in the Arts and humanities; 37% in the Sciences; and 42% in the Social sciences. Academics who have not received a grant (46%) are more likely to describe their research as applied compared to those who are grant recipients (29%) and this pattern is broadly consistent across the three disciplinary groups although the absolute levels vary. Thus the proportion of academics who have not received a grant and who undertake applied research are: at 26% lowest in the Arts and humanities compared with almost twice as many in the Sciences 50% and the Social sciences (48%). All of these patterns are confirmed in the matched sample analysis although the absolute differences are typically smaller.

5. Research relevance

5.1 Relevance of research by RAE score and RAE score within discipline subgroups (%)

In an attempt to explore use made of research the academic respondents were asked whether their research had in the last three years been applied in a commercial context; been in a general area of interest to business; had been of relevance to non-commercial external organisations; or was of no relevance for external organisations.

Exhibit 5.1 'If undertaking research, which of the following statements apply?' by RAE score

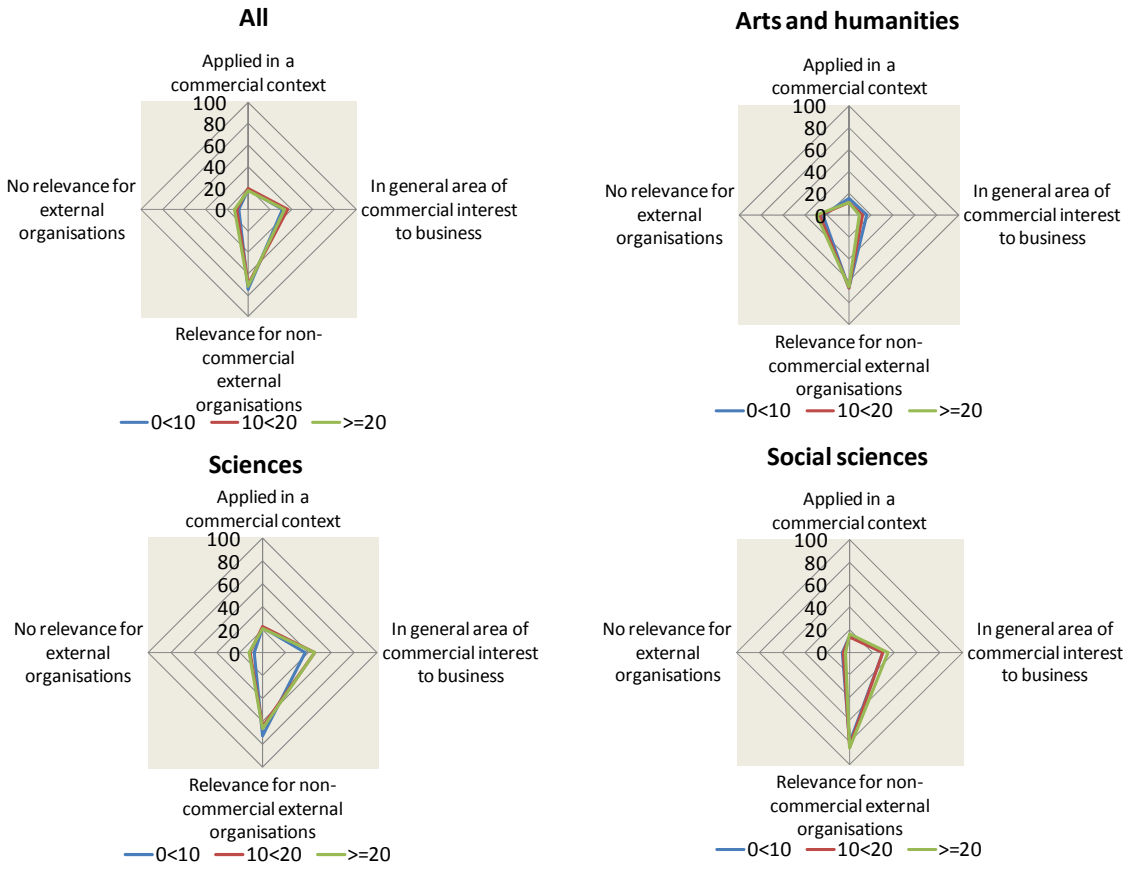


Exhibit 5.1 shows that the two least common answers were that their research was of no relevance or that it had been applied commercially. Relevance for non-commercial organisations was most frequent with commercial relevance in an intermediate position.

Overall, 18% of academics have had their research applied in a commercial context and this proportion is highest in Sciences, followed by Social sciences and then Arts and humanities. Strikingly, for the sample as a whole there is very little variation in these patterns across departments in terms of their RAE ratings. Some differences do, however, emerge within disciplinary groupings. Thus in Arts and humanities, research applied in a commercial context is most frequently reported in the low ranked departments whilst in the Sciences, it is highest in the medium ranked departments and in the Social sciences, it is highest amongst academics in the high ranked departments.

Overall, 35% of academics consider that their research is of commercial interest to business which is almost twice as high as research which academics report as having been applied. This proportion is highest in Sciences, followed by Social sciences and then Arts and humanities.

In terms of the variation across RAE ratings the exhibit shows that in Arts and humanities, research that is of commercial interest to business is highest in the low ranked departments just as was the case with actual applications. In the Sciences and Social sciences, research of commercial interest to business is most likely to be reported by academics in the high ranked departments which is once again consistent with the pattern for actual applications.

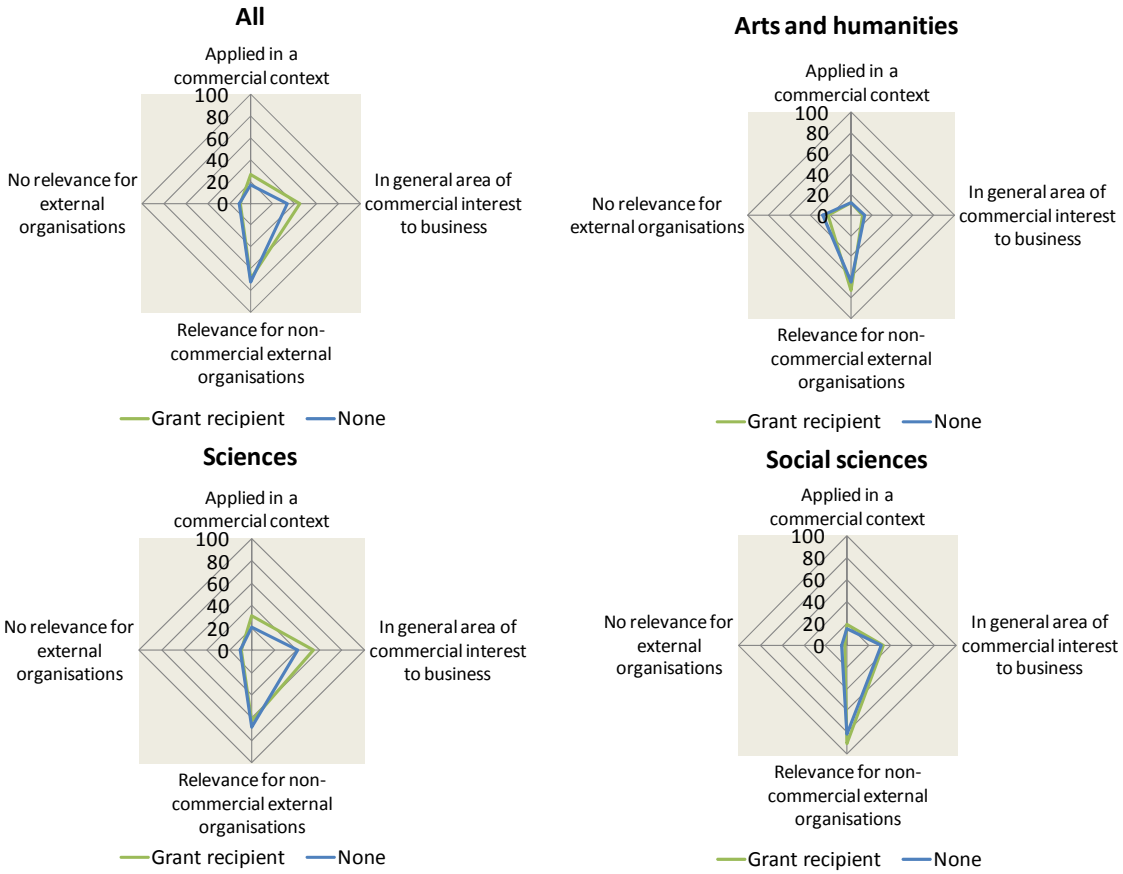
Turning now to research deemed of relevance to non-commercial external organisations, the exhibit shows that this is most frequently reported in the Social sciences and that overall 72% of academics consider that their research falls into this category.

A small minority of academics believe that their research has no relevance for external organisations. For the sample as a whole only 11% held this view. This is largely due to the responses from the Arts and humanities. Very few academics in Social sciences and the Sciences believe this to be the case.

5.2 Relevance of research by grant status and grant status within discipline subgroups (%)

Exhibit 5.2 reports the degree of commercial and other relevance cross classified by whether or not the respondent held a grant.

Exhibit 5.2 'If undertaking research, which of the following statements apply?' by grant status



Academics who are grant recipients are more likely to have their research applied in a commercial context compared to those who have not received a grant (26% compared with 17%). This result is driven by the Sciences, where academics who are grant recipients are much more likely to have their research applied in a commercial context than those who have not received a grant (31% compared to 20%). In the Social sciences, academics who are grant recipients are also more likely to have their research applied in a commercial context compared to those who have not received a grant (20% compared to 15%). These findings are confirmed in the matched sample analysis although the absolute differences are typically smaller and within Sciences are most marked in Health sciences.

Academics who are grant recipients are also more likely to consider that their research is of commercial interest to business compared to those who have not received a grant (45% compared 33%). Once again this is driven by differences in the Sciences, where academics who are grant recipients are much more likely to consider that their research is of commercial interest to business compared to those who have not received a grant (55% compared to 41%).

These differences are confirmed in the matched sample analysis although the absolute differences are typically smaller and in the case of commercial relevance are strongest in Health sciences and Physics.

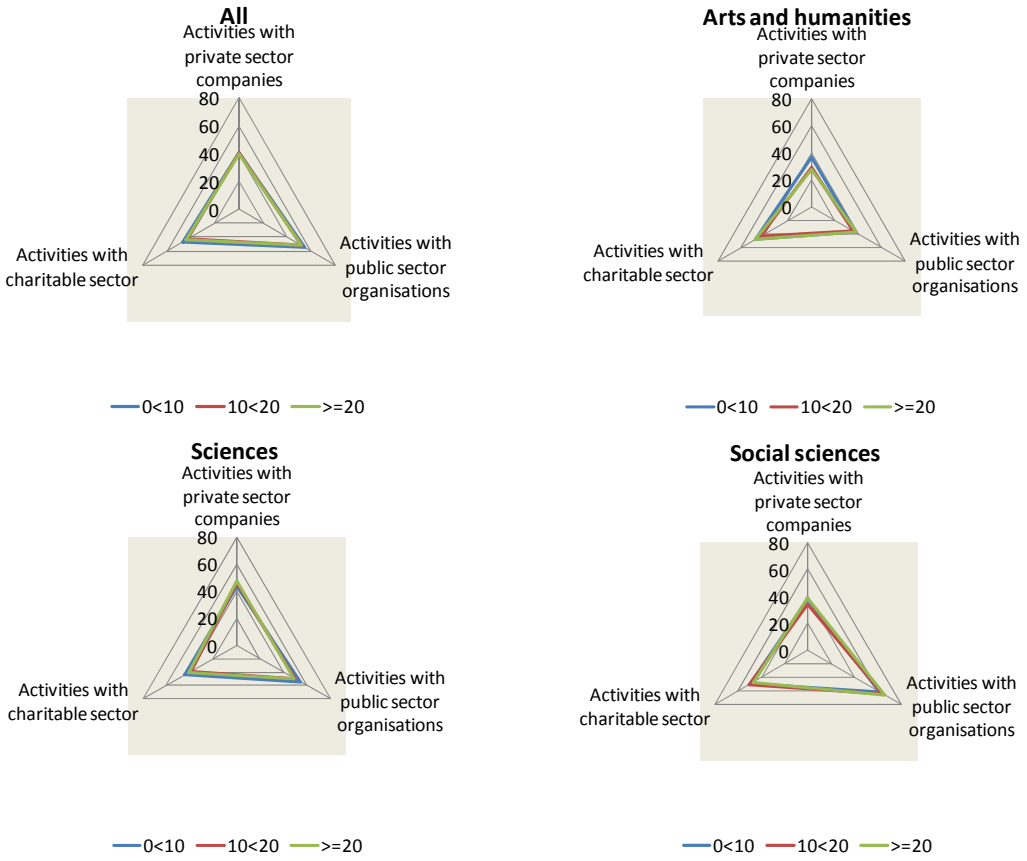
Academics who are grant recipients are less likely to consider that their research is of relevance for non-commercial external organisations compared to those who have not received a grant (70% compared to 73%). This is not confirmed in the matched sample analysis where the absolute differences are typically smaller and not statistically significant. There are, however, important differences across the disciplinary groups. Academics in the Sciences who are grant recipients are *less* likely to report non-commercial relevance than non-grant holders (62% compared with 68%) whereas in Arts and humanities and Social sciences the opposite is the case with 73% and 90% respectively of grant holders reporting non-commercial relevance compared to 65% and 82% respectively. These results are confirmed in the matched sample analysis although the absolute differences are typically smaller and statistically significant for Physics and Mathematics and the Social sciences.

Taken together these results suggest that grant status has little or no independent effect on whether an academic believes that his or her research has no relevance to external organisations.

5.3 Partners that academics connect with by RAE score (%)

Academics were asked to identify activities with various types of external partner. The results cross classified by departmental RAE rating are shown in Exhibit 5.3.

Exhibit 5.3 Private, Public and Charitable sector activities by RAE score.



Private Sector Interactions

In relation to activities with private sector companies the exhibit shows that substantial engagement occurs with 41% of academics reporting such involvement. Within the disciplinary groupings academics in low ranked departments in the Arts and humanities academics are more likely to engage with the private sector compared to academics in medium and high ranked departments (37% compared to 29% and 28% respectively).The opposite is the case in the Sciences where academics in high ranked departments are marginally *more* likely to engage with the private sector compared to academics in medium and low ranked departments. (47% compared to 46% and 44% respectively). In the Social sciences academics in both the high ranked (39%) and low ranked (38%) departments are more likely to engage with the private sector compared to academics in medium ranked (34%) departments.

Public Sector Interactions

Turning now to activities with the public sector we find that 53% of academics interact with public sector organisations. This is higher than activities involving the private sector. Such engagement is highest in Social sciences and within that is highest of all amongst academics in high ranked Social science departments (66%) compared with departments that are medium ranked (64%) and low ranked (61%). Science academics are the next most likely to interact with the public sector but within that group it is academics in the lowest ranked departments who are most likely to report such interactions (55%) compared to academics in medium (50%) and low ranked (50%) departments). As with private sector engagement Arts and humanities academics are least likely to engage with the public sector with individuals in both the high ranked (38%) and low ranked (37%) departments marginally more likely to engage with the public sector compared to academics in medium ranked (36%) departments.

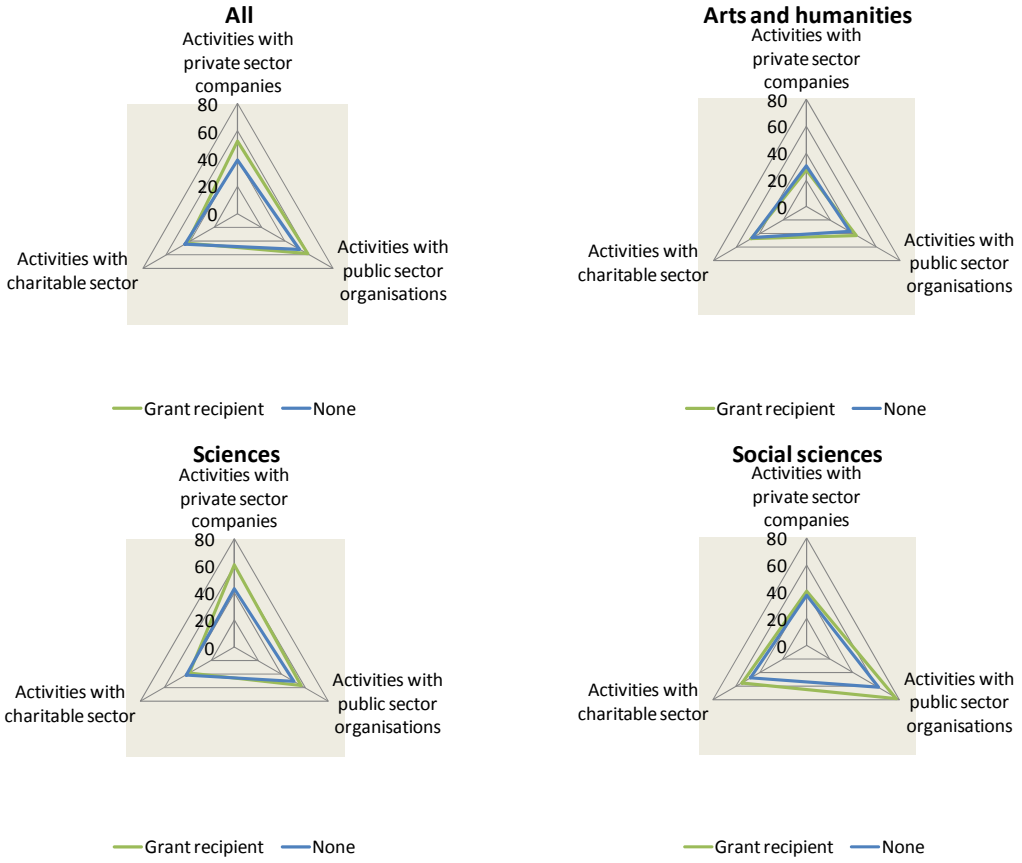
Charitable Sector Interactions

Overall, 44% of academics interact with the charitable sector and here it is the Social science academics who are to the fore with individuals in low and medium ranked departments (both 51%) more likely to engage with the third sector compared to those in the high ranked departments (47%). Next are the Arts and humanities academics where individuals in both low ranked (48%) and high ranked (48%) departments are more likely to engage with the charitable sector compared to those in medium ranked (43%) departments. Finally Science academics are least likely to engage with the charitable sector although the difference with social scientists is not very great. Within Sciences 44% of academics in low ranked departments engage with the charitable sector compared to 39% and 41% respectively of academics in medium and high ranked departments.

5.4 Partners that academics connect with by grant status within discipline subgroups (%)

Exhibit 5.4 shows the results of cross classifying private, public and charitable sector activity by grant holding status.

Exhibit 5.4 Private, Public and Charitable sector activities by grant status



Private Sector interactions

Overall, 52% of academics with a grant interact with the private sector compared to 39% who do not have a grant. This is confirmed in the matched sample although the difference is smaller (48% and 44% respectively). In the Arts and humanities academics without a grant (31%) are more likely to engage with the private sector compared to academics with a grant (28%). This is confirmed in the matched sample although the difference is smaller. In the full sample Sciences academics with a grant (61%) are more likely to engage with the private sector compared to academics without a grant (43%). In the matched sample this difference is only significant in the case of Physics and Mathematics. In the Social sciences academics with a grant (41%) are more likely to engage with the private sector compared to academics without a grant (38%). In the matched sample the difference is similar but statistically insignificant. In general it appears that there is a positive link between grant holding and being involved in activities with private sector companies.

Public Sector interactions

Overall, 59% of academics with a grant interact with the public sector compared to 52% who do not have a grant. This is confirmed in the matched sample. In the Arts and humanities academics with a grant (43%) are more likely to engage with the public sector compared to academics without a grant (37%) although there is no statistically significant difference in the matched sample. In the Sciences academics with a grant (56%) are more likely to engage with the public sector compared to academics without a grant (50%) but there are no statistically significant differences in the matched sample. In the Social sciences, however, academics with a grant are more likely to engage with the public sector compared to academics without a grant (78% compared to 62%) and this holds in the matched sample as well. Thus it appears that grant holding is most likely to be positively associated with public sector activities amongst social scientists and that this drives the overall positive link between grant holding and public sector activity for the sample as a whole.

Charitable Sector interactions

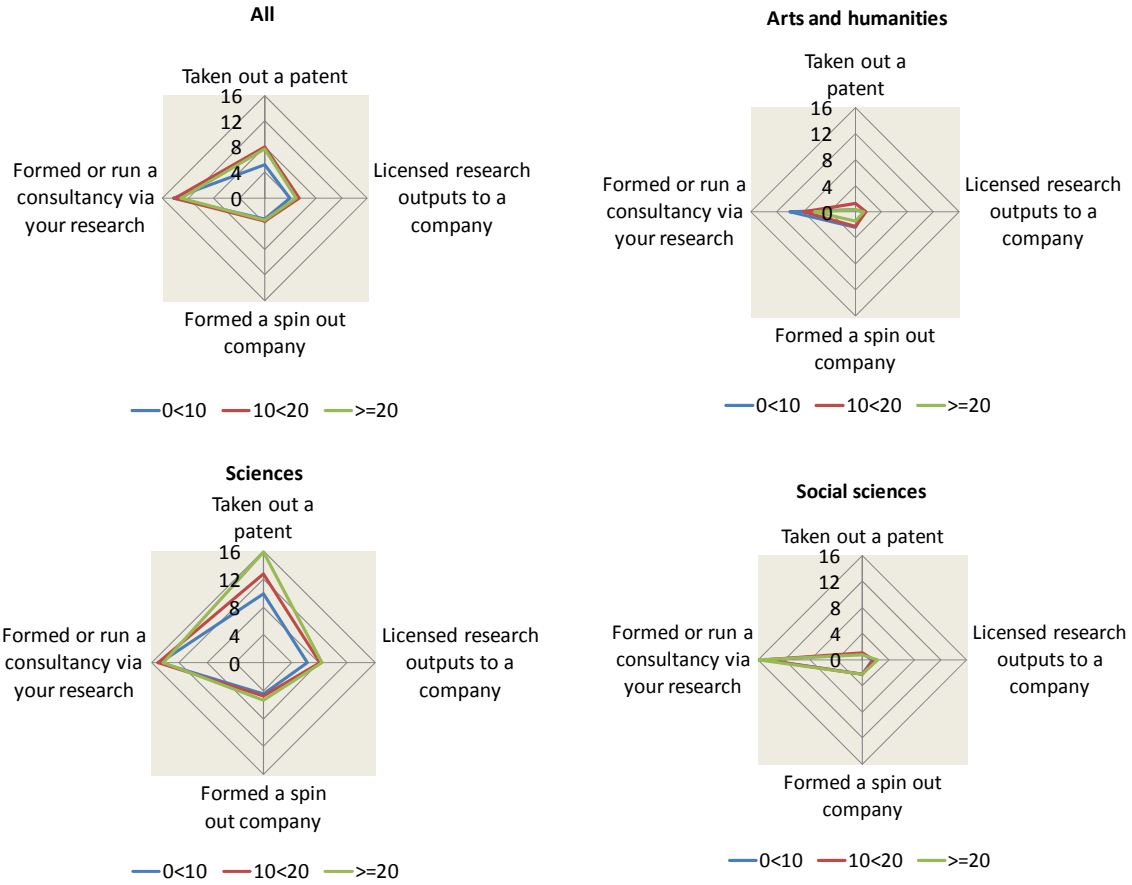
The exhibit shows that for the sample as a whole 43% of academics with a grant interact with the charitable sector compared to 45% who do not have a grant. This negative link appears to be driven by the Sciences where 38% of grant holders have charitable interactions compared with 41% for non-grant holders. Grant holders are *more* likely to report activities with charities in both the Arts and humanities (47% compared to 46%) and Social sciences (55% compared to 48%). These patterns are also reflected in the matched sample but none of the differences are statistically significant. It thus appears that grant holding has no impact on the likelihood of interacting with the public sector.

6. Commercialisation

6.1 Commercialisation activities by RAE score and RAE score within discipline subgroups (%)

Respondents were asked to indicate how many patents they had taken out in the past three years, whether they had licensed research outputs to a company in the same period and whether or not they had formed or run a consultancy. The results cross classified by RAE rating are shown in Exhibit 6.1.

Exhibit 6.1 Whether participated in patenting licensing spin outs or consultancy in the last three years by RAE score



The exhibit shows that in the three years up to the survey date 14% of academics formed a consultancy, 7% took out one or more patents, 5% licensed research output, and 4% formed a spinout company, and that in the last three years in all cases except consultancy (where Social scientists have marginally greater propensity than scientists) these forms of activity are most common in the Sciences.

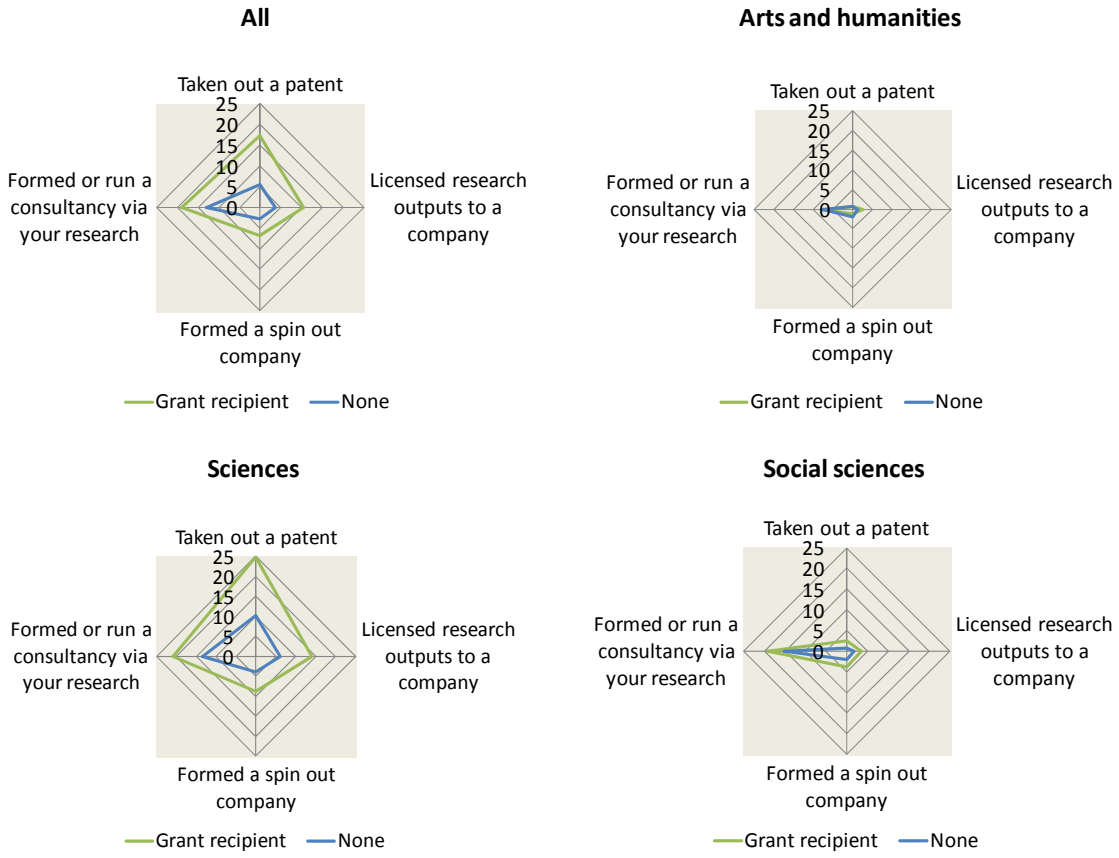
In the Sciences, patenting is highest by academics in the highly rated departments (16%) compared to those in the medium ranked (13%) and low ranked departments (10%).The same pattern holds in a more muted way for licensing (where academics in the high and medium ranked departments have a higher frequency (8%) than low ranked departments (6%)) and for spin out formation where 5% of academics in the highly rated departments and the medium ranked departments reported such activity compared to 4% in the low ranked departments.

In the Social sciences and in the Arts and humanities there is little variation across RAE rankings although consultancies are more likely to be formed by academics in the low ranked departments (10%) compared to those in the medium ranked (8%) and high ranked departments (6%).

6.2 Commercialisation activities by grant status and grant status within discipline subgroups (%)

Exhibit 6.2 shows patenting, licensing, spin out and consultancy formation cross classified by grant holding status.

Exhibit 6.2 Whether participated in patenting, licensing, spin outs or consultancy in the last three years by grant status



The exhibit shows that in the sample as a whole and each disciplinary group grant holding is associated with greater involvement in each of the four forms of commercialization activity shown. The differences are most striking in the Sciences.

Thus for the sample as a whole 17% of academics who have been grant recipients have taken out a patent in the last three years; compared to 5% of academics who did not have a grant. This is confirmed in the matched sample analysis although the absolute difference is smaller. In the Sciences, 25% of grant holding academics have taken out a patent in the last three years compared to 10% of non-grant holders. This also is confirmed in the matched sample analysis although the absolute differences are typically smaller and statistically significant only for Health sciences.

Overall, 10% of grant holding academics have licensed research output in the last three years; compared to 4% of non-grant holders and this is confirmed in the matched sample analysis although the absolute difference is smaller. In the sciences the respective proportions are 14% and 6% and this is confirmed in the matched sample analysis where the results are statistically significant for Engineering and Materials science and for Health sciences.

In the whole sample 7% of grant holders formed a spinout company; compared to 3% of non-grant holding academics. In the matched sample analysis the absolute difference is smaller but still statistically significant. In the Sciences, 9% of grant holding academics formed a spinout compared to 4% of academics who did not have a grant. This pattern is confirmed in the matched sample analysis but is not statistically significant.

Of grant holders 19% formed a consultancy compared to 13% of academics who did not have a grant. This difference is confirmed in the matched sample analysis but is, however, smaller and statistically insignificant. In the Sciences, 21% of grant holders formed a consultancy in the last three years compared to 13% of academics who did not have a grant. In the matched sample analysis, however, the absolute differences are typically smaller and statistically significant only for Engineering and Materials science.

Finally, in the Social sciences, 19% of academics who have been grant recipients formed a consultancy in the last three years; compared to 15% of academics who did not have a grant. This difference is however smaller and not statistically significant in the matched sample.

7. Modes of interaction: people based, problem solving and community based

Respondents were asked whether they had taken part in a wide range of pathways to impact which we grouped into people based, problem solving and community based activities. The broad picture which emerges is shown in Exhibit 7.1 which also includes for completeness the four commercialisation pathways examined in the previous section.

Exhibit 7.1 Pathways to Impact: People based, Problem solving, Community based and Commercialisation activities

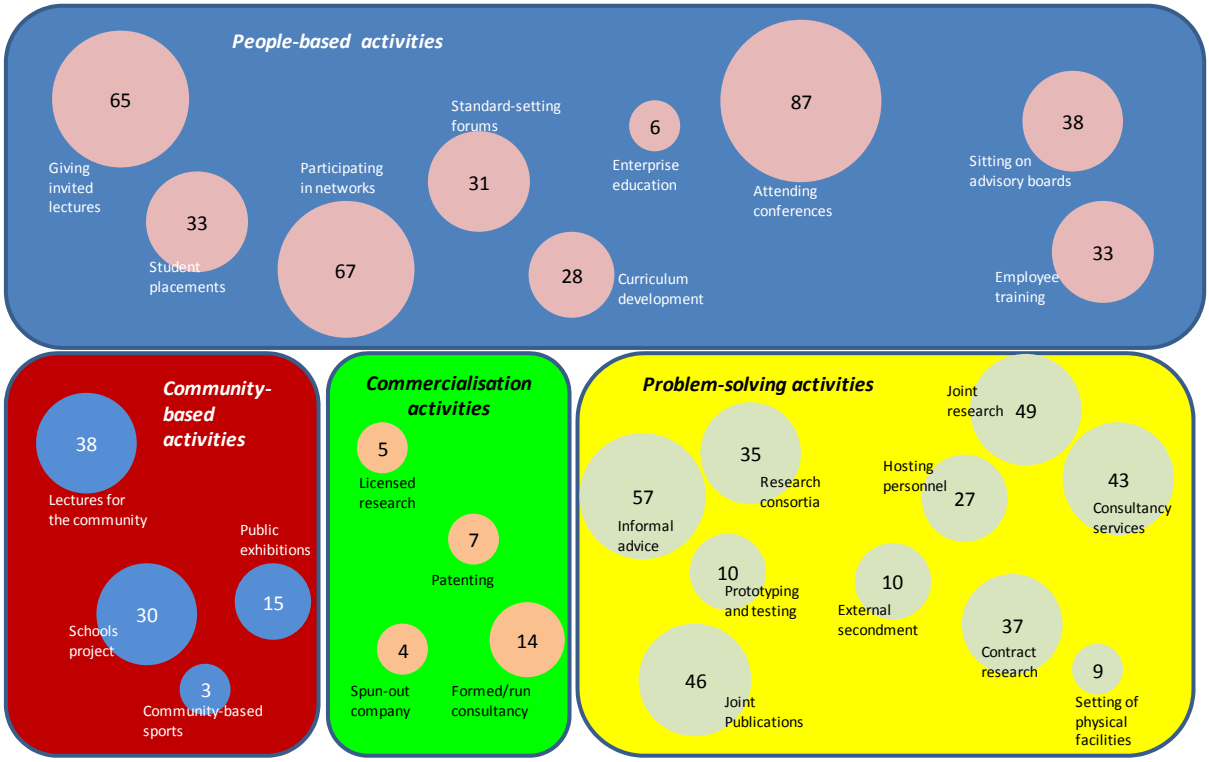


Exhibit 7.1 serves to emphasise the breadth and intensity of academic pathways to impact with external organisations. It also places the pathways based on commercialisation per se in perspective. Academics are in particular heavily involved in problem solving and people based modes of interaction.

In order to compare this range of modes of interaction by departmental RAE rating we have simplified the presentation so that we compare the high and low ranked departments only rather than compare pathways across all grades. The full comparison across all three is, however, shown in the Annex tables A2(7.1.1, 7.1.2, 7.1.3).

We also only present in the text the results for the sample as a whole although we comment on any differences that arise across disciplines. Once again the full results by discipline can be found in the Annex tables A2(7.1.4 to 7.1.6).

7.1 People based, problem solving and community based activities by RAE score

Exhibit 7.1.1 People based activities by RAE score (% graded 4* weighted average) All

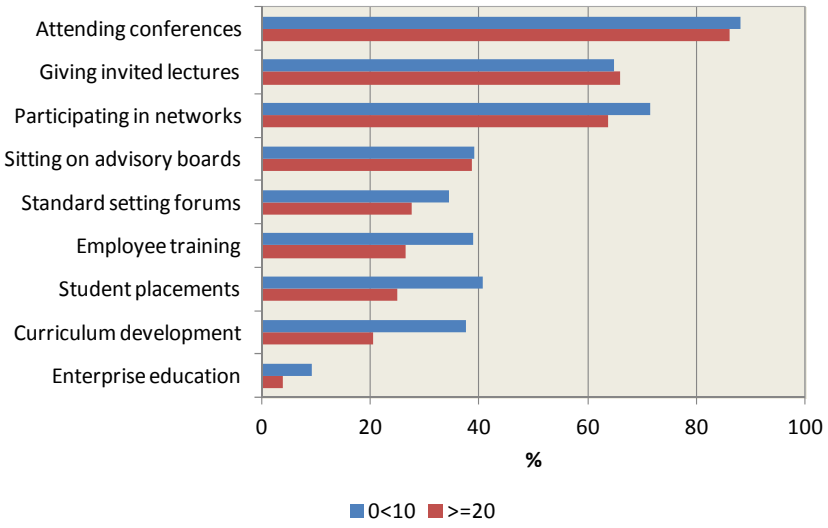


Exhibit 7.1.2 Problem solving activities by RAE score (% graded 4* weighted average) All

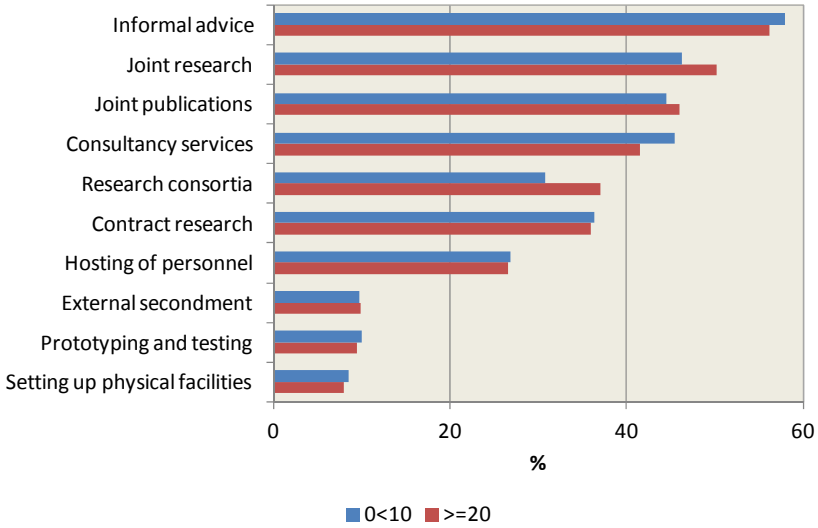
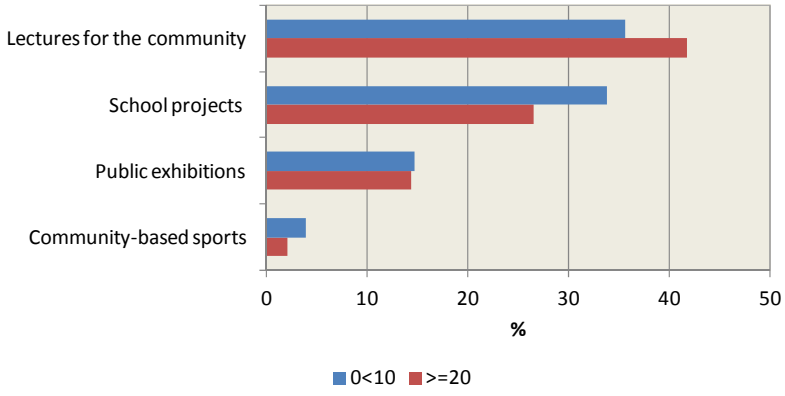


Exhibit 7.1.3 Community based activities by RAE score (% graded 4* weighted average) All



Modes of interaction: All disciplines

Exhibit 7.1.1 shows that in general, academics in low ranked departments are more likely to engage in people based modes of interaction compared to academics in high ranked departments The Annex tables show that this pattern is generally consistent across the three broad disciplinary groups.

Exhibit 7.1.2 shows a less clear pattern. Although joint research, joint publications and membership of research consortia tend to be slightly higher for academics in medium and high ranked departments; consultancy services tend to be higher by academics in low ranked departments. This suggests a clearer link between high ranking and research based pathways. The Annex tables show that this pattern is also generally consistent across the three broad disciplinary groups.

Exhibit 7.1.3 shows that engagement in community based activities is broadly similar for academics from the different rankings of departments. Academics from highly ranked departments are, however, more likely to provide lectures for the community; and academics from low ranked departments are more likely to help school projects and community based sports. The Annex tables show that this pattern is generally consistent across the three broad disciplinary groups.

7.2 People based, problem solving, and community based activities by grant status

The various pathways to impact cross classified by grant holding status are shown in Exhibits 7.2.1 to 7.2.3.

Exhibit 7.2.1 People based activities by grant status All

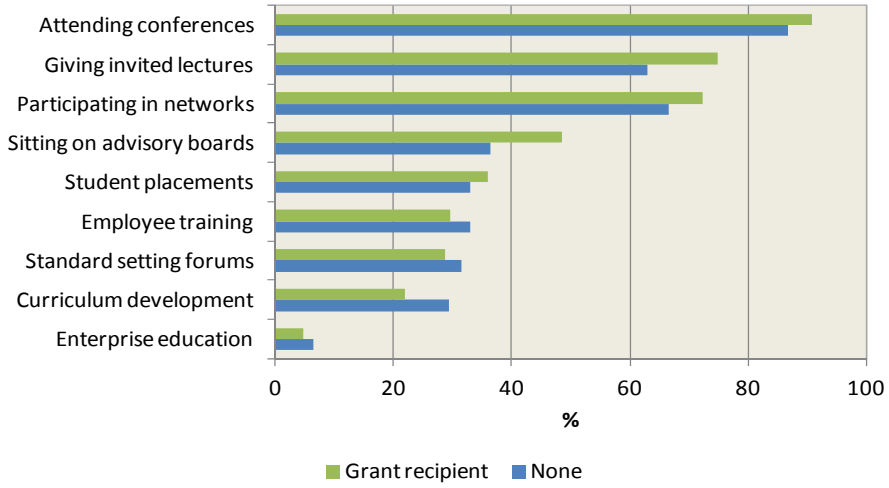


Exhibit 7.2.2 Problem solving activities by grant status All

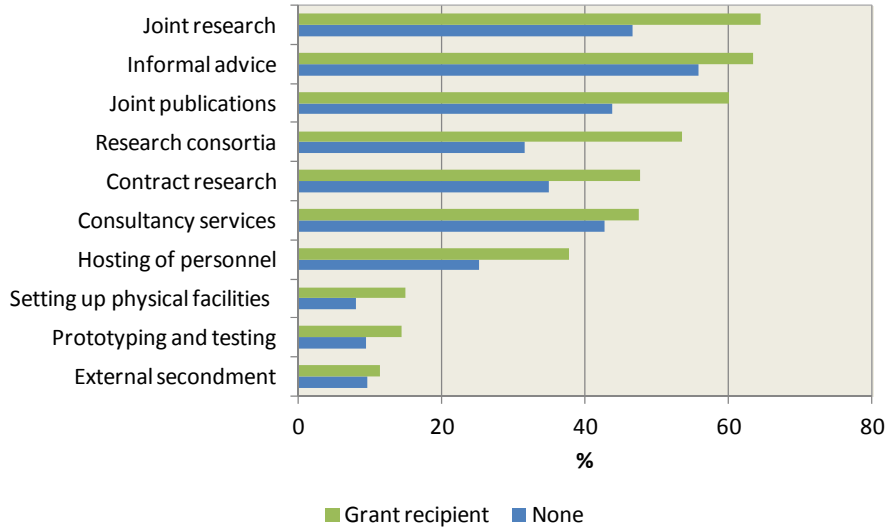
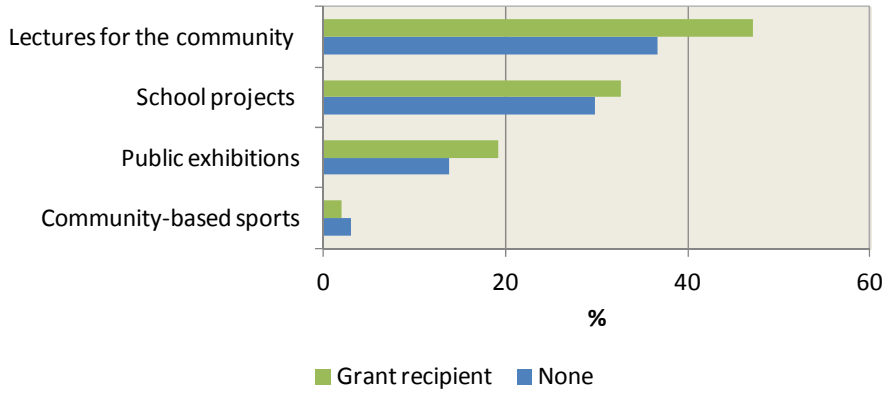


Exhibit 7.2.3 Community based activities by grant status All



People Based Interactions

There is a mixed picture in terms of grant funding and the propensity to engage in people based modes of interaction. For some modes – such as participating in networks and sitting on advisory boards – there is higher propensity for academics in receipt of a grant. Whereas for other modes – such as employee training and curriculum development - there is higher propensity for academics not in receipt of a grant. This is confirmed in the matched sample analysis. Although the absolute differences are typically somewhat lower they typically remain statistically significant.

In the full sample this pattern is generally consistent across the three broad disciplinary groups. In the matched sample analysis a more complex pattern emerges with the absolute differences smaller. Thus in the matched sample in Arts and humanities there are no significant differences, in Biology, Chemistry and Veterinary science grant holders are significantly less likely to be involved in curriculum development and standard setting forums, in Health sciences grant holders are also significantly less likely to be involved in curriculum development and in employee training, but are significantly more likely to give invited lectures, in Physics and Mathematics grant holders are significantly more likely to attend conferences, they are also significantly more likely to take part in networks and to sit on advisory boards and to give invited lectures, a pattern which they share with Social sciences.

Problem Solving Interactions

In general, academics in receipt of a grant are more likely to engage in problem solving activities compared to academics not in receipt of a grant. This is confirmed in the matched sample analysis although the absolute differences are typically somewhat smaller they also typically remain statistically significant.

In the full sample this pattern is generally consistent across the three broad disciplinary groups. In the matched sample grant holders were significantly more likely than non-grant holders to host personnel in Biology, Chemistry and Veterinary science, in Engineering and Material sciences and in Physics. They were significantly more likely to be involved in external secondments in Arts and humanities and more likely to undertake joint research in Health, in Physics and Mathematics and in Social sciences. They were more likely to be involved in consultancy only in the case of Engineering and Materials science. Grant holders were significantly more likely than non-grant holders to be involved in research consortia in all disciplines except Biology, Chemistry, Health sciences and Veterinary science. They were also significantly more likely to be involved in prototyping in the Arts and humanities, in informal advice in Health, in joint publications in Engineering and Materials science, and in setting up physical facilities in Health and in Social sciences.

Community Based Interactions

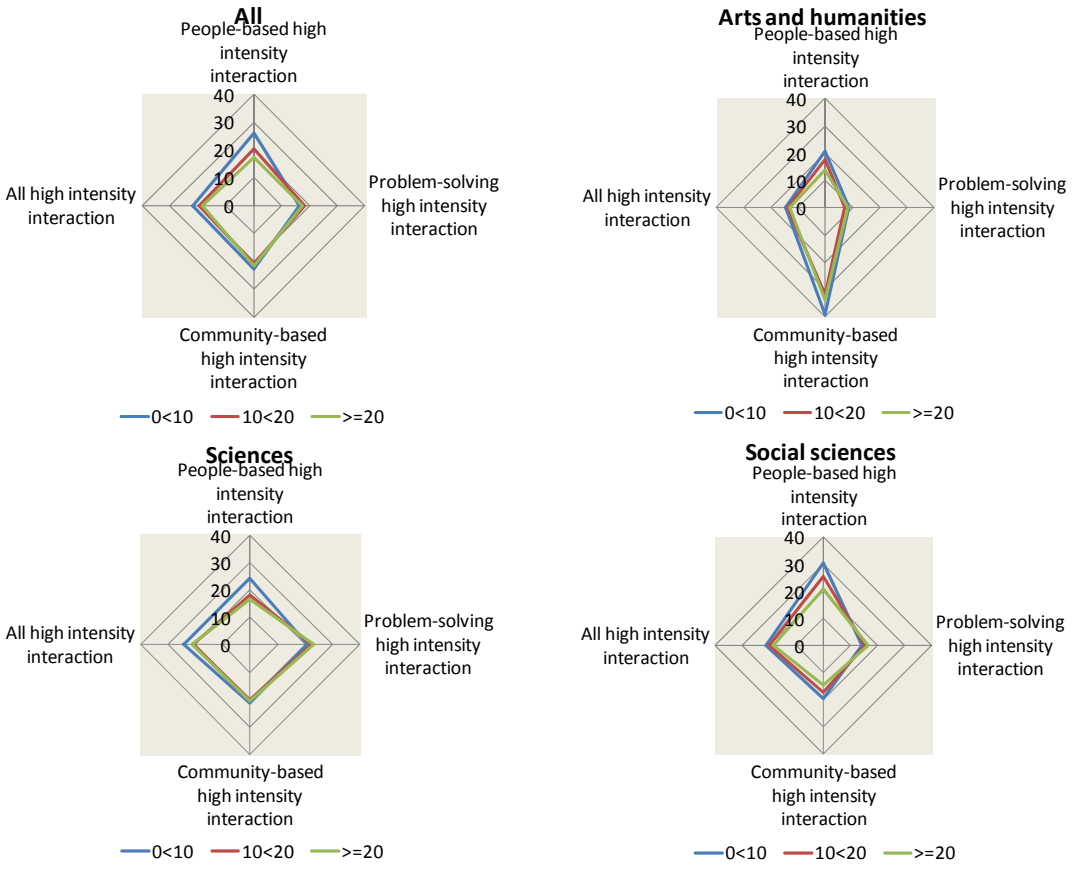
In general, academics in receipt of a grant are more likely to engage in community based activities compared to academics not in receipt of a grant (with the exception of community based sports). This is confirmed in the matched sample analysis although the absolute differences are typically smaller.

This pattern is generally consistent across the three broad disciplinary groups in the full sample. In the matched sample statistically significant differences occur only in relation to community sports in the case of Biology and School projects in the case of Engineering.

7.3 High interaction intensity by RAE score and RAE score within discipline subgroups (%)

In sections 7.1 and 7.2 we considered each activity or impact pathway on its own. Individuals, however interact along many pathways, or modes of interaction. It is of interest, therefore, to compare the characteristics of individuals who are intensive interactors within each of the problem solving people based and community based groups. We define highly intensive interacting academics as: those with 6 or more out of 9 possible people modes of interaction; or those with 6 or more out of 10 possible problem solving modes; or two or more out of four community based modes; or 12 or more of all interactions taken together. Exhibit 7.3 shows the results of cross tabulating the proportion of high intensity interactors by departmental RAE ratings.

Exhibit 7.3 Highly connected academics by RAE score



For the sample as a whole and across all disciplines and for each group of activities the exhibit shows that low rated departments are associated with high intensive people interaction. For the whole sample the respective frequencies are low 26%, medium, 20% high 17%; for Arts and humanities 21% 18%, 14%; for Sciences 24%, 18%, 16%; for Social sciences 30%, 26%, 21%. It thus appears that academics in highly rated departments in each broad disciplinary group are more likely to be specialised in a smaller range of people based interactions.

In the case of problem solving the proportion of intense interactions is generally lower and the difference across rating groups is significant only in the case of social sciences where the highest ranked departments have the highest frequency of intensive interactions (14% low, 15% moderate, 17% high).

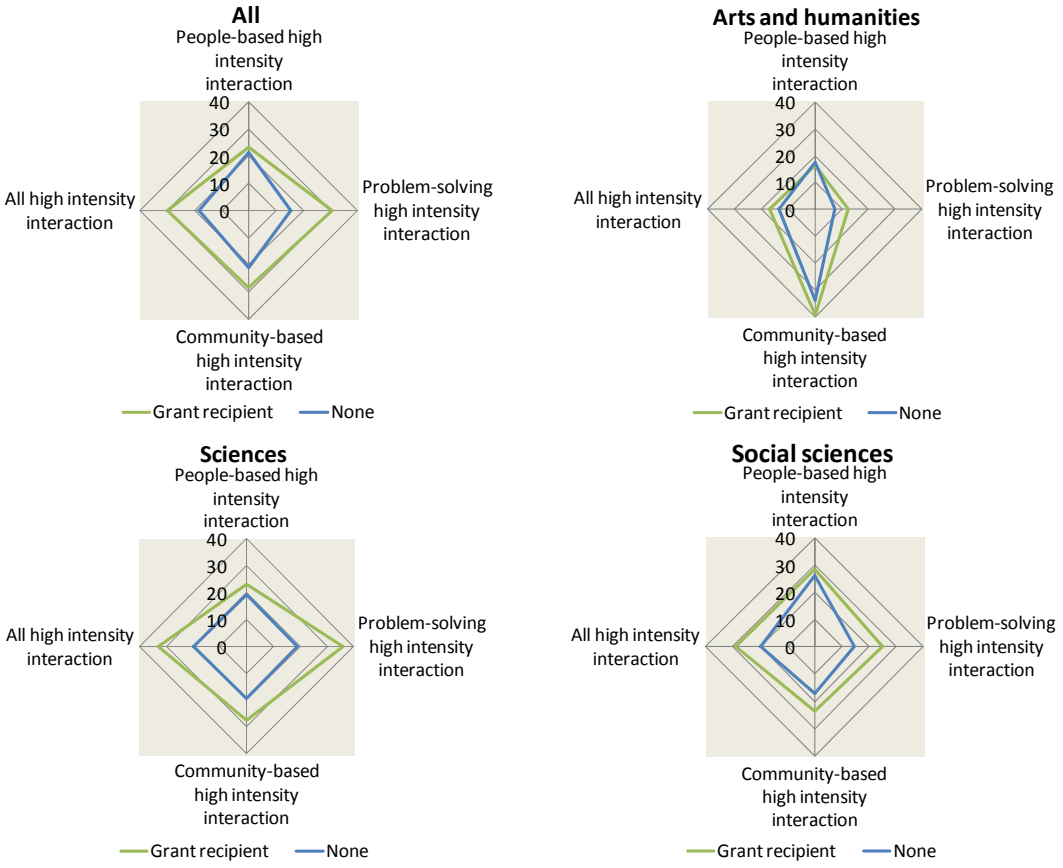
Looking next at community based interaction the exhibit shows that low rated departments have a higher proportion of intensive interactions than high rated departments. For the sample as a whole the proportions are 23 21 22. The result is statistically significant for all subgroups except the Sciences.

Taken as a whole these results suggest that in high rated departments academics are less likely to spread themselves across multiple pathways and vice versa for low rated departments. Finally taking all forms of interaction together, the upshot is that lower rated departments exhibit the highest frequency and this difference is statistically significant in all except Social sciences.

7.4 High interaction intensity by grant status and grant status within discipline subgroups (%)

Exhibit 7.4 continues the analysis of intensive interactors but using cross cuts based on grant holding status.

Exhibit 7.4 Highly connected academics by grant status



All interactions

In terms of all interactions, high intensity is highest by academics in receipt of a grant (30%) compared to those not in receipt of a grant (19%). This is confirmed in the matched sample analysis. In the matched sample the difference is statistically significant but smaller (grant holders 27% compared to non-grant holders 22%).This pattern is generally consistent across the three broad disciplinary groups and is confirmed in the matched sample analysis although the absolute differences are typically smaller and statistically significant only for Health sciences and Physics and Mathematics and the Social sciences.

People Based interactions

In terms of people based interactions, high intensity is highest by academics in receipt of a grant (23%) compared to those not in receipt of a grant (21%). This is confirmed in the matched sample analysis but the smaller sample size means the difference is not significant. This pattern is also generally consistent across the three broad disciplinary groups. In the matched sample analysis

although the pattern and size absolute differences are similar the only statistically significant differences are in Engineering and Materials science.

Problem Based interactions

In terms of problem solving interactions, high intensity is highest amongst academics in receipt of a grant (31%) compared to those not in receipt of a grant (16%). This is confirmed in the matched sample analysis although the difference is smaller. This pattern is also generally consistent across the three broad disciplinary groups and this is confirmed in the matched sample analysis with statistically significant differences in Engineering and Physics and Mathematics and the Social sciences.

Community Based interactions

In terms of community based interactions, high intensity is highest by academics in receipt of a grant (28%) compared to those not in receipt of a grant (21%). This difference is confirmed in the matched sample but is not statistically significant. This pattern is generally consistent across the three broad disciplinary groups in the full sample but in the matched sample is statistically significant only in the case of Social sciences.

Taking all these results together it appears that grant holders, are more likely to be engaged in multiple pathways or modes of interaction than non-grant holders. They are in that sense less specialised than non-grant holders.

It thus appears to be the case that grant holders are more likely to be interacting across multiple pathways.

This finding holds in both the full and matched samples and is therefore independent of RAE status of the department.

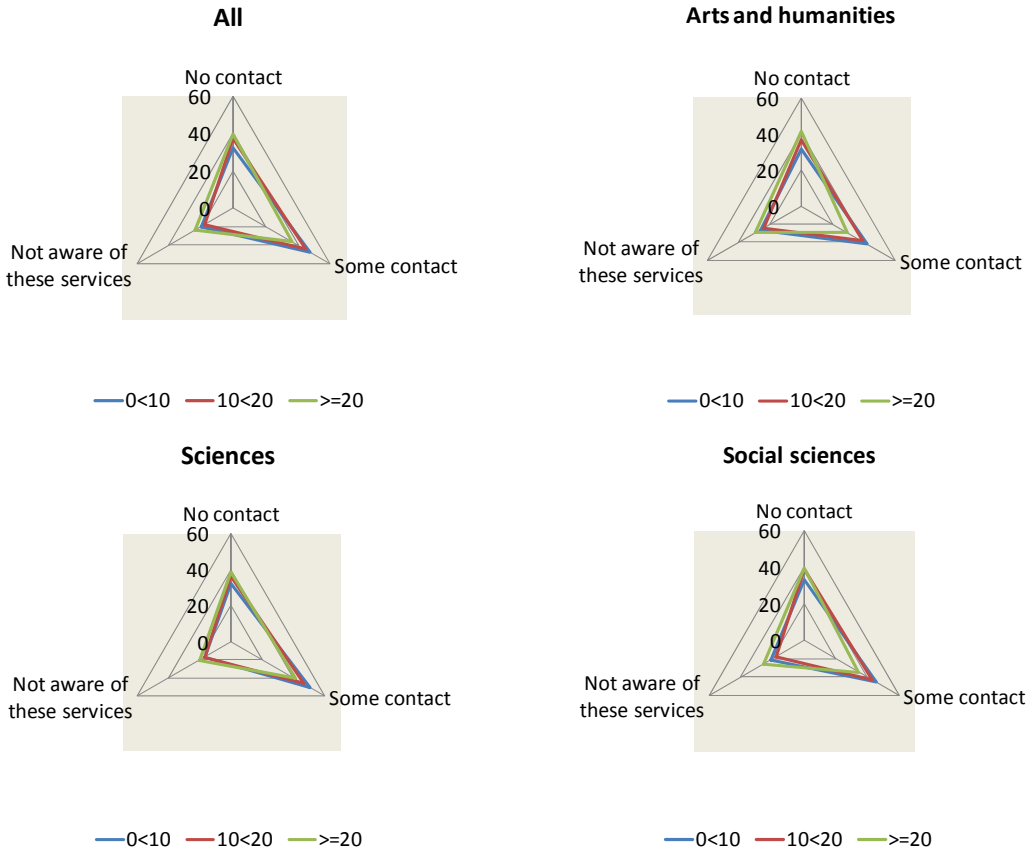
8. The Role of Knowledge Transfer Offices

In this section we examine academics interactions with their university's Knowledge Transfer Offices (KTOs). We analyse first academic contact with KTO's and then their role in the initiation of activities with external organisations.

8.1 Contact with institution's Knowledge Transfer Offices by RAE score and RAE score within discipline subgroups (%)

Respondents were asked whether they had had any contact with their KTO, and whether they were aware of the services of a KTO.

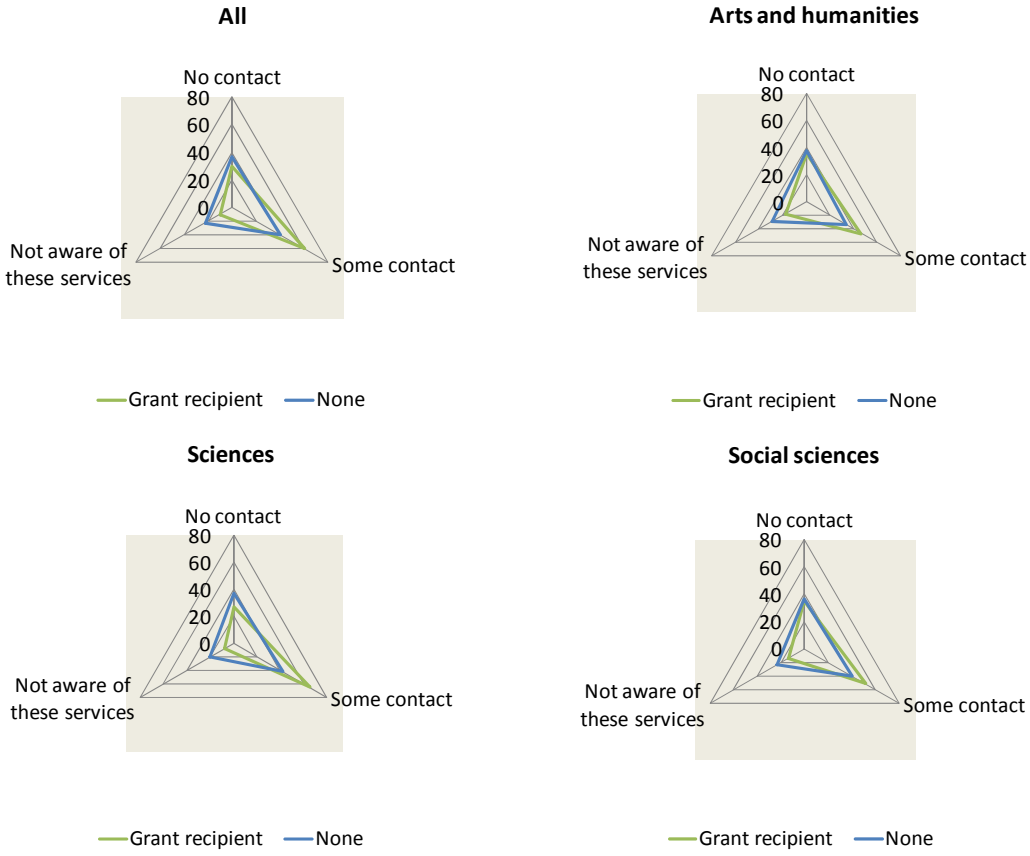
Exhibit 8.1 Contact with Knowledge, Technology Transfer Office or consultancy services office (KTO) within the past three years by RAE score



There are a number of formal and informal mechanisms through which partnerships between academics and other organisations can be initiated and developed. It is clear from Exhibit 8.1 that KTO's are one of the main mechanisms. Thus it appears that, 43% of academics had some contact with their KTO. The level of contact is somewhat lower for academics from top rated departments, and this pattern is consistent across the three broad disciplines. A lack of awareness of the services of the KTO was highest amongst academics from top rated departments (24%) compared to academics from medium rated (18%) and low rated (20%) departments.

8.2 Contact with institution's Knowledge Transfer Offices by grant status and grant status within discipline subgroups (%)

Exhibit 8.2 Contact with Knowledge, Technology Transfer Office or consultancy services office within the past three years by grant status

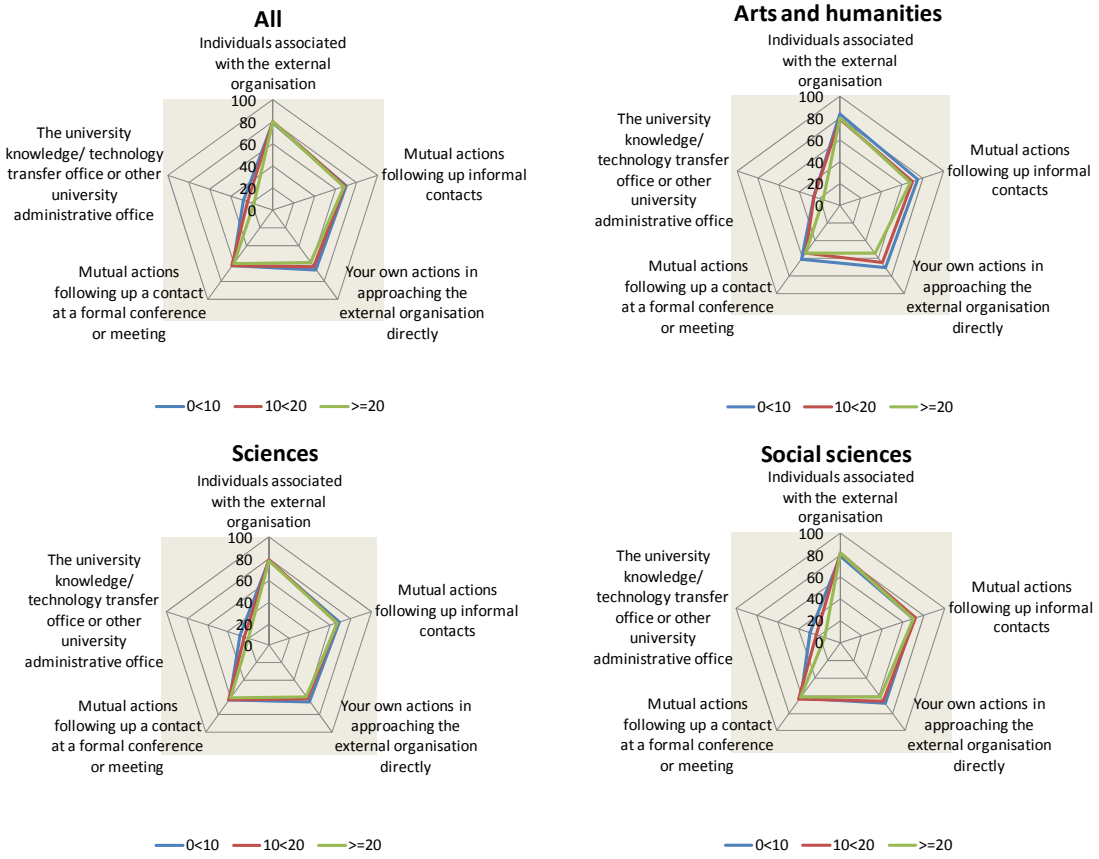


In the full sample the share of those having some contact with the KTO is higher for academics with a grant (60%) compared to those without a grant (41%). This pattern is consistent across the three broad disciplines in the full sample and also across the six disciplinary groupings in the matched sample. A lack of awareness of the services of the KTO was higher for academics without a grant (23%) compared to those with a grant (10%). This pattern is consistent across the three broad disciplines in the full sample and across the six disciplinary groupings in the matched sample except for Engineering and Materials science where the proportions were both very low and the same for each group (4%). It thus appears that whereas being a member of a high ranked department is more likely to be associated with somewhat less contact with the KTO when we hold that constant in the matched sample we find that grant holding is associated with more contact.

8.3 Initiation of interactions by RAE score and RAE score within discipline subgroups (%)

Respondents with activities involving external organisations were asked about the way in which these interactions were initiated. The results are shown in Exhibit 8.3 which identifies 5 possible initiation pathways. Respondents could cite more than one route.

Exhibit 8.3 Way in which activities with external organisations were initiated by RAE score



The most frequently cited initiators were individuals associated with the external organisations – with 80% of all academics citing this channel. This pattern is similar for departments with different research rankings. The second most frequently cited initiator was mutual actions following from informal contact – with 69% of all academics citing this channel and very small differences across research rankings with the proportions for low medium and high ranked departments being 70%, 69% and 68% respectively. Thus there is a strong demand pull associated with external relationships and substantial use of informally initiated pathways. The third most frequently cited initiator was own actions by the academic – with 64% of all academics citing this channel. Academics in low ranked departments tend to cite this channel more than those in medium and high ranked departments (67%, 64% and 59% respectively). The fourth most frequently cited initiator was mutual actions following from formal contact – with 62% of all academics citing this channel. Academics in low and medium ranked departments (both 63%) tend to cite this channel more than those in high ranked departments (60%).These formal initiations are less frequent than informally initiated but still extensive. The lowest cited initiator was the KTO – with only 24% of all academics citing this channel. Academics in low ranked departments (29%) tend to cite this channel more than those in medium (24%) and high ranked departments (18%).Taken as a whole the relatively low frequency of links initiated through KTOs reflects the very wide range of external interactions many of which do not involve KTO mediation.

8.4 Initiation of interactions by grant status and grant status within discipline subgroups (%)

Exhibit 8.4 Way in which activities with external organisations were initiated by grant status

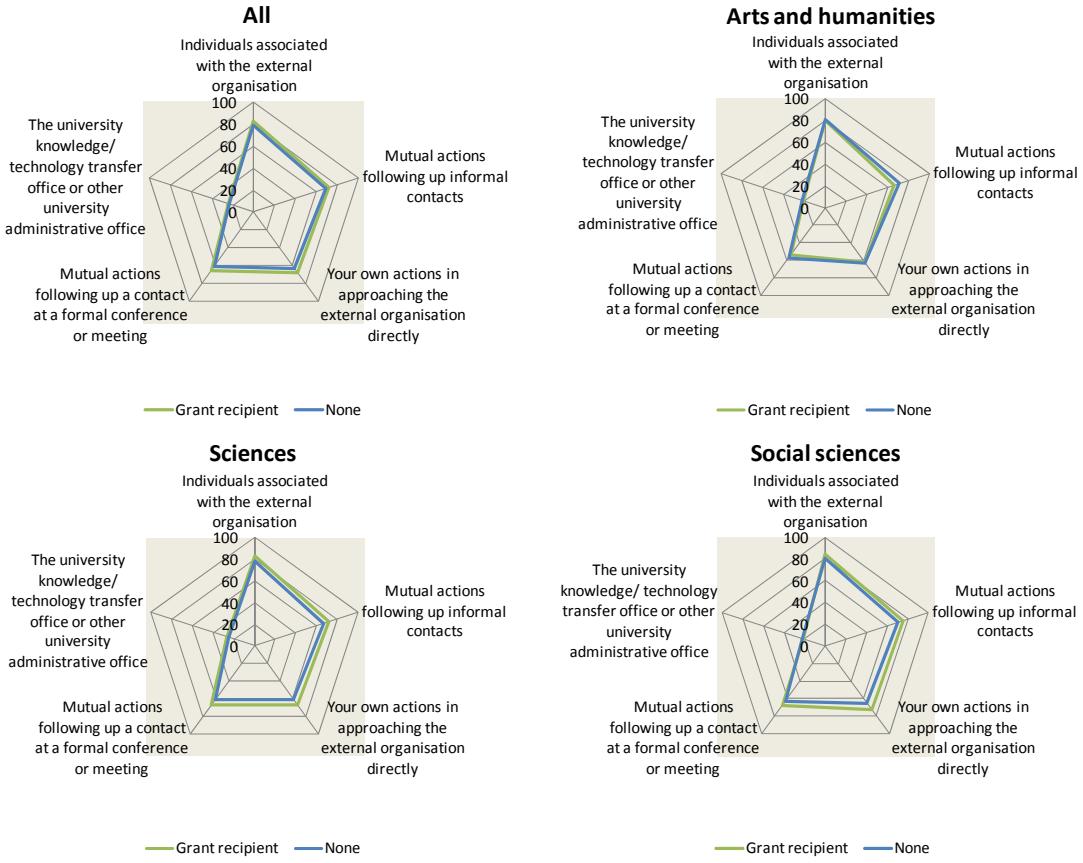


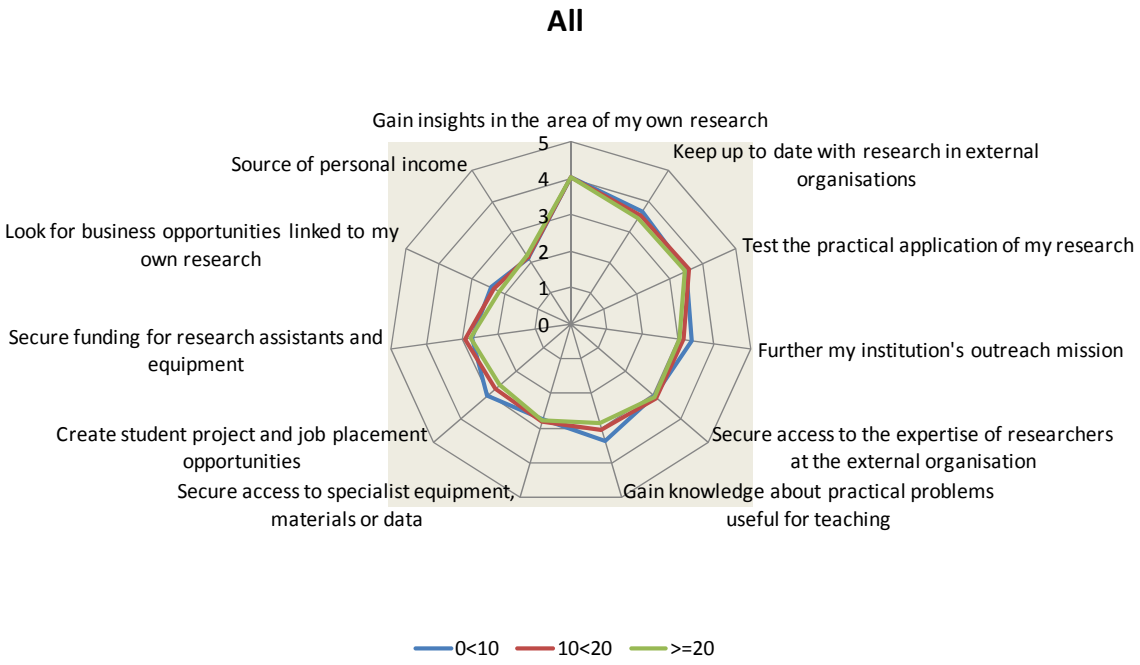
Exhibit 8.4 shows that academics with a grant (83%) are more likely to cite individuals associated with the external organisations as initiators compared to academics without a grant (79%). Demand pull is therefore stronger for this group. This pattern however varies across the broad disciplinary groups and is driven by the results for Sciences and Social sciences since the differences in the Arts and humanities are small and not statistically significant. In the matched sample the differences are smaller and remain significant in the case of Health sciences. Academics with a grant (72%) are more likely to cite mutual actions following from informal contact compared to academics without a grant (69%). In the matched sample the differences are smaller and only in the case of Social sciences statistically significant. Academics with a grant (68%) are more likely to cite own actions by the academic compared to academics without a grant (63%). In the matched sample the differences are smaller and statistically significant only for the matched sample as a whole and for Social sciences. Academics with a grant (66%) are also more likely to cite mutual actions following from formal contact compared to academics without a grant (61%). In the matched sample the differences are smaller and never statistically significant. Finally Academics with a grant (25%) are marginally more likely to cite the KTO compared to academics without a grant (24%). In the matched sample the differences are similarly small and statistically significant only in the case of Health sciences. In Engineering non-grant holders are more likely to have used the KTO but the difference is not statistically significant. Taken as a whole these results suggest that grant holders are somewhat more likely to cite each pathway and marginally more likely to cite KTO involvement. This may reflect their tendency (shown earlier in Exhibit 7.2.1) to be more likely than non-grant holders to be involved in external problem solving activities and is also consistent with their relatively higher likelihood of having had some contact with their KTO (Exhibit 8.2).

9. Motivations for interactions

9.1 Motivations for participating in interactions by RAE score and RAE score within discipline subgroups (%)

Respondents were asked to indicate their motivation for participating in interactions with external organisations by scoring each of 11 motivations on a scale of 1 to 5 (where 1 is of no importance 5 is very important). The mean scores are shown in Exhibit 9.1.

Exhibit 9.1 Motivations objectives for participating in activities with external organisations for interactions by RAE score (score is 1-5 where 5 is very important)(mean score)



The main motivations to engage with external organisations were concerned with developing the research activities of academics. Overall, the highest scoring factor is to gain insights in the area of the academic's research area – this scored 4.0 by all academics. The highest scores were 4.2 for academics from the Social sciences in medium and high ranked departments.

The second highest scoring factor was to keep up to date with research in external organisations. This scored 3.6 by all academics and was scored highest by academics in low ranked departments. The third highest scoring factor was test the practical application of research. This scored 3.5 by all academics. This was particularly scored highly (3.7) by academics from the Sciences.

The fourth highest scoring factor was to further the institution's outreach mission. This scored 3.2 by all academics and was scored highest by academics in low ranked departments. The equal fifth highest scoring factor was to secure access to external expertise. This scored 3.1 by all academics. This was particularly scored highly (3.3) by academics from the Sciences. The other equal fifth highest scoring factor was to gain knowledge useful for teaching. This scored 3.1 by all academics and was scored highest by academics in low ranked departments. The equal seventh highest scoring factor was to secure access to specialist equipment. This scored 2.8 by all academics. This was particularly scored highly (3.1) by academics from the Sciences.

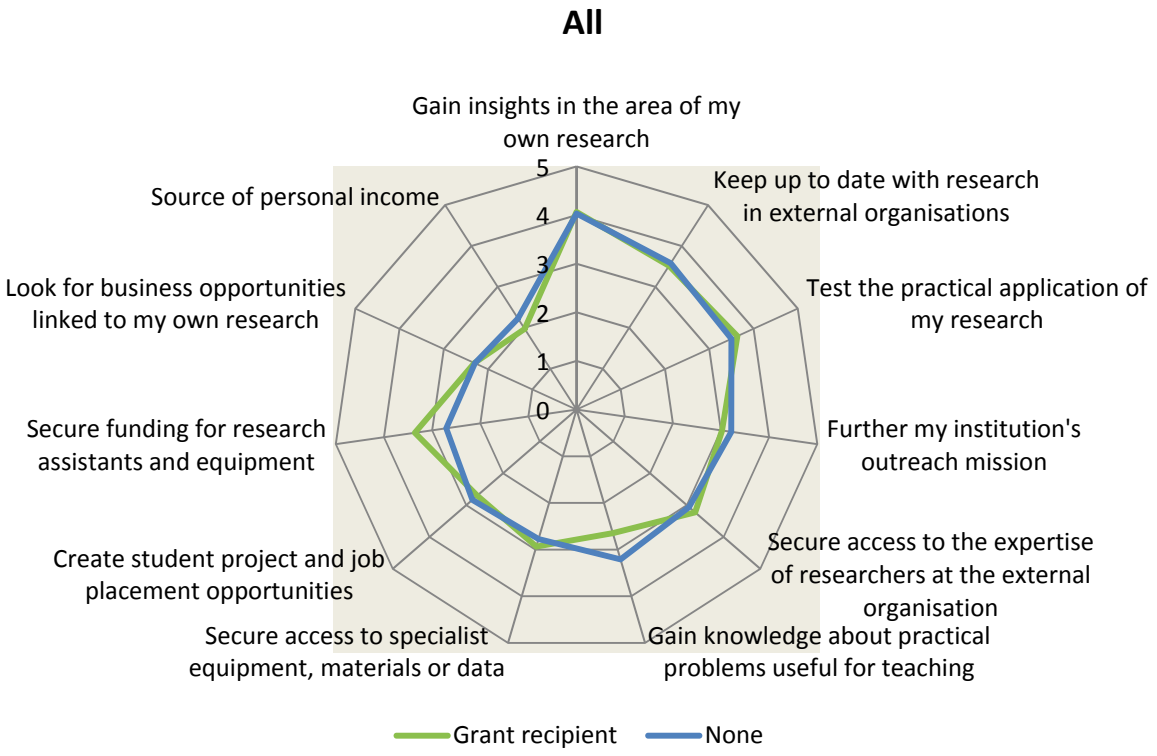
The next seventh equal highest scoring factor was concerned with student projects and placements. This scored 2.8 by all academics and was scored highest (3.0) by academics in low ranked departments. The other seventh equal highest scoring factor was to secure funding for researchers and equipment. This scored 2.8 by all academics. This was particularly scored highly by academics from the Sciences (3.3). The tenth highest scoring factor was concerned with looking for business opportunities linked to research. This scored 2.3 by all academics and was scored highest by academics in low ranked departments. The lowest scoring factor was concerned with raising personal income. This was scored 2.2 by all academics.

Taken as a whole these results are consistent with academics in low ranked departments being more motivated by outreach mission, teaching, student placements, the pursuit of business opportunities and the need to keep up with external research developments whereas those in science departments generally were somewhat more concerned with securing funding for students and equipment and access to specialist equipment.

9.2 Motivations for participating in interactions by grant status and grant status within discipline subgroups (%)

Exhibit 9.2 shows the pattern of motivation cross classified by grant holding status.

Exhibit 9.2 Motivations and objectives for participating in activities with external organisations for interactions by grants status (score is 1-5 where 5 is very important)(mean score)



The overall pattern of motivations is naturally very similar to that shown in Exhibit 9.1. Thus, the highest scoring factor is to gain insights in the area of the academic's research area. Here the highest score was 4.3 for academics from the Social sciences that are in receipt of grants. This pattern is the same in the matched sample where none of the differences between grant and non-grant holders were significant statistically.

The second highest scoring factor was to keep up to date with research in external organisations. This was scored highest by Scientists (3.6), and lowest by academics from the Arts and humanities in receipt of a grant (3.2). This pattern is the same in the matched sample where only the difference between grant and non-grant holders in Health sciences was significant statistically.

The third highest scoring factor was to test the practical application of research. This was scored highest by Scientists and Social scientists in receipt of a grant (3.7), and lowest by academics from the Arts and humanities in receipt of a grant (3.0). This pattern is the same in the matched sample except that Engineering and Materials science emerges as highest scorer. None of the differences between grant and non-grant holders were significant statistically.

The fourth highest scoring factor was to further the institution's outreach mission. This was scored highest by academics from the Arts and humanities not in receipt of a grant (3.5), and lowest by Scientists in receipt of a grant (3.0). In the matched sample a similar pattern holds with non-grant

receivers statistically significantly more likely than grant holders to be concerned with furthering outreach in the sample as a whole and in the Arts and humanities and Social sciences. It thus appears that both lower ranked RAE status and not having a grant are associated with a higher motivation to interact externally based on outreach mission.

The equal fifth highest scoring factor was to secure access to external expertise. This was scored highest by Scientists in receipt of a grant (3.4), and lowest by academics from the Social sciences not in receipt of a grant (2.8). In the matched sample a similar pattern holds but no difference is statistically significant.

The other equal fifth highest scoring factor was to gain knowledge useful for teaching. This tended to be scored highly by academics not in receipt of a grant. This is also the case in the matched sample where the differences are statistically significant in all disciplines except Biology, Chemistry and Veterinary science. This is consistent with the earlier finding that research excellence rating is inversely linked to external interaction motivated by teaching needs.

This teaching motivational pattern is confirmed by the results for the seventh equal highest scoring factor. This was to secure access to specialist equipment. This was scored highest by Scientists in receipt of a grant (3.1), and lowest by academics from the Arts and humanities (2.5). In the matched sample a similar pattern holds but no difference is statistically significant.

The next equal seventh highest scoring factor was concerned with student projects and placements. This tended to be scored highly by academics not in receipt of a grant. In the matched sample a similar pattern holds and the difference is statistically significant in Engineering and Materials science.

The next seventh equal highest scoring factor was to secure funding for researchers and equipment. This was scored highest by Scientists in receipt of a grant (3.7), and lowest by academics from the Arts and humanities not in receipt of a grant (2.3). In the matched sample a similar pattern holds and the differences are statistically significant in Engineering and Materials science, Health sciences and Social sciences. This result is also consistent with the earlier findings linked to research excellence and show that given departmental excellence grant holders are more motivated by these factors in these subjects than non-grant holders.

The tenth highest scoring factor was concerned with looking for business opportunities linked to research- this was scored highest by all Scientists (2.5), and lowest by academics from the Arts and humanities in receipt of a grant (1.7). In the matched sample a similar pattern holds and differences are statistically significant in Arts and humanities where non-grant holders are more likely to be looking for business opportunities.

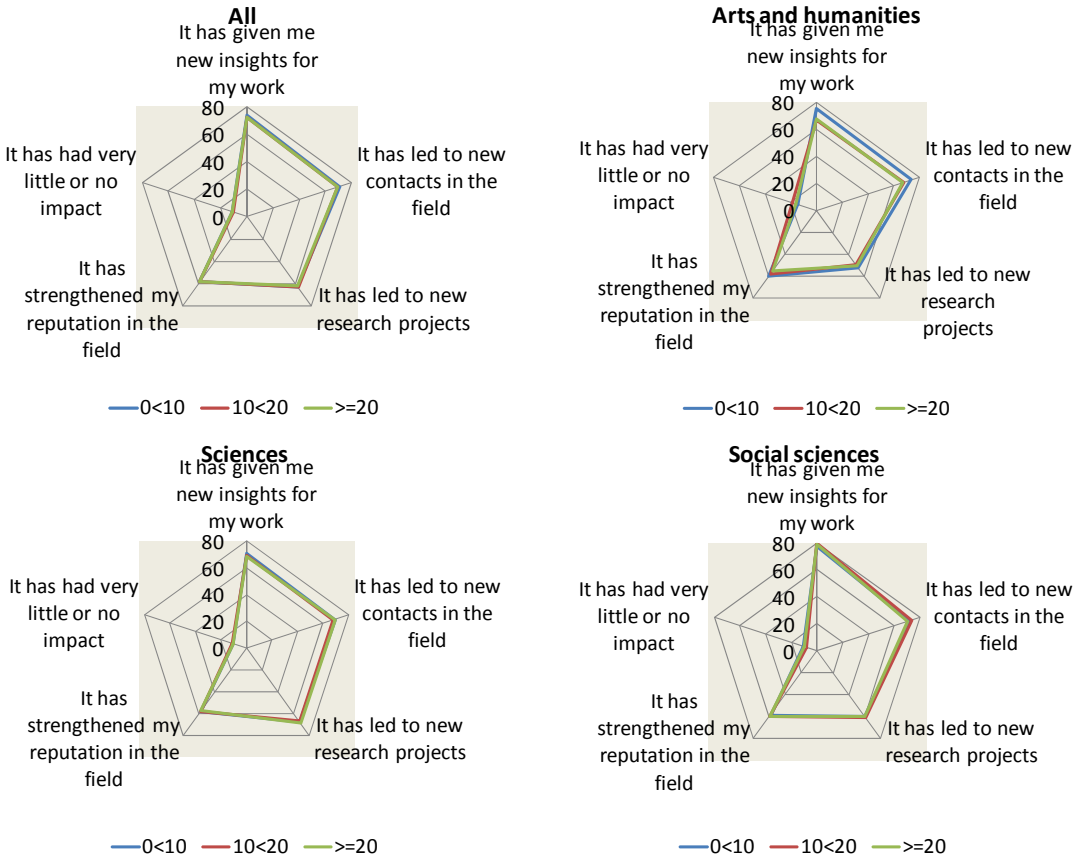
The lowest scoring factor was concerned with raising personal income. In the matched sample non-grant holders scored this factor statistically significantly more highly than grant holders in the Arts and humanities, Health, Physics and Mathematics and Social sciences.

10.Impact of interactions

Respondents were asked to indicate the impact of external interactions on their research. The pattern of responses cross classified by departmental RAE rating is shown in Exhibit 10.1.

10.1 Impact Interactions: the impact on research by RAE score and RAE score within discipline subgroups (%)

Exhibit 10.1 Impact that involvement with external organisations has had on amount and kind of research done by RAE score



Overall, 73% of academics who engage with external organisations believe that it has given them new insights into their research work. This is slightly higher for academics in low ranked departments (74%), which is mainly due to the responses from academics in the Arts and humanities. There the lowest ranked departments report a statistically significantly higher proportion with new insights than medium and high departments (75% compared with 67% and 68%).

In addition in the sample as a whole 71% of academics who engage with external organisations believe that it has led to new contacts in the field. Once again this is slightly higher for academics in low ranked departments in the Arts and humanities (73%) as well as for those in medium ranked departments in the Social sciences (73%).

For the sample as a whole around 62% of academics who engage with external organisations believe that it has led to new research projects – this impact is highest in the Sciences and within that group in the highest ranked departments (around 69%). None of the differences are statistically significant.

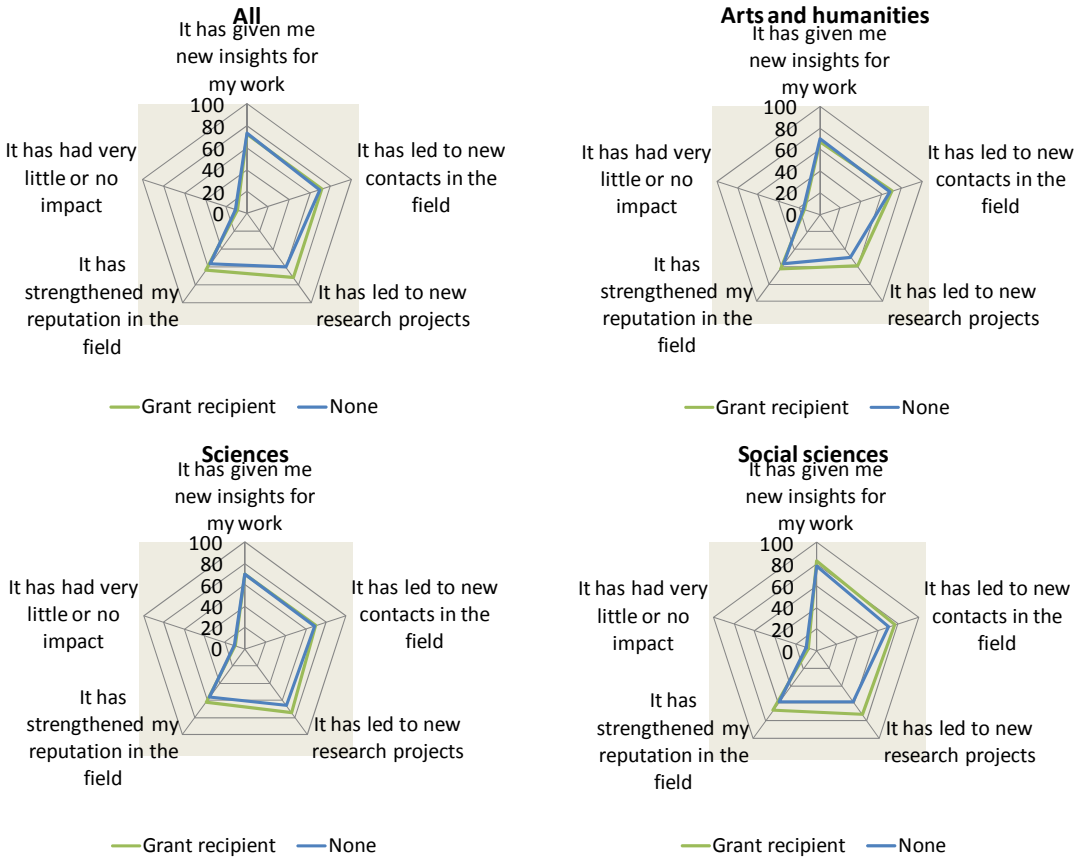
Overall, 58% of academics who engage with external organisations believe that it has strengthened their reputation. This is broadly similar across different disciplines and different ranked departments.

Finally only around 11% of academics who engage with external organisations believe it has had very little or no impact on their research. This neutral outcome is highest in medium ranked departments in the Arts and humanities (around 19%) but none of the differences across the sample as a whole or within the disciplinary subgroups is statistically significant (with the exception of social sciences where the lowest rated departments were most likely to report a neutral or very little impact).

10.2 Impact Interactions: the impact on research by grant status within discipline subgroups for the whole sample and for the matched sample (%)

Research impacts cross classified by grant status are shown in Exhibit 10.2.

Exhibit 10.2 Impact that involvement with external organisations has had on amount and kind of research done by grant status



The overall pattern for each impact category in the sample as a whole is naturally the same as in Exhibit 10.1. Thus 73% of academics who engage with external organisations believe that it has given them new insights into their research work. When the sample is cut by grant status the exhibit shows that this impact is highest for academics from the Social sciences in receipt of a grant (83%). In the matched sample a similar pattern holds which is, however, only statistically significant for grant holders compared to non-grant holders in Physics and Mathematics.

The proportion of academics who believe that it has led to new contacts in the field is highest for academics from the Social sciences in receipt of a grant (77% compared with 70% for the sample as a whole and 71% for social science non-grant holders). In the matched sample a similar pattern holds but no differences between grant and non-grant holders are significant.

The proportion of academics who believe that it has led to new research projects is 72% for those with a grant compared to 60% for those not in receipt of a grant. These differences are highest for Scientists (in receipt of a grant 74%, not in receipt of a grant 66%) and in Social science (grant holder 73%, non-grant holder 58%). In the matched sample a similar pattern holds but the difference is statistically significant only in Social sciences.

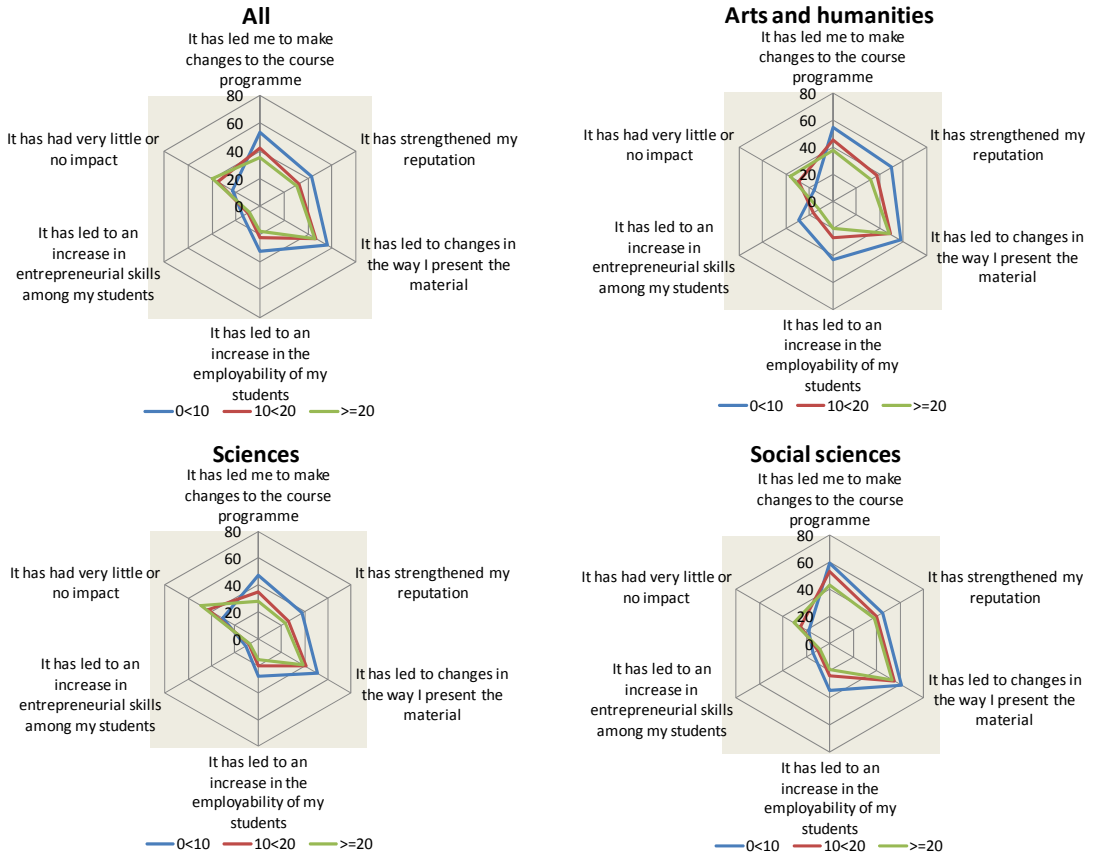
Overall, 58% of academics who engage with external organisations believe that it has strengthened their reputation. This is broadly similar across different disciplines and always statistically significant. In the matched sample a similar pattern holds and the differences are statistically significant in Physics and Mathematics.

Finally the proportion of academics who engage with external organisations and believe it has had very little or no impact on their research is highest for academics from the Arts and humanities who are not in receipt of a grant (16% compared to 11% for academics in the sample as a whole and 14% of Arts and humanities grant holders). For the sample as a whole grant holders are significantly, but slightly less likely than non-grant holders to report no or little impact (10% compared to 11% respectively). In the matched sample once again it is academics in Arts and humanities who are most likely to report little or no impact with 19% of grant holders and 18% of non-grant holders reporting this compared with 10% and 11% respectively to the matched sample as a whole. There are, however, no significant differences between non-grant and grant holders for the sample as a whole or any discipline. The difference within Social sciences is weakly significant.

10.3 Impact Interactions: the impact on teaching by RAE score and RAE score within discipline subgroups (%)

In addition to questions about research impacts the respondents were asked about impacts on their teaching. The results cross classified by departmental RAE ratings are shown in Exhibit 10.3.

Exhibit 10.3 Impact that involvement with external organisations has had on amount and kind of teaching done by RAE score



Overall, 50% of academics who engage with external organisations believe it has had an impact on their teaching through the way that they present their material. This is somewhat lower than those reporting positive research impacts. The proportion is highest for academics in low ranked departments (56%) compared to those from medium (47%) and high ranked (46%) departments.

For the sample as a whole 45% of academics who engage with external organisations believe it has had an impact on their teaching through changes to the course programme. This is highest for academics in low ranked departments (53%) compared to those from medium (42%) and high ranked (36%) departments.

Similarly whilst 35% of academics who engage with external organisations believe it has had an impact on their teaching through strengthening their reputation, the proportion is highest for academics in low ranked departments (43%) compared to those from medium (32%) and high ranked (30%) departments.

A similar pattern emerges when we consider whether engagement with external organisations has an impact on teaching through an increase in the employability of their students. This proportion is

26% for the sample as a whole but is highest for academics in low ranked departments (33%) compared to those from medium (22%) and high ranked (18%) departments.

For the sample as a whole only 11% of academics who engage with external organisations believe it has had an impact on their teaching through increasing the entrepreneurial skills of their students. Once again this is highest for academics in low ranked departments (14%) compared to those from medium (10%) and high ranked (9%) departments.

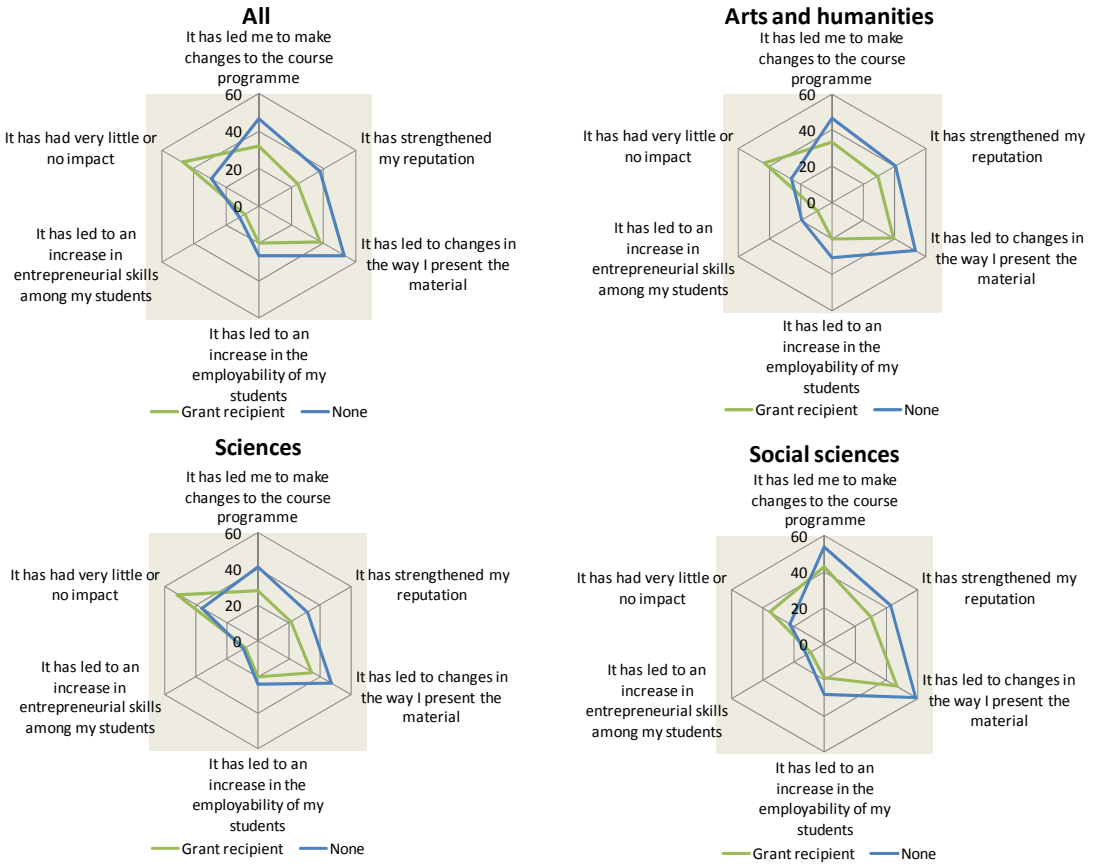
Around 32% of academics who engage with external organisations believe it has had little or no impact on their teaching. This is much higher than the proportion reporting no research impacts. In keeping with the results for the positive teaching impacts we have just discussed this is highest for academics in high ranked departments (39%) compared to those from medium (36%) and low ranked (23%) departments.

The overall picture is quite clear teaching impacts are systematically higher in lower RAE rated departments and this is consistent with the earlier finding discussed earlier in relation to Exhibit 9.1 that external interactions in low rated departments are more frequently motivated by gaining knowledge that could be useful for teaching and for developing student projects and placements.

10.4 Impact Interactions: the impact on teaching by grant status within discipline subgroups for the whole sample and the matched sample (%)

Teaching impacts cross cut by grant status are shown in Exhibit 10.4.

Exhibit 10.4 Impact that involvement with external organisations has had on amount and kind of teaching done by grant status



For the full sample 50% of academics who engage with external organisations believe it has had an impact on their teaching through the way that they present their material. For those not in receipt of a grant the proportion is 53% compared to 38% for those in receipt of a grant. In the matched sample a similar pattern holds and non-grant holders are statistically significantly more likely to report this impact than grant holders in Arts and humanities and Health sciences.

The next most important impact is through changes to the course programme with 45% of the full sample recording this response. This is highest for academics not in receipt of a grant (47%) compared to those in receipt of a grant (32%). In the matched sample a similar pattern holds and non-grant holders are statistically significantly more likely to report this impact than grant holders in Arts and humanities, Biology, Chemistry and Veterinary science and Health sciences.

For the full sample 35% believe it has had an impact on their teaching through strengthening their reputation. This is highest for academics not in receipt of a grant (38%) compared to those in receipt of a grant (24%). In the matched sample a similar pattern holds and non-grant holders are statistically significantly more likely to report this impact than grant holders in Social sciences.

Overall, 26% of academics who engage with external organisations believe it has had an impact on their teaching through an increase in the employability of their students. This is highest for academics not in receipt of a grant (27%) compared to those in receipt of a grant (20%). In the matched sample a similar pattern holds and non-grant holders are statistically significantly more likely to report this impact than grant holders in Arts and humanities and in Social sciences.

Overall, 11% of academics who engage with external organisations believe it has had an impact on their teaching through increasing the entrepreneurial skills of their students. This is highest for academics not in receipt of a grant (12%) compared to those in receipt of a grant (9%). In the matched sample a similar pattern holds and non-grant holders are statistically significantly more likely to report this impact than grant holders in Arts and humanities.

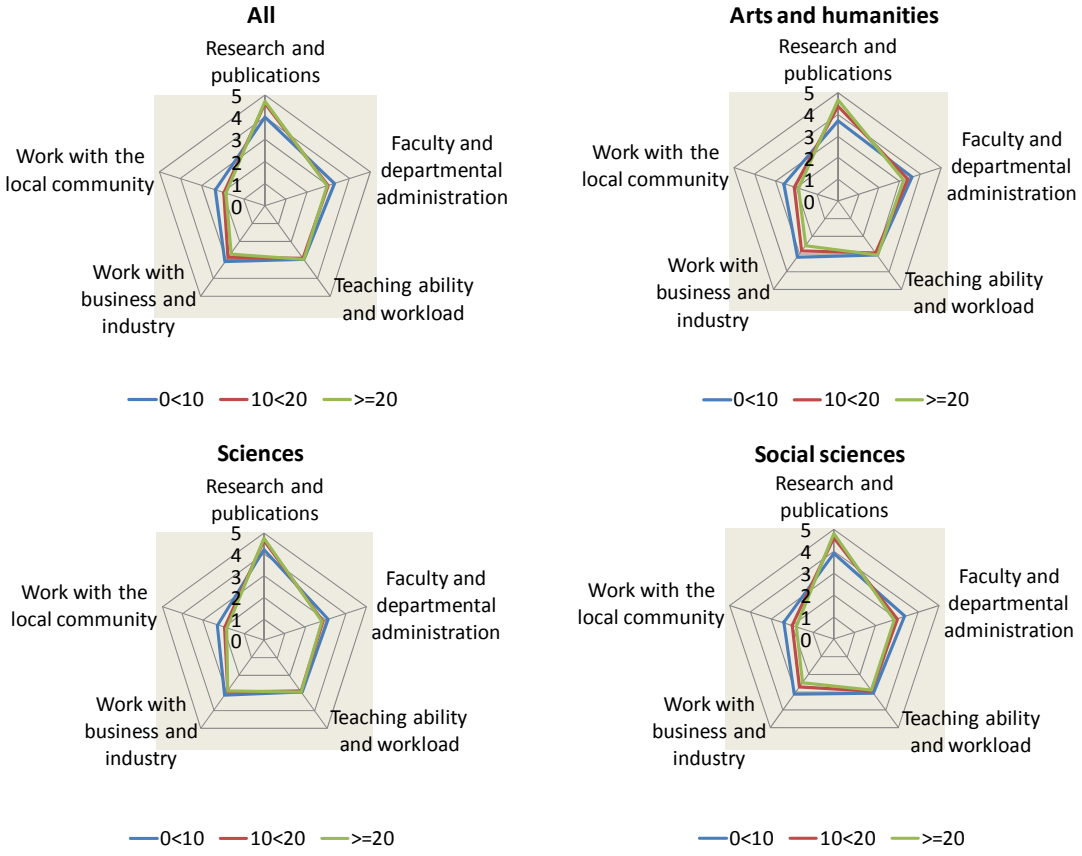
Overall, 32% of academics who engage with external organisations believe it has had little or no impact on their teaching. This is highest for academics in receipt of a grant (47%) compared to those not in receipt of a grant (29%). In the matched sample a similar pattern holds and grant holders are statistically significantly more likely to report this lack of impact than non-grant holders in Arts and humanities, Health sciences, Physics, Mathematics and in Social sciences.

The overall picture which emerges is very clear. Non-grant holders are generally much more likely to report positive impacts and are less likely to report no or little impact and this is typically true in both the full and matched samples.

10.5 Weight given to factors in career advancement by RAE score and RAE score within discipline subgroups (mean score)

Respondents were asked to score each of 5 factors by their weight in relation to career advancement with 1 of no importance and 5 most important. The mean scores by RAE departmental rating are shown in Exhibit 10.5.

Exhibit 10.5 How much weight institution gives to the following criteria with regards to career advancement and promotion by RAE score (score is 1-5 where 5 is the highest)(mean score)



Research and publications is considered by far the most important factor in terms of promotion (4.4). This is consistent across disciplines but is more important for academics from high (4.7) and medium ranked (4.6) departments compared to those from low ranked departments (4.0). Administrative duties are also an important factor (3.1) but in this case academics from low (3.3) and medium ranked (3.0) departments weight it slightly more highly compared to those from high ranked departments (2.9).

Teaching ability and workload (3.0) was also ranked as marginally less important than administration and this position is consistent across disciplines and differently ranked departments.

Engagement with business tended to be considered to have a moderate impact on promotion (2.9). This is slightly more important for academics from low (3.1) compared to medium ranked (2.9) and even more so compared to those from high ranked departments (2.7).

Engagement with the local community was considered to have a low impact on promotion (2.1). This is more important for academics from low (2.4) and medium ranked (2.0) departments compared to those from high ranked departments (1.8). It is also more important for academics in the Arts and humanities compared to those in the Sciences and Social sciences.

10.6 Weight given to factors in career advancement by grant status and grant status within discipline subgroups (mean score)

Exhibit 10.6 shows the mean weightings given to career advancement factors cross classified by grant status.

Exhibit 10.6 How much weight institution gives to the following criteria with regards to career advancement and promotion by grant status (score is 1-5 where 5 is the highest)(mean score)

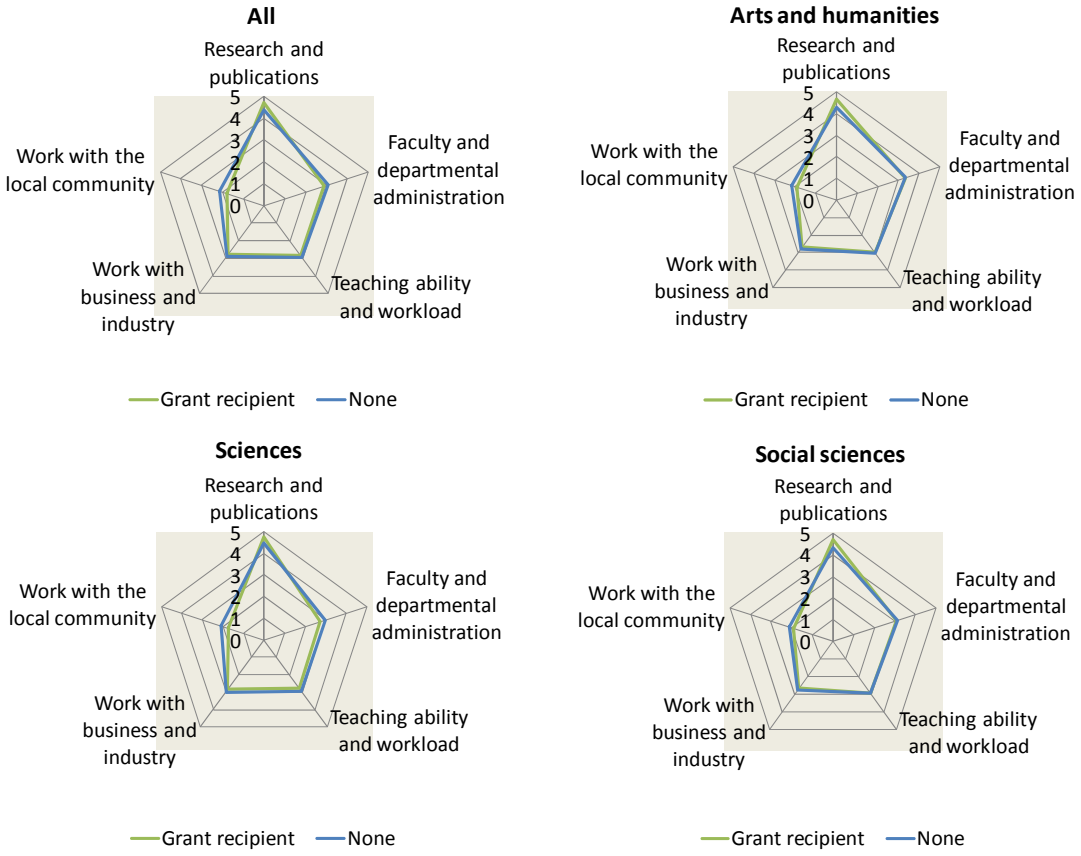


Exhibit 10.6 shows that in general the perceptions of the weight given to the factors varies little in absolute terms between the grant holding and non-grant holding groups although the sample sizes mean that in most cases the differences are statistically significant. For the sample as a whole academics with a grant rank research and publications as more important in terms of promotion compared to those without a grant (4.7 compared to 4.4) but rank administrative duties as less important than those without a grant (2.9 compared to 3.1). They also rank teaching ability and workload as marginally less important in terms of promotion than those without a grant (2.9 compared to 3.0) and the same holds for engagement with business (2.8 compared to 2.9). Finally academics with a grant rank engagement with the local community as less important in terms of promotion compared to those without a grant (1.8 compared to 2.1).

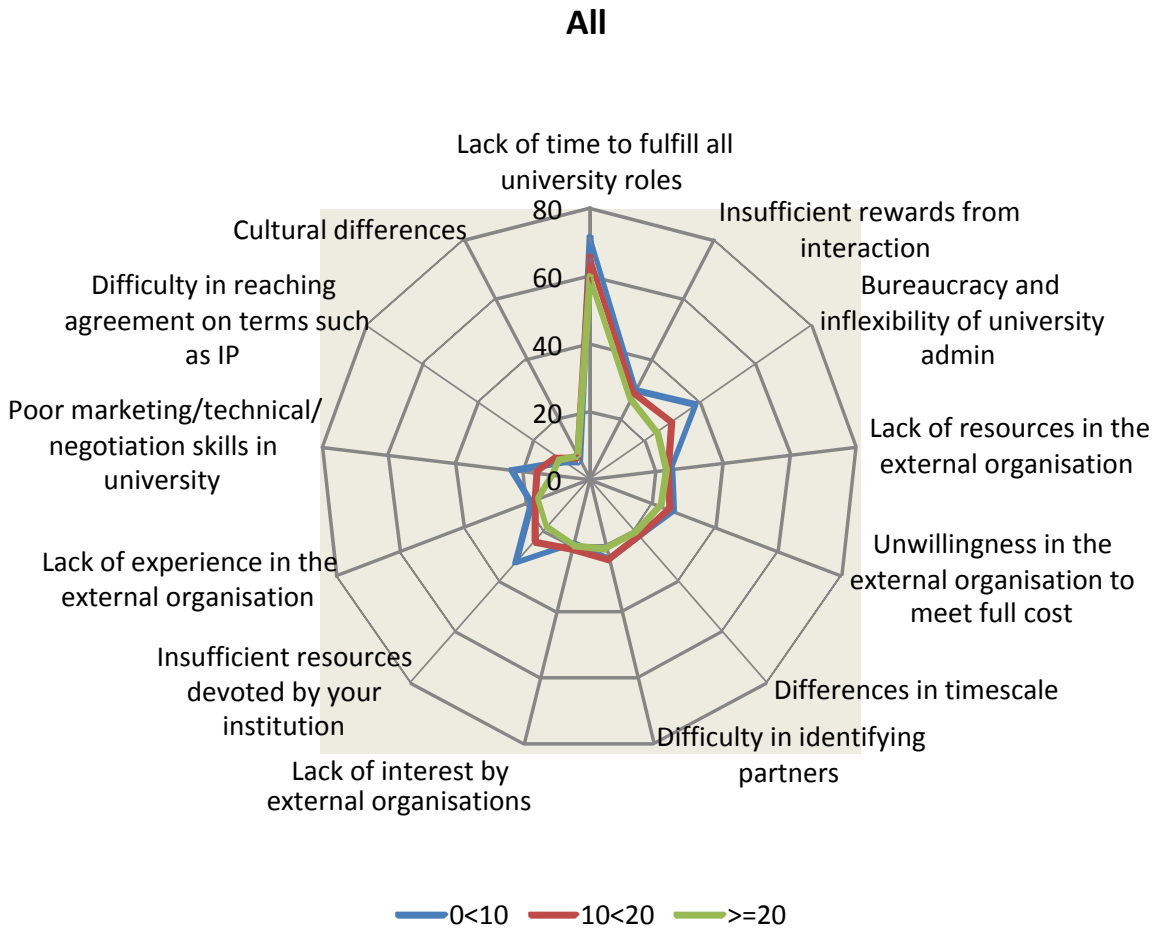
When the same analysis is carried out for the matched sample the differences between grant and non- grant holders are smaller than in the full sample and are rarely statistically significant.

11. Barriers to interaction

11.1 Constraints on interactions by RAE score and RAE score within discipline subgroups (%)

Respondents were asked to indicate whether their interactions with external organisations were constrained by any of 13 factors. The results are shown in Exhibit11.1.

Exhibit 11.1 Which factors have constrained or prevented your interactions with external organisations by RAE score



The exhibit shows that although there is a high degree of interaction between academics and external organisations there are also a range of factors that are perceived to constrain such interactions. Of these for the sample as a whole the most frequently cited are a lack of time (66%) and bureaucracy and lack of flexibility in university administration (31%) .

In most cases academics in low ranked departments are likely to cite constraints more. Thus in the case of lack of time the differences are quite large (71% in low compared to 60% in the top ranked group). The same is true for bureaucratic problems (39% in low compared to 30% in medium ranked and 24% in high ranked); insufficient resources from the university (33%, 24%, 19% respectively) and poor marketing and other skills in university admin (23% low, 16% medium and 11% high). Smaller

but still statistically significant differences showing higher frequencies of constraints in low rated departments are found in relation to insufficient rewards (30% low, 28% medium, 27% high); unwillingness of external bodies to meet the cost (27% low, 25% medium, 23% high); difficulty in identifying partners (24% low, 24% medium, 21% high); lack of external partner interest (19% low, 21% medium, 20 % high); lack of external partner experience (19%, 17%, 16%).

There are small insignificant differences across RAE ratings for lack of external partner resources (24% for the whole sample); and differences in timescale (22% for the whole sample).

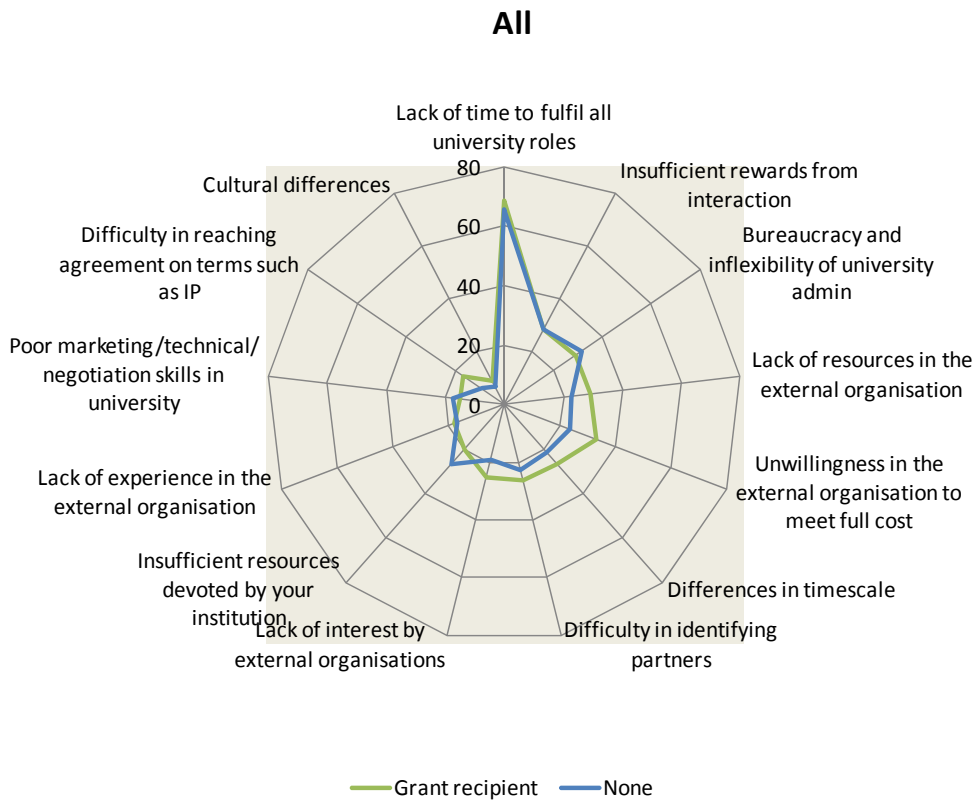
The only cases in which high and medium rated departments have a higher reported frequency of constraint is in relation to reaching agreement on IP where academics in the medium rated departments score highest (9% low, 12% medium, 10% high) and cultural differences which are most frequently cited in high rated departments (6% low, 7% medium, 8% high). These constraints are however at the bottom of the list for academics in all types of department.

These broad patterns are largely reflected across each disciplinary group, but it is notable that it is academics in the Sciences who, as might be expected given their relatively high propensity to patent, are most likely to cite IP difficulties (12% low, 15% medium and 16% high).

11.2 Constraints on interactions by grant status and grant status within subgroups (%)

Exhibit 11.2 shows the pattern of constraints cross classified by grant status.

Exhibit 11.2 Which factors have constrained or prevented your interactions with external organisations by grant status



In the majority of cases academics with grants are more likely to report constraints. Thus, a lack of time, is higher for academics with a grant (69%) compared to those without a grant (65%) as is external organisation unwilling to meet the cost (33%) compared to those without a grant (24%); difficulty in reaching agreement over IP (17%) compared to those without a grant (9%); external body unwilling to meet the cost (33%) compared to those without a grant (24%); in terms of lack of external resources (29%) compared to those without a grant (23%); difficulty in identifying partners (26%) compared to those without a grant (23%); differences in timescales (27%) compared to those without a grant (21%); lack of interest by external organisations (26%) compared to those without a grant (19%); lack of experience in the external organisation, slightly higher for academics with a grant (18%) compared to those without a grant (17%); cultural differences, which is slightly higher for academics with a grant (9%) compared to those without a grant (7%).

A number of constraints are less frequently cited by academics with a grant. Thus constraints arising from bureaucracy and inflexibility, are lower for academics with a grant (29%) compared to those without a grant (32%); as are insufficient internal resources (20%) compared to those without a grant (27%); insufficient rewards which is slightly lower for academics with a grant (28%) compared to those without a grant (29%) and poor marketing (15%) compared to those without a grant (17%).

In the matched sample the overall pattern is similar to the whole sample but in general the differences between grant and non-grant holders are not statistically significant.

12. Summary Conclusions

The Dual Support system of funding for UK university research has delivered a rise in real terms in both the quality (mainstream QR) related Funding Council stream and the Research Council Grant stream. Funding through the Research Council route has grown faster than mainstream QR, in part as a result of the introduction of the full economic costs. In 2002 mainstream QR funding was higher than Research Council funding. By 2010 the positions had been reversed. Industrial funding for university research has increased less fast than funding from charities, central government, and from overseas and by much less than mainstream QR and Research Council funding. 'Other' QR linked to HEI's research income from business and charities and PhD training provision has risen relatively quickly in the last 5 years of the period.

The Dual Support system is associated with a high level of concentration of funding across UK universities. In 2010 the share of the top 10 universities in Research Council funding was 64%, in charitable funding 77%, in industrial funding 60% and overseas funding 62%. It was 53% for mainstream QR and 57% for central government funding. There was either no change or a small increase in the share of concentration in each source of income over time between 2002 and 2010, except for mainstream QR where the degree of concentration fell slightly and 'other' QR where it rose. Thus in terms of the Dual Support mechanism mainstream QR has tended to be a moderating influence on the concentration of research income flows overall.

In general there is a very strong positive relationship between the distribution of Research Council income and mainstream QR income across universities and between the distribution of these and each of the other sources of research income.

An illustrative exercise for the allocation of mainstream QR in the two years 2009-10 and 2010-11 was carried out. It compared the allocation of funds based on the mainstream QR excellence rating algorithm following the 2008 RAE with an allocation based on the shares of institutions in total research council funding summed over the RAE evaluation period. These two processes produced a very similar distribution. The mean change in universities mainstream QR allocated funding was 0. However, a number of institutions would have gained by as much as 2.6% and some would have lost by around 1%. Since Research Council funding is more highly concentrated than mainstream QR funding, the typical gain arising from allocating mainstream QR funds on the basis of Research Council income would have been to those institutions already dominant at the top of the Research Council income distribution.

When we turn to our microeconomic analysis of the pattern of individual academic involvement in impact pathways and academics' motivation for and conduct of research activity, a number of differences emerge between highly rated and less highly RAE rated departments. Differences also emerge between holders and non-holders of Research Council grants.

Our analysis shows that academics in highly rated RAE departments are more likely to report that they are motivated to carry out basic or user-inspired basic research than academics in lower ranked departments. Even so 25% of academics in highly rated departments consider that their research is motivated by applications *per se*. Despite these differences in motivation there is, however, very little difference in the extent to which the research which is carried out by academics in differently rated departments has been applied in a private, commercial or public context or is perceived to be of commercial relevance. Academics in highly rated and less highly rated departments are equally likely to report these outcomes. Moreover, if we focus attention on patenting, licensing and spin-outs, then in the Sciences, where these activities are most prevalent, academics in higher rated departments are more likely to be involved than those in lower rated departments.

It thus appears to be the case that although motivations to carry out research in highly rated departments may be less likely to be concerned with applications *per se*, nonetheless, in terms of commercialisation activities involving patenting, licensing and spin-outs, academics in these departments are more likely to find that their research has these positive impact characteristics.

Patenting, licensing and spin-outs are, however, a small component of the full system of pathways to impact in which UK academics are involved. Our analysis shows that a much higher proportion of academics are involved in a wider range of people-based, problem-solving and community-based interactions with external organisations. In relation to this wide range of pathways academics in highly rated departments tend to be more focused on a somewhat narrower range of research related problem-solving and people-based activities. It is in particular notable that pathways involving academics with external organisations via joint research, joint publications and membership of research consortia are all more frequently cited by academics in more highly RAE rated departments than in lower rated departments.

Motivations to interact with external organisations are, for academics in all types of department, driven, in general, more by research than by teaching. Academics in lower rated departments are, however, more likely to be motivated by teaching, student placements and the pursuit of their home universities outreach mission. Academics in highly rated departments are in contrast more likely to be motivated by developing research activities and less likely to be motivated to interact with external organisations to keep up with research than those in lower rated departments. In general, with little variation across departmental ratings, the impacts of interactions upon teaching and research are universally considered positive.

In terms of constraints on interactions for academics in both high and low rated departments a lack of time and university bureaucracy are top of the list. Academics in lower rated departments are somewhat more likely to feel constrained across each of the various potential constraints identified in the survey. The only area where academics in highly rated departments are more likely to report constraints is in relation to reaching agreement on IP. This is, in general, a constraint which is cited in a very small number of cases, even in the highly rated departments. The tendency for it to be a more frequently reported constraint in highly rated departments reflects the fact that academics in such departments have a greater propensity to patent and license and therefore are more likely to experience such constraints more frequently than academics in low rated departments.

Because there is a close correlation between Research Council grant awards and mainstream QR funding, there is in most cases a similar pattern of variations across academics when we classify them by whether or not they hold grants as when we classify them by their departments' RAE excellence ratings. However, when we use a matched sample to estimate grant holding effects whilst holding departmental excellence ratings constant, a number of findings emerge.

Not surprisingly grant holders in the matched sample emerge as more likely to be carrying out research than non-grant holders. They are also, however, more likely: to have had their research applied in a commercial context; to have interactions with private and public sector external organisations; and to be involved in patenting, licensing and spin-outs. Their pattern of wider interactions with external organisations and the motivations for those interactions are more likely to be focused on a range of research and problem-solving pathways. They are less concerned than non-grant holders with teaching and student related pathways. Non-grant holders are also more likely to report a variety of possible beneficial impacts on teaching arising from their external relationships than is the case with grant holders.

Finally, grant holders in the matched sample are more likely than non-grant holders to report constraints arising from: a lack of resources to support their research in external organisations;

differences in perceptions of appropriate timescales compared to external organisations; difficulties in identifying partners; and a lack of interest amongst external partners.

References

Adams, J. and Bekhradnia, B. (2004) *What future for dual support?*, Higher Education Policy Institute, February. http://www.hepi.ac.uk/files/6%20Dual%20Support.pdf.

Adams, J. and Gurney, K. (2009) *Funding Selectivity, Concentration and Excellence – How good is the UK's Research?,* Higher Education Policy Institute. http://www.hepi.ac.uk/files/46%20Funding%20selectivity,%20concentration%20and%20excellence%20full.pdf.

Alexander, A. (2009) *RCUK/UUK Review of the Impact of Full Economic Costing on the UK Higher Education Sector: A Report prepared for Research Councils UK and Universities UK by a Panel chaired by Professor Alan Alexander*, RCUK and UUK, April.

Barker, K. (2007) 'The UK Research Assessment Exercise: The evolution of a national research evaluation system', *Research Evaluation* 16 (1): 3-12.

Box, S. (2010) 'Performance-based funding for public research in tertiary educational institutions: Country experiences' in OECD (2010) *Performance-based funding for public research in tertiary education institutions*, Paris: OECD: 127-166.

Brown, M. (2009) 'RAE2008: results, reflections, implications' *Research Intelligence* 107: 14-19

Diggle, P. and Chetwynd, A. (2006) *High Correlation is not the whole Story: A cautionary note on the use of simple metrics to determine QR allocations*, Mimeo, Lancaster University, 3rd April. http://www.hm-treasury.gov.uk/d/foi_researchassessment_3and_memo.pdf.

Dunne, J.P. and Hughes, A. (1994) 'Age, Size, Growth and Survival : UK Companies in the 1980's', *Journal of Industrial Economics* XLII (2): 115-140

Geuna, A. and Martin, B.R. (2003) 'University Evaluation and Funding: An international comparison', *Minerva* 41 (4): 277-304.

Gilroy, P. and McNamara, O (2009) 'A Critical History of Research Assessment in the UK and its post 1997 Impact on Education' *Journal of Education for Teaching* 35(4) 321-325.

Hare, P.G. (2003) 'The United Kingdom's Research Assessment Exercise: Impact on Institutions, Departments, Individuals', *Journal of the Programme on Institutional Management in Higher Education*, Special Issue on Higher Education Management and Policy: 43-62.

HEFCE (2010) *Guide to Funding: How HEFCE allocates its Funds*, Bristol: HEFCE 2010/24, September.

Hicks, D. (2012) 'Performance-based university research funding systems', *Research Policy* 41: 251-261.

Hughes, A and Martin, B.R. (2012) *Enhancing Impact: The Value of Public Sector R&D,* UK Innovation Research Centre and Council for Industry and Higher Education.

Hughes, A., Kitson, M., Abreu, M., Grinevich, V., Bullock, A. and Milner, I. (2010) 'Cambridge Centre for Business Research Survey of Knowledge Exchange Activities by UK Academics', *UK Data Archive Study no. 6462.*

Hughes, A. and Kitson, M. (2012) 'Pathways to Impact and the Strategic Role of Universities: new evidence on the breadth and depth of university-knowledge exchange in the UK and the factors constraining its development', *Cambridge Journal of Economics* 36: 712-50.

London Mathematical Society, The (2010) *UK Government Funding for Mathematical Sciences Research: A briefing paper of the London Mathematical Society*, http://www.lms.ac.uk/sites/default/files/Mathematics/Funding.pdf.

Martin, B.R. (2011) 'The Research Excellence Framework and the 'impact agenda': are we creating Frankenstein Monster?' *Research Evaluation,* 20(3): 247-254

PA Consulting (2009) *RAE Accountability Exercise*, London: PA Consulting.

Ramsden, B. (2012) *Institutional Diversity in UK Higher Education*, Higher Education Policy Institute. London. http://www.hepi.ac.uk/files/Institutional%20diversity%20in%20UK%20Higher%20Education%20final.pdf.

Roberts, G. (2003) *Review of research assessment* Report by Sir Gareth Roberts to the UK funding bodies.

Russell Group, The (2010) *The Concentration of Research Funding in the UK: Driving Excellence and Competing Globally*, London: The Russell Group of Universities.

Sastry, T. and Bekhradnia, B. (2006) *Using Metrics to Allocate Research Funds: A short evaluation of alternatives to the Research Assessment Exercise,* Higher Education Policy Institute. http://www.hepi.ac.uk/files/23RAEandmetricsfullreport.pdf.

Siegel, S. and Castellan, N.J., Jr. (1998) *Nonparametric Statistics for the Behavioral Sciences*

Universities UK (2009) *Monitoring Research Concentration and Diversity: Changes between 1994 and 2007*, A report by Evidence for UUK, London, June.

Wakeham, W. (2010) *Financial Stability and Efficiency in Full Economic Costing of Research in UK Higher Education Institutions: Report of RCUK/UUK Task Group chaired by Sir William Wakeham*, UUK and RCUK, June.

Annex 1 Dataset Creation

A1.1 Calculation of Main Stream QR Funding based on the 2008 RAE

The allocation of funding for research through the funding council component of the dual funding structure varies in detail across the funding councils for England (HEFCE), Scotland (SFC) and Wales (HEFCW) and the Department for Employment and Learning (DEL) in Northern Ireland. The broad principles are, however, essentially the same. It is helpful to set out the procedure in England first.

The procedure for the allocation of what is termed mainstream quality related (mainstream QR) funding in England is as follows (see HEFCE 2010). The subjects in which research is to be funded are classified into units of assessment and universities are invited to submit returns of their research activity and a variety of indicators related to outputs and, in particular, staff inputs based on these units. In the 2008 Research Assessment Exercise (RAE) there were 67 units of assessments and these were grouped into 15 main RAE panel disciplines. The research funding allocation process determines the split between main RAE panels and the 67 units of assessment. The assessed allocation for each unit of assessment is aggregated for each university which then receives a block grant based on that aggregation[19].

The allocation process is based on an assessment of the quality of the research carried out and an indicator of the volume of research carried out (based on the number of research active staff at each unit of assessment). For the quality component a five level quality rating system was used in the last RAE in 2008. Each unit of assessment's submission was rated in terms of the proportion of outputs submitted which were either four star (world leading), three star (internationally excellent), two star (recognised internationally), one star (recognised nationally) or unclassified (below the standard of nationally recognised work). The total funding available was then divided between the units of assessment making up the 15 RAE main panels in proportion to the volume of research in each field[20] that was assessed as meeting or exceeding the two star quality level [21]. The allocation is in proportion to the volume activity assessed at the two star, three star and four star quality levels, multiplied by quality weights.[22] The weightings which were applied to each star category were (for 2009/10: four star 7, three star 3, two star 1. However, in allocating the funding for 2010/11 this was revised to four star 9, three star 3, two star 1, to reflect the view that the weights used in 2009/10 did not give enough credit to four star compared to three star. In these calculations the volume of research which is allocated across the various star categories is based on the full-time equivalent number of academic staff in each institution's unit of assessment submission.[23] It is also important to note that the staff numbers are fixed between Research Assessment Exercises. This means that there is a step-change in the volume of research activity at each Research Assessment Exercise.

[19] It is important to note that an initial procedure is required to determine the total amount of funding which is available to be split between the main panels. This sum is determined as part of government policy outside the quality related allocation exercise.

[20] Weightings were applied to reflect the relative costs of research in different subjects so that high cost laboratory and clinical subjects were weighted 1.6, intermediate cross subjects 1.3 and others were weighted 1.0.

[21] In 2009/10 these totals were adjusted to ensure that the proportion of mainstream QR allocated to each main panel group in science, technology, engineering and mathematics (STEM) was not less than the amount allocated in 2008/09. In 2010/11 this process was continued and in addition was extended to geography and psychology on the basis that around half of the research activity in those disciplines were regarded as more analogous to STEM than to other social sciences (HEFCE, 2010).

[22] These allocations also are taking into account cost variations within a main part group.

[23] For a useful account of the funding allocation procedures and examples of the formulae and working out the allocation of funds see the London Mathematical Society, 2010.

In addition to the calculation of mainstream QR based on quality and research volume, a number of other allocations are made to contribute towards research related costs. These funds are provided to institutions on the basis of post graduate research numbers[24] and the relative costs of the subject they are studying: charity related funding; business related funding; and funding for national research libraries (which is based on an allocation across five research libraries on the basis of review carried out during 2007). The charity related funding element has been added to reflect the fact that charity related funding is an important provider of financial resource for university based research, but is not always able to meet the full economic costs of the research. The business related funding component is linked to the objective of incentivise and supporting institutions undertaking research with business and industry. These additions to mainstream QR are based on the proportion of income received from charities and business for research respectively. Table A1.1 below shows the breakdown of mainstream QR between and these various elements in England 2010/11.

Table A1.1 The Components of Quality-Related Research Funding in England 2010/11

	Amount
Mainstream QR	£1,130m
Research Degree Programme Supervision Fund	£205m
Charity Support Element	£198m
Business Research Element	£64m
National Research Library	£6m
TOTAL	£1,603m

Source: HEFCE, 2010, Table 5, p.42

There are variations between England, Scotland, Wales and Northern Ireland. In Scotland research funding is termed the Research Excellence Grant (REG). The allocation of the research excellence grant after the 2008 RAE was carried out in a single stage which allocated the total available to departments within each of the 2008 Research Assessment Exercise units of assessment and then aggregated those up to produce grants made to each institution. Full time equivalent staff numbers remain the core volume driver, but the volume of research assistants, post graduate research students (both of which are excluded from the HEFCE volume indicators) and research grant and contract income are grouped as other activity indicators (OAIs) and account for over 38% of the total allocation.[25]

[24] Funding for research degree programme supervision is based on the number of post graduate research students full time equivalents in all departments of an institution that receive mainstream QR funding for research suitably weighted for London costs.

[25] The data for research grant and contract income are weighted to ensure they meet the required contribution to full economic costs and a higher weighting is given to charity funding than other sources. In addition, the weighting system applied in Scotland means that some funds are allocated across each of the

In the case of Northern Ireland, the allocation process is very similar to that in England with the exception that the volume measure includes research assistants and research fellows which are excluded from the research active staff definition in the UK. These are weighted at 0.67 of a full time employment research active staff member in the research assessment allocation process. In the case of Northern Ireland, additional elements are awarded in relation to charities support which mirrors the English process, along with funds to encourage increased participation in European framework programmes for research and technological development and a sustainability research fund which is directed towards the theme of sustainability emphasising renewable energy sources or green technology. This funding sum had been withheld from the overall estimated part available for quality related funding. (See http://www.delni.gov.uk/index/further-and-higher-education/higher-education/role-structure-HE-Division/HE-research-policy). In the case of the Welsh Funding Council, in addition to research active staff as defined in the English exercise, research students, research assistants, research fellows and charitable income were converted into full time research active staff in the ratio of research students 0.15, research assistants 0.10, research fellows 0.10 and charitable income 0.25. In addition to the volume and quality based allocation an additional £6.1m was added to mainstream QR and allocated to four star quality submissions only. A further £3.1m was provided to help institutions meet the full economic costs of research funded by charities calculated in proportion to research income from UK charities in units of assessment which met the mainstream QR volume threshold. (http://www.hefcw.ac.uk/documents/policy_areas/research/mainstream QR%20Funding%20Method.pdf).

It has been estimated that the costs to the HEI sector of the 2008 RAE were £47.3 million, equivalent to £1.127 per researcher or £612,828 per HEI (PA Consulting Group 2009 Table 1 p.4).

For the purposes of this report data on mainstream QR allocations were obtained by unit of assessment for each university for each year 2002/3 to 2010/11. We are extremely grateful to David Sweeney of HEFCE, Stuart Fancey of SFC, Linda Tiller of HEFCW and Martin Fullerton of DEL for providing us with this detailed data.

scales from one star to four star, whereas in England only two stars and upwards were counted. (see Scottish Funding Council
http://www.sfc.ac.uk/funding/universities/funding_streams/research_funding/funding_research.aspx)

A1.2 Collation of existing HESA and Funding Council data

Creating a consistent disaggregated panel data set linking HESA and RAE sources

To analyse existing data relevant to the Dual Funding System it was necessary to create a new panel dataset linking HESA Research Income and Funding Council mainstream QR data by year, institution and cost centre within each institution.

Cross-sectional Annual Research Income data were obtained from HESA for each source of research income for the years 2001/2 to 2010/11 disaggregated by institution and cost centre.

As different years had different formats and levels of disaggregation for income types we combined some groups in some years to give 8 consistent categories of income source and a total for each cost centre, as shown in Table A1.2.

Table A1.2 Categories of Income

Income source
1 DIUS Research Councils
2 UK-based charities
3 UK central government/local authorities, health & hospital authorities
4 UK industry, commerce & public corporations
5 EU government
6 EU other
7 Other overseas
8 Other sources
9 Total

The cross sections for each year were then linked to form a panel dataset by institution and cost centre.

We then added mainstream QR funding data by institution and Unit of Assessment (UOA) using the Funding Council Sources discussed in the previous section. This required a number of adjustments to the data.

The UOA data for the years 2002 - 2008 used the 2001 RAE Unit of Assessment definitions which differed from the definitions used for assessment and allocation in the 2008 RAE. We therefore created a new analysis code that would take account of these differences and allow us to create a consistently defined disaggregated time series. A conversion code was then created to map the UOA definitions into the definitions of cost centres used in the HESA data (See Exhibit A1.3).

Table A1.3 Assignment of 2001 and 2008 RAE Units of Assessment via Cost Centre to Analysis group

2001 RAE Unit of Assessment		Cost Centre		Analysis Group
1	Clinical Laboratory Sciences	1	Clinical Medicine	1
3	Hospital-Based Clinical Subjects	1	Clinical Medicine	1
5	Pre-Clinical Studies	1	Clinical Medicine	1
6	Anatomy	4	Anatomy and Physiology	1
7	Physiology	4	Anatomy and Physiology	1
2	Community Based Clinical Subjects	1	Clinical Medicine	1
4	Clinical Dentistry	2	Clinical Dentistry	2
10	Nursing	5	Nursing and Paramedical Studies	5
11	Other Studies and Professions Allied to Medicine	6	Health and Community Studies	6
8	Pharmacology	8	Pharmacy and pharmacology	8
9	Pharmacy	8	Pharmacy and pharmacology	8
12	Biochemistry (discontinued)	-	-	
14	Biological Sciences	10	Biosciences	10
15	Agriculture	13	Agriculture and Forestry	3
16	Food Science and Technology	13	Agriculture and Forestry	3
17	Veterinary Science	3	Veterinary Science	3
20	Earth Sciences	14	Earth, Marine and Environmental Sciences	14
21	Environmental Sciences	14	Earth, Marine and Environmental Sciences	14
18	Chemistry	11	Chemistry	11
19	Physics	12	Physics	12
22	Pure Mathematics	24	Mathematics	24
23	Applied Mathematics	24	Mathematics	24
24	Statistics and Operational Research	24	Mathematics	24
25	Computer Science	25	Information Technology, Systems Sciences and computer software engineering	25
29	Electrical and Electronic Engineering	20	Electrical, Electronic and Computer Engineering	20
26	General Engineering	16	General Engineering	16
31	Mineral and Mining Engineering	18	Mineral, Metallurgy and Materials Engineering	16
32	Metallurgy and Materials	18	Mineral, Metallurgy and Materials Engineering	16
27	Chemical Engineering	17	Chemical Engineering	17
28	Civil Engineering	19	Civil Engineering	19
30	Mechanical, Aeronautical and Manufacturing Engineering	21	Mechanical, Aero and Production Engineering	21
33	Built Environment	23	Architecture, Built Environment and Planning	23
34	Town and Country Planning	23	Architecture, Built Environment and Planning	23
35	Geography	28	Geography	28
40	Social Policy and Administration	29	Social Studies	28
41	Social Work	29	Social Studies	28
38	Economics and Econometrics	29	Social Studies	28
36	Law	29	Social Studies	28
39	Politics and International Studies	29	Social Studies	28
42	Sociology	29	Social Studies	28
37	Anthropology	29	Social Studies	28
58	Archaeology	37	Archaeology	37
44	Accountancy	27	Business and Management Studies	27
43	Business and Management Studies	27	Business and Management Studies	27
61	Library and Information Management	30	Media studies	30
13	Psychology	7	Psychology and Behavioural Sciences	7
68	Education	34	Education	34
69	Sports Related Subjects	38	Sports Science and Leisure Studies	38
45	American Studies (Canada, Caribbean, Latin America and US)	31	Humanities	31
46	Middle Eastern and African Studies	31	Humanities	31
47	Asian Studies	31	Humanities	31
48	European Studies	31	Humanities	31
54	Russian, Slavonic and East European Languages	35	Modern Languages	35
51	French	35	Modern Languages	35
52	German, Dutch and Scandinavian Languages	35	Modern Languages	35
53	Italian	35	Modern Languages	35
55	Iberian and Latin American Languages	35	Modern Languages	35
49	Celtic Studies	31	Humanities	31
50	English Language and Literature	31	Humanities	31
56	Linguistics	31	Humanities	31
57	Classics, Ancient History, Byzantine and Modern Greek Studies	31	Humanities	31
62	Philosophy	31	Humanities	31
63	Theology, Divinity and Religious Studies	31	Humanities	31
59	History	31	Humanities	31
64	Art and Design	33	Design and Creative Arts	33
60	History of Art, Architecture and Design	31	Humanities	31
66	Drama, Dance and Performing Arts	33	Design and Creative Arts	33
65	Communication, Cultural and Media Studies	30	Media studies	30
67	Music	33	Design and Creative Arts	33

2008 RAE Unit of Assessment		Cost Centre		Analysis Group
1	Cardiovascular Medicine	1	Clinical Medicine	1
2	Cancer Studies	1	Clinical Medicine	1
3	Infection and Immunology	1	Clinical Medicine	1
4	Other Hospital Based Clinical Subjects	1	Clinical Medicine	1
5	Other Laboratory Based Clinical Subjects	1	Clinical Medicine	1
6	Epidemiology and Public Health	1	Clinical Medicine	1
7	Health Services Research	1	Clinical Medicine	1
9	Psychiatry, Neuroscience and Clinical Psychology	1	Clinical Medicine	1
8	Primary Care and Other Community Based Clinical Subjects	1	Clinical Medicine	1
15	Pre-clinical and Human Biological Sciences	1 or 4	'Clinical Medicine' or 'Anatomy and Physiology'	1
10	Dentistry	2	Clinical Dentistry	2
11	Nursing and Midwifery	5	Nursing and Paramedical Studies	5
12	Allied Health Professions and Studies	6	Health and Community Studies	6
13	Pharmacy	8	Pharmacy and pharmacology	8
14	Biological Sciences	10	Biosciences	10
16	Agriculture, Veterinary and Food Science	3 or 13	'Veterinary Science' or 'Agriculture and Forestry'	3
17	Earth Systems and Environmental Sciences	14	Earth, Marine and Environmental Sciences	14
18	Chemistry	11	Chemistry	11
19	Physics	12	Physics	12
20	Pure Mathematics	24	Mathematics	24
21	Applied Mathematics	24	Mathematics	24
22	Statistics and Operational Research	24	Mathematics	24
23	Computer Science and Informatics	25	Information Technology, Systems Sciences and computer software engineering	25
24	Electrical and Electronic Engineering	20	Electrical, Electronic and Computer Engineering	20
25	General Engineering and Mineral & Mining Engineering	16 or 18	'General Engineering' or 'Mineral, Metallurgy and Materials Engineering'	16
29	Metallurgy and Materials	18	Mineral, Metallurgy and Materials Engineering	16
26	Chemical Engineering	17	Chemical Engineering	17
27	Civil Engineering	19	Civil Engineering	19
28	Mechanical, Aeronautical and Manufacturing Engineering	21	Mechanical, Aero and Production Engineering	21
30	Architecture and the Built Environment	23	Architecture, Built Environment and Planning	23
31	Town and Country Planning	23	Architecture, Built Environment and Planning	23
32	Geography and Environmental Studies	28	Geography	28
43	Development Studies	28 or 29	'Geography' or 'Social Studies'	28
40	Social Work and Social Policy & Administration	29	Social Studies	28
34	Economics and Econometrics	29	Social Studies	28
38	Law	29	Social Studies	28
39	Politics and International Studies	29	Social Studies	28
41	Sociology	29	Social Studies	28
42	Anthropology	29	Social Studies	28
33	Archaeology	37	Archaeology	37
35	Accounting and Finance	27	Business and Management Studies	27
36	Business and Management Studies	27	Business and Management Studies	27
37	Library and Information Management	30	Media studies	30
44	Psychology	7	Psychology and Behavioural Sciences	7
45	Education	34	Education	34
46	Sports-Related Studies	38	Sports Science and Leisure Studies	38
47	American Studies and Anglophone Area Studies	31	Humanities	31
48	Middle Eastern and African Studies	31	Humanities	31
49	Asian Studies	31	Humanities	31
50	European Studies	31	Humanities	31
51	Russian, Slavonic and East European Languages	35	Modern Languages	35
52	French	35	Modern Languages	35
53	German, Dutch and Scandinavian Languages	35	Modern Languages	35
54	Italian	35	Modern Languages	35
55	Iberian and Latin American Languages	35	Modern Languages	35
56	Celtic Studies	31	Humanities	31
57	English Language and Literature	31	Humanities	31
58	Linguistics	31	Humanities	31
59	Classics, Ancient History, Byzantine and Modern Greek Studies	31	Humanities	31
60	Philosophy	31	Humanities	31
61	Theology, Divinity and Religious Studies	31	Humanities	31
62	History	31	Humanities	31
63	Art and Design	33	Design and Creative Arts	33
64	History of Art, Architecture and Design	31	Humanities	31
65	Drama, Dance and Performing Arts	33	Design and Creative Arts	33
66	Communication, Cultural and Media Studies	30	Media studies	30
67	Music	33	Design and Creative Arts	33

Source: HEFCE Analytical Services Group

Annex 2 Tables and Tests of Significance for the Analysis of the Whole Sample

Whole Sample Analysis: Supporting Tables

In this annex we first provide 8 tables setting out the year by year rankings of the top decile of research income universities by type of income. Those tables (A2.1 to A2.8) correspond to the table for total income shown in Exhibit 2.5 in the main report.

We then provide a set of tables which correspond to each of the graphical exhibits in the main text. These are numbered to match the exhibits in the main text. Thus Table A2(3.1) corresponds to Exhibit 3.1 and so on.

In each table tests of significance are reported. For pair-wise or three-way comparisons of proportions the Chi-Square Test is reported. For pair-wise grant and non-grant holder comparisons of scores the Mann-Whitney U-Test result is shown. For three-way comparisons of scores across RAE ratings the results of the Kruskal-Wallis Test are shown.

Table A2.1 UK University Top Decile Rankings by Mainstream QR Research Income

University	Rank 2002	Mainstream QR University Research Income (£000s)* 2002	% Mainstream QR University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Mainstream QR University Research Income (£000s) 2010	% Mainstream QR University Research Income 2010
The University of Cambridge	1	77,477	6.0%	1	1	2	1	1	1	2	2	78,698	5.5%
The University of Oxford	2	74,742	5.8%	2	2	1	2	2	2	1	1	78,698	5.5%
University College London	3	68,492	5.3%	3	3	3	3	4	4	4	4	63,232	4.5%
Imperial College of Science, Technology and Medicine	4	61,554	4.8%	4	4	4	6	6	6	6	6	51,613	3.6%
The University of Manchester	5	58,620	4.6%	5	5	5	4	5	5	5	5	58,673	4.1%
The University of Edinburgh	6	45,637	3.6%	6	6	6	5	3	3	3	3	70,706	5.0%
King's College London	7	37,706	2.9%	7	7	7	12	13	12	13	13	34,077	2.4%
The University of Leeds	8	34,865	2.7%	9	9	9	10	9	10	11	11	36,353	2.6%
The University of Southampton	9	34,858	2.7%	10	11	10	9	10	9	14	14	33,413	2.4%
The University of Sheffield	10	33,741	2.6%	11	10	11	11	11	11	12	12	34,810	2.5%
The University of Glasgow	11	33,196	2.6%	14	12	12	7	7	7	7	7	42,135	3.0%
The University of Birmingham	12	32,457	2.5%	12	13	14	14	14	14	15	15	30,781	2.2%
The University of Bristol	13	32,388	2.5%	13	14	13	13	12	13	10	10	36,825	2.6%
Cardiff University	14	32,253	2.5%	8	8	8	8	8	8	8	9	38,350	2.7%
The University of Nottingham	15	28,090	2.2%	15	15	15	15	15	15	9	8	38,641	2.7%
The University of Newcastle-upon-Tyne	16	25,451	2.0%	16	16	16	17	18	18	17	18	25,179	1.8%
Subtotal Mainstream QR (top 10%)		**711,527**	**55.5%**									**752,182**	**53.0%**
Total Mainstream QR (in thousands)		**1,282,451**										**1,420,330**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.89[++] significant at the 1% level

Source: Authors' calculations based on HESA Financial Statistics

Table A2.2 UK University Top Decile Rankings by 'Other' QR Research Income

University	Rank 2002	Other QR University Research Income (£000s) 2002	% Other QR University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Other QR University Research Income (£000s) 2010	% Other QR University Research Income 2010
University College London	1	12,730	8.3%	1	1	1	1	1	1	1	1	45,746	8.3%
Imperial College of Science, Technology & Medicine	2	12,254	8.0%	2	2	2	2	2	2	2	3	44,135	8.0%
King's College London	3	7,899	5.2%	3	3	4	5	5	5	5	5	25,612	4.6%
The University of Cambridge	4	4,993	3.3%	4	4	3	3	3	4	4	4	37,179	6.7%
The University of Edinburgh	5	4,399	2.9%	5	7	17	21	18	18	18	18	8,362	1.5%
The University of Glasgow	6	4,300	2.8%	7	8	18	22	25	24	24	24	5,785	1.0%
The University of Oxford	7	4,211	2.7%	6	6	6	4	4	3	3	2	45,118	8.1%
The University of Manchester	8	3,842	2.5%	8	5	5	6	6	6	6	6	25,043	4.5%
The University of Birmingham	9	3,165	2.1%	9	9	7	7	7	7	7	7	13,838	2.5%
The University of Sheffield	10	3,000	2.0%	11	11	8	9	10	14	16	16	11,167	2.0%
The University of Leeds	11	2,795	1.8%	12	13	10	8	8	8	10	9	13,520	2.4%
The University of Southampton	12	2,782	1.8%	15	16	11	14	13	15	15	15	11,984	2.2%
The University of Bristol	13	2,676	1.7%	13	15	12	11	11	11	8	8	13,612	2.5%
Queen Mary and Westfield College	14	2,671	1.7%	14	14	15	13	12	12	14	12	12,482	2.3%
The University of Nottingham	15	2,652	1.7%	10	10	9	10	9	10	11	11	12,958	2.3%
The University of Liverpool	16	2,634	1.7%	17	21	16	17	16	13	9	13	12,313	2.2%
Subtotal Other QR (top 10%)		**77,002**	**50.3%**									**338,856**	**61.2%**
Total Other QR (in thousands)		**153,199**										**553,915**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.809^{++} significant at the 1% level

Source: Authors' calculations based on HESA Financial Statistics

Note: The Strategic Research Development Grant for Scottish universities is not available disaggregated by individual university. It is therefore not included in Other QR for individual Scottish universities in the top 10% in 2002. It is included in the total Other QR for all universities combined. Excluding it from total Other QR would raise the share of the top 10% to 55% as shown in Table 2.4 p.6.

Table A2.3 UK University Top Decile Rankings by Research Council Income

University	Rank 2002	RC University Research Income (£000s) 2002	% RC University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	RC University Research Income (£000s) 2010	% RC University Research Income 2010
The University of Cambridge	1	75,215	7.7%	1	1	1	1	1	1	2	2	104,944	6.8%
The University of Oxford	2	63,010	6.4%	2	2	2	2	2	2	1	1	117,806	7.6%
Imperial College of Science, Technology and Medicine	3	59,195	6.0%	5	5	4	3	3	3	3	4	102,723	6.6%
The University of Manchester	4	57,964	5.9%	4	4	5	5	5	5	6	6	75,469	4.9%
University College London	5	57,391	5.9%	3	3	3	4	4	4	4	3	104,252	6.7%
The University of Southampton	6	37,908	3.9%	6	6	7	12	10	10	10	10	43,221	2.8%
The University of Edinburgh	7	37,165	3.8%	7	7	6	6	6	6	5	5	82,995	5.4%
The University of Birmingham	8	30,581	3.1%	9	11	11	13	13	13	13	14	35,241	2.3%
The University of Leeds	9	29,945	3.1%	10	9	12	11	11	11	12	12	38,632	2.5%
The University of Nottingham	10	29,432	3.0%	13	13	10	8	12	9	9	9	45,713	3.0%
The University of Sheffield	11	29,410	3.0%	8	8	8	7	7	12	11	11	40,989	2.7%
The University of Glasgow	12	28,383	2.9%	11	10	14	9	8	7	7	8	48,463	3.1%
The University of Bristol	13	26,730	2.7%	12	12	9	10	9	8	8	7	49,918	3.2%
King's College London	14	23,192	2.4%	14	14	13	14	14	14	14	13	36,500	2.4%
The University of Liverpool	15	22,059	2.2%	15	15	15	15	15	16	16	16	29,606	1.9%
The University of Leicester	16	18,232	1.9%	18	19	21	21	23	24	22	26	18,218	1.2%
Subtotal RC (top 10%)		**625,813**	**63.8%**									**974,690**	**63.0%**
Total RC (in thousands)		**980,870**										**1,546,700**	

Kendall's coefficient of concordance (across ranks in all years) W =0.917^{++} significant at the 1% level

Source: Authors' own calculations based on HESA Financial Statistics

Table A2.4 UK University Top Decile Rankings by Charities Research Income

University	Rank 2002	Charities University Research Income (£000s) 2002	% Charities University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Charities University Research Income (£000s) 2010	% Charities University Research Income 2010
University College London	1	92,373	11.7%	1	1	2	2	2	2	2	3	84,168	9.2%
The University of Oxford	2	74,261	9.4%	2	2	1	1	1	1	1	1	104,850	11.4%
Imperial College of Science, Technology and Medicine	3	63,264	8.0%	3	4	3	3	4	4	4	4	68,529	7.5%
The University of Cambridge	4	58,744	7.4%	4	3	4	4	3	3	3	2	84,276	9.2%
King's College London	5	44,251	5.6%	5	5	5	7	7	7	7	6	43,161	4.7%
The University of Glasgow	6	32,561	4.1%	7	6	9	9	9	9	8	8	39,959	4.4%
The University of Edinburgh	7	32,533	4.1%	6	8	6	8	8	6	5	7	42,695	4.7%
The University of Manchester	8	30,654	3.9%	8	9	8	6	5	5	6	5	48,910	5.3%
The Institute of Cancer Research	9	26,917	3.4%	9	7	7	5	6	8	9	9	34,845	3.8%
The University of Dundee	10	22,911	2.9%	11	14	13	13	11	11	10	10	25,595	2.8%
The University of Leeds	11	22,466	2.8%	10	12	15	14	15	15	16	16	20,251	2.2%
The University of Bristol	12	21,369	2.7%	14	13	11	12	13	14	14	13	21,656	2.4%
The University of Birmingham	13	20,947	2.6%	12	11	12	11	12	12	11	11	23,194	2.5%
The University of Newcastle-upon-Tyne	14	17,917	2.3%	15	15	14	15	14	13	12	12	22,756	2.5%
Queen Mary and Westfield College	15	15,869	2.0%	13	10	10	10	10	10	15	14	21,486	2.3%
The University of Liverpool	16	15,581	2.0%	17	16	16	16	16	16	13	15	21,454	2.3%
Subtotal Charities (top 10%)		**592,619**	**74.9%**									**707,785**	**77.1%**
Total Charities (in thousands)		**791,223**										**918,161**	

Kendall's coefficient of concordance (across ranks in all years) W =0.93^{++} significant at the 1% level

Source: Authors' own calculations based on HESA Financial Statistics

Table A2.5 UK University Top Decile Rankings by Central Government Research Income

University	Rank 2002	Central Government University Research Income (£000s) 2002	% Central Government University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Central Government University Research Income (£000s) 2010	% Central Government University Research Income 2010
The University of Edinburgh	1	25,295	4.7%	1	4	4	5	9	10	13	15	17,300	2.2%
The University of Manchester	2	17,830	3.3%	2	1	1	1	1	1	1	7	32,774	4.1%
The University of Birmingham	3	17,417	3.3%	5	6	10	11	10	11	8	8	26,341	3.3%
King's College London	4	16,867	3.1%	4	5	3	4	3	3	4	5	36,557	4.6%
The University of Oxford	5	16,664	3.1%	9	8	9	3	4	2	5	4	38,094	4.8%
Imperial College of Science, Technology and Medicine	6	16,155	3.0%	6	9	12	10	2	4	2	1	43,514	5.4%
The University of Newcastle-upon-Tyne	7	16,000	3.0%	12	13	21	14	14	16	18	18	16,733	2.1%
The University of Liverpool	8	14,986	2.8%	11	10	7	12	11	12	12	12	21,055	2.6%
Cardiff University	9	14,012	2.6%	14	15	6	8	5	7	7	9	25,063	3.1%
The University of Sheffield	10	13,966	2.6%	10	7	13	13	13	15	15	14	19,816	2.5%
University College London	11	13,596	2.5%	15	12	8	7	8	5	6	3	38,239	4.8%
The University of Glasgow	12	13,453	2.5%	20	24	23	26	20	23	17	16	16,941	2.1%
The University of Leeds	13	13,435	2.5%	13	11	11	9	7	6	3	2	38,910	4.9%
The University of Cambridge	14	13,337	2.5%	8	23	25	23	16	14	14	13	20,328	2.5%
The University of Aberdeen	15	12,024	2.2%	21	21	14	17	17	9	10	11	23,300	2.9%
London School of Hygiene and Tropical Medicine	16	12,000	2.2%	19	18	18	16	19	19	24	25	10,881	1.4%
Subtotal Central Government (top 10%)		**247,038**	**46.1%**									**425,846**	**53.3%**
Total Central Government (in thousands)		**535,862**										**798,632**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.704^{++} significant at the 1% level

Source: Authors' own calculations based on HESA Financial Statistics

Table A2.6 UK University Top Decile Rankings by Industry Research Income

University	Rank 2002	UK Industry University Research Income (£000s) 2002	% UK Industry University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	UK Industry University Research Income (£000s) 2010	% UK Industry University Research Income 2010
Imperial College of Science, Technology and Medicine	1	28,125	9.8%	1	1	1	1	1	1	1	1	18,189	6.4%
The University of Cambridge	2	19,622	6.8%	2	2	2	3	3	3	2	3	16,305	5.7%
The University of Nottingham	3	15,168	5.3%	3	3	6	10	8	10	10	9	9,689	3.4%
The University of Oxford	4	13,840	4.8%	6	6	5	6	5	6	5	2	16,993	6.0%
King's College London	5	13,561	4.7%	4	4	4	5	7	7	8	10	9,131	3.2%
University College London	6	11,582	4.0%	5	8	10	11	15	9	6	6	11,336	4.0%
The University of Southampton	7	9,529	3.3%	10	9	13	14	13	17	12	12	7,568	2.7%
The University of Manchester	8	8,786	3.1%	7	7	9	6	6	5	4	4	14,383	5.0%
The University of Birmingham	9	8,381	2.9%	9	11	11	15	12	15	15	18	5,273	1.9%
The University of Sheffield	10	8,150	2.8%	11	10	14	12	10	11	9	7	11,229	3.9%
The University of Edinburgh	11	7,875	2.7%	14	14	15	13	9	8	7	8	10,080	3.5%
The University of Leeds	12	7,809	2.7%	8	5	8	9	11	16	16	11	7,894	2.8%
Cardiff University	13	7,776	2.7%	12	13	7	8	16	12	13	24	3,760	1.3%
The Open University	14	7,387	2.6%	74	67	63	56	73	80	71	56	766	0.3%
Loughborough University	15	6,295	2.2%	15	16	18	21	18	20	20	15	5,828	2.0%
The University of Liverpool	16	5,995	2.1%	17	17	19	22	20	19	18	22	4,695	1.6%
Subtotal Industry (top 10%)		**179,882**	**62.8%**									**153,119**	**53.7%**
Total Industry (in thousands)		**286,635**										**284,893**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.846^{++} significant at the 1% level

Source: Authors' own calculations based on HESA Financial Statistics

Table A2.7 UK University Top Decile Rankings by Overseas Research Income

University	Rank 2002	Overseas University Research Income (£000s) 2002	% Overseas University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Overseas University Research Income (£000s) 2010	% Overseas University Research Income 2010
Imperial College of Science, Technology and Medicine	1	28,409	7.0%	1	1	1	2	2	2	2	2	65,210	8.2%
The University of Oxford	2	27,211	6.7%	2	2	2	1	1	1	1	1	91,851	11.5%
The University of Cambridge	3	24,638	6.1%	3	3	3	3	3	3	3	3	55,326	6.9%
University College London	4	19,188	4.7%	4	4	4	4	4	4	4	4	44,072	5.5%
The University of Manchester	5	13,985	3.4%	5	6	9	8	10	8	8	7	23,307	2.9%
The University of Glasgow	6	13,311	3.3%	13	19	19	23	22	22	18	15	13,135	1.6%
King's College London	7	12,824	3.2%	7	7	10	6	8	9	9	9	19,956	2.5%
The University of Southampton	8	12,663	3.1%	9	10	11	12	14	13	12	10	17,381	2.2%
The University of Nottingham	9	12,287	3.0%	10	11	12	10	11	12	11	11	16,435	2.1%
London School of Hygiene and Tropical Medicine	10	12,166	3.0%	6	8	5	11	7	5	6	6	32,146	4.0%
The University of Edinburgh	11	11,485	2.8%	8	9	8	7	6	7	7	8	22,349	2.8%
The University of Leeds	12	11,070	2.7%	14	17	18	15	16	15	15	14	15,886	2.0%
The University of Liverpool	13	9,860	2.4%	15	12	6	5	5	6	5	5	32,877	4.1%
The University of Sheffield	14	9,042	2.2%	12	14	16	13	12	10	10	13	16,034	2.0%
The University of Newcastle-upon-Tyne	15	8,451	2.1%	16	13	14	14	13	11	16	16	12,584	1.6%
The University of Surrey	16	8,407	2.1%	11	5	7	9	9	17	21	22	10,845	1.4%
Subtotal Overseas (top 10%)		**234,998**	**57.8%**									**489,394**	**61.3%**
Total Overseas (in thousands)		**406,676**										**798,625**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.82^{++} significant at the 1% level

Source: Authors' own calculations based on HESA Financial Statistics

Table A2.8 UK University Top Decile Rankings by Other Sources of Research Income

University	Rank 2002	Other Sources University Research Income (£000s) 2002	% Other Sources University Research Income 2002	Rank 2003	Rank 2004	Rank 2005	Rank 2006	Rank 2007	Rank 2008	Rank 2009	Rank 2010	Other Sources University Research Income (£000s) 2010	% Other Sources University Research Income 2010
Cardiff University	1	8,179	11.8%	2	1	1	2	2	8	9	12	968	2.3%
Imperial College of Science, Technology and Medicine	2	8,132	11.7%	1	2	4	6	11	10	14	15	893	2.1%
The University of Glasgow	3	3,822	5.5%	4	3	7	11	6	5	4	3	2,071	4.9%
The University of Cambridge	4	3,190	4.6%	9	7	8	7	16	12	10	11	1,047	2.5%
King's College London	5	2,860	4.1%	5	9	22	23	27	19	17	29	476	1.1%
The University of Edinburgh	6	2,825	4.1%	7	6	5	4	1	1	1	1	3,338	7.9%
The University of Sheffield	7	2,332	3.4%	11	26	37	30	78	32	24	19	648	1.5%
The University of Oxford	8	2,193	3.2%	6	5	9	3	58	51	37	27	499	1.2%
London School of Economics and Political Science	9	2,161	3.1%	8	10	13	9	13	2	28	17	781	1.8%
The University of Newcastle-upon-Tyne	10	1,760	2.5%	10	8	11	13	14	23	16	7	1,315	3.1%
University of Ulster	11	1,758	2.5%	3	4	6	10	9	14	25	22	587	1.4%
London Business School	12	1,632	2.4%	16	29	10	1	5	4	8	42	296	0.7%
The University of Manchester	13	1,478	2.1%	12	11	3	8	7	27	18	20	624	1.5%
The University of Leeds	14	1,384	2.0%	19	19	12	5	4	7	6	2	2,402	5.7%
The University of Birmingham	15	1,368	2.0%	18	18	17	15	15	20	15	16	866	2.0%
The University of Reading	16	1,335	1.9%	13	16	19	19	28	31	59	101	20	0.0%
Subtotal Other Sources (top 10%)		**46,410**	**67.0%**									**16,831**	**39.7%**
Total Other Sources (in thousands)		**69,293**										**42,388**	

Kendall's coefficient of concordance (across ranks in all years) W = 0.483^{++} significant at the 1% level

Source: Authors' calculations based on HESA Financial Statistics

Table A2(4.1) Self-reported academic activity by RAE score and RAE score within discipline subgroups (%)

Discipline	Research	Teaching	Administrative activities	Outreach activities	Other activities	Total respondents
All	93.1	85.4	63.2	35.7	2.4	*22,170*
RAE score (% graded 4* weighted average)						
0<10	89.2	90.1	65.0	36.4	2.4	*5,686*
10<20	94.6	83.7	64.2	35.1	2.7	*7,265*
>=20	96.9 **	82.3 **	61.1 **	34.1 **	2.5	*7,242*
RAE score (% graded 4* weighted average) within discipline						
Arts and humanities						
0<10	89.7	96.3	72.8	42.4	1.5	*728*
10<20	90.7	92.9	75.7	44.4	0.9	*982*
>=20	95.8 **	91.9 **	73.9	45.1	1.1	*1,673*
Sciences						
0<10	89.7	85.8	61.8	35.4	3.9	*2,704*
10<20	95.4	78.6	58.2	32.2	4.0	*4,214*
>=20	97.1 **	74.8 **	51.6 **	29.8 **	4.2	*3,298*
Social sciences						
0<10	88.5	93.3	66.4	35.6	0.9	*2,252*
10<20	94.6	89.8	71.2	36.3	0.9	*2,066*
>=20	97.4 **	86.2 **	65.4 **	32.3 **	1.1	*2,270*

Question: Please indicate whether you participate in the following activities:

Table A2(4.2)Self-reported academic activity by grant status and grant status within discipline subgroups(%)

Discipline	Research	Teaching	Administrative activities	Outreach activities	Other activities	Total respondents
All	93.1	85.4	63.2	35.7	2.4	*22,170*
Grant status (from research council data)						
Grant recipient	99.7	91.0	78.3	44.9	1.4	*3,176*
None	92.0 **	84.4 **	60.7 **	34.1 **	2.6 **	*18,972*
Grant status (from research council data) within discipline						
Arts and humanities						
Grant recipient	100.0	95.0	85.7	52.5	0.2	*440*
None	90.9 **	93.1	72.4 **	43.1 **	1.1 *	*3,234*
Sciences						
Grant recipient	99.7	90.8	77.0	43.9	1.8	*2,087*
None	92.5 **	77.2 **	52.6 **	30.8 **	4.3 **	*9,120*
Social sciences						
Grant recipient	99.7	88.8	77.6	43.1	0.9	*643*
None	92.0 **	90.2	66.2 **	34.2 **	1.0	*6,583*

Question: Please indicate whether you participate in the following activities:

Table A2(4.4) Which statement most closely describes the research you undertake by RAE score?

	Basic research	User-inspired basic research	Applied research		Total respondents
All (%)	27.3	29.7	43.0		
All (N)	*5,455*	*5,925*	*8,569*		*19,938*
RAE score (% graded 4* weighted average)					
0<10	21.0	27.3	51.7		*4,908*
10<20	27.4	30.7	42.0		*6,672*
>=20	34.0	31.4	34.7	**	*6,745*
RAE score (% graded 4* weighted average) within discipline					
Arts and humanities					
0<10	36.0	28.1	36.0		*570*
10<20	49.7	24.5	25.8		*791*
>=20	59.1	22.3	18.6	**	*1,419*
Sciences					
0<10	20.0	26.3	53.7		*2,385*
10<20	25.4	31.1	43.5		*3,973*
>=20	28.7	32.3	39.1	**	*3,169*
Social sciences					
0<10	17.9	28.3	53.7		*1,951*
10<20	22.2	32.4	45.4		*1,905*
>=20	25.3	35.9	38.8	**	*2,157*

The table excludes those that ticked 'None of the above apply to my research'.

Question: If undertaking research, which of the following statements most closely describes it?

Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

Applied research: original investigation undertaken in order to acquire new knowledge directed towards an individual, group or societal need or use.

(None of the above apply to my research)

Table A2(4.5) Which statements most closely describe the research you undertake by grant status?

	Basic research	User-inspired basic research	Applied research		Total respondents
All (%)	27.3	29.7	43.0		
All (N)	*5,455*	*5,925*	*8,569*		*19,938*
Grant status (from research council data)					
Grant recipient	33.9	36.8	29.4		*3,118*
None	26.1	28.4	45.5	**	*16,820*
Grant status (from research council data) within discipline					
Arts and humanities					
Grant recipient	54.7	27.9	17.4		*408*
None	49.9	24.0	26.1	**	*2,589*
Sciences					
Grant recipient	33.3	36.8	29.9		*2,069*
None	22.1	28.2	49.8	**	*8,307*
Social sciences					
Grant recipient	22.5	42.0	35.4		*635*
None	21.4	30.6	48.0	**	*5,894*

The table excludes those that ticked 'None of the above apply to my research'.

Question: If undertaking research, which of the following statements most closely describes it?

Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

Applied research: original investigation undertaken in order to acquire new knowledge directed towards an individual, group or societal need or use.

(None of the above apply to my research)

Table A2(5.1) 'If undertaking research, which of the following statements apply?' RAE score and RAE score within discipline subgroups (%)

	Applied in a commercial context	In general area of commercial interest to business	Relevance for non-commercial external organisations	No relevance for external organisations	Total respondents
All	18.4	34.6	72.0	11.1	*20,425*
RAE score (% graded 4* weighted average)					
0<10	18.1	31.8	75.0	8.7	*5,024*
10<20	18.9	36.4	70.2	11.5	*6,798*
>=20	17.0 **	33.7 **	72.1 **	13.1 **	*6,937*
RAE score (% graded 4* weighted average) within discipline					
Arts and humanities					
0<10	15.0	16.5	67.1	23.6	*648*
10<20	11.0	12.7	66.4	26.9	*875*
>=20	10.9 **	9.7 **	65.8	29.1 **	*1,565*
Sciences					
0<10	21.6	37.6	72.8	6.8	*2,409*
10<20	23.2	44.9	64.6	11.0	*3,985*
>=20	20.9 **	45.4 **	66.0 **	11.7 **	*3,176*
Social sciences					
0<10	14.8	29.7	80.3	6.2	*1,965*
10<20	13.8	29.6	83.4	5.4	*1,935*
>=20	15.8	34.0 **	85.5 **	3.8 **	*2,195*

Question: If undertaking research, which of the following statements apply to it? Please indicate all that apply.
It has been applied in a commercial context
It is in a general area of commercial interest to business and/or industry
It has relevance for non-commercial external organisations (including the public sector)
It has no relevance for external organisations

Table A2(5.2) 'If undertaking research, which of the following statements apply?' by grant status and grant status within discipline subgroups (%)

	Applied in a commercial context	In general area of commercial interest to business	Relevance for non-commercial external organisations	No relevance for external organisations	Total respondents
All	18.4	34.6	72.0	11.1	*20,425*
Grant status (from research council data)					
Grant recipient	26.3	44.5	69.5	9.7	*3,143*
None	16.9 **	32.8 **	72.5 **	11.4 **	*17,260*
Grant status (from research council data) within discipline					
Arts and Humanities					
Grant recipient	12.1	11.2	73.0	22.1	*430*
None	11.7	12.8	65.4 **	27.7 **	*2,885*
Sciences					
Grant recipient	31.4	55.0	62.3	9.4	*2,069*
None	20.4 **	41.1 **	68.2 **	9.9	*8,353*
Social sciences					
Grant recipient	19.1	32.8	90.3	2.4	*638*
None	14.6 **	30.9	81.8 **	5.6 **	*5,989*

Question: If undertaking research, which of the following statements apply to it? Please indicate all that apply.
It has been applied in a commercial context
It is in a general area of commercial interest to business and/or industry
It has relevance for non-commercial external organisations (including the public sector)
It has no relevance for external organisations

Table A2(5.3) Private sector, Public sector and Charitable sector activities by RAE score and RAE score within discipline subgroups (%)

	Activities with private sector companies		Activities with public sector organisations		Activities with charitable sector	
	%	N	%	N	%	N
All	*41.1*	*21,937*	*53.1*	*21,839*	*44.3*	*21,684*
RAE score (% graded 4* weighted average)						
0<10	40.8	*5,621*	55.1	*5,598*	46.7	*5,555*
10<20	40.4	*7,184*	52.2	*7,145*	42.8	*7,092*
>=20	40.0	*7,172*	51.9 **	*7,148*	44.2 **	*7,095*
RAE score (% graded 4* weighted average) within discipline						
Arts and humanities						
0<10	36.6	*722*	37.3	*715*	47.6	*702*
10<20	28.7	*969*	35.7	*958*	43.3	*966*
>=20	27.7 **	*1,651*	37.9	*1,637*	47.9 *	*1,638*
Sciences						
0<10	43.9	*2,676*	54.6	*2,664*	44.4	*2,651*
10<20	46.2	*4,172*	50.3	*4,149*	38.8	*4,111*
>=20	47.2 **	*3,268*	49.5 **	*3,260*	40.7 **	*3,226*
Social sciences						
0<10	38.3	*2,221*	61.4	*2,217*	49.2	*2,200*
10<20	34.3	*2,040*	63.8	*2,035*	50.6	*2,012*
>=20	38.6 **	*2,252*	65.5 **	*2,250*	46.7 **	*2,230*

Question:

1. Have you undertaken activities with private sector companies in the last three years?
2. Have you undertaken activities with public sector organisations in the last three years?
3. Have you undertaken activities with any charitable or voluntary organisationsector organisations in the last three y

Table A2(5.4) Private sector, Public sector and Charitable sector activities by grant status and grant status within discipline subgroups (%)

	Activities with private sector companies		Activities with public sector organisations		Activities with charitable sector	
	%	N	%	N	%	N
All	*41.1*	*21,937*	*53.1*	*21,839*	*44.3*	*21,684*
Grant status (from research council data)						
Grant recipient	52.4	*3,151*	59.0	*3,133*	42.8	*3,106*
None	39.2 **	*18,764*	52.1 **	*18,685*	44.5 *	*18,556*
Grant status (from research council data) within discipline						
Arts and humanities						
Grant recipient	27.7	*433*	43.0	*430*	47.1	*431*
None	30.9	*3,199*	37.1 **	*3,167*	46.2	*3,161*
Sciences						
Grant recipient	61.2	*2,072*	56.6	*2,060*	38.2	*2,039*
None	43.4 **	*9,025*	50.1 **	*8,991*	41.3 **	*8,929*
Social sciences						
Grant recipient	40.5	*640*	77.6	*637*	55.1	*630*
None	37.5	*6,505*	61.9 **	*6,492*	48.1 **	*6,431*

Question:

1. Have you undertaken activities with private sector companies in the last three years?
2. Have you undertaken activities with public sector organisations in the last three years?
3. Have you undertaken activities with any charitable or voluntary organisationsector organisations in the last three

Table A2(6.1) Commercialisation: Whether participated in any of the following in the last 3 years by RAE score and RAE score within discipline subgroups (%)

	Taken out a patent	Licensed research outputs to a company	Formed a spin out company	Formed or run a consultancy via your research	Total respondents
All	7.1	4.8	3.5	13.9	*19,029*
RAE score (% graded 4* weighted average)					
0<10	5.2	3.9	3.3	14.3	*4,792*
10<20	7.9	5.4	3.7	14.1	*6,247*
>=20	7.6 **	4.9 **	3.5	13.0	*6,328*
RAE score (% graded 4* weighted average) within discipline					
Arts and humanities					
0<10	0.3	1.3	2.3	10.0	*600*
10<20	1.2	1.7	2.2	8.0	*824*
>=20	0.3 **	1.4	1.4	6.2 **	*1,426*
Sciences					
0<10	9.9	6.4	4.4	14.8	*2,310*
10<20	12.8	8.1	4.8	15.0	*3,662*
>=20	15.9 **	8.3 **	5.3	14.3	*2,925*
Social sciences					
0<10	0.9	1.5	2.3	15.0	*1,880*
10<20	1.0	1.6	2.2	15.1	*1,758*
>=20	0.7	2.2	2.2	16.1	*1,976*

Question: How frequently, if at all have you participated in any of the following in the past three years?
Taken out a patent
Licensed research outputs to a company
Formed a spin out company
Formed or run a consultancy via your research

Table A2(6.2) Whether participated in any of the following in the last 3 years by grant status and grant status within discipline subgroups (%)

	Taken out a patent	Licensed research outputs to a company	Formed a spin out company	Formed or run a consultancy via your research	Total respondents
All	7.1	4.8	3.5	13.9	*19,029*
Grant status (from research council data)					
Grant recipient	17.2	10.4	6.8	18.9	*2,856*
None	5.4 **	3.8 **	2.9 **	13.0 **	*16,152*
Grant status (from research council data) within discipline					
Arts and humanities					
Grant recipient	0.8	2.6	1.3	7.5	*386*
None	0.6	1.2 *	1.9	7.5	*2,700*
Sciences					
Grant recipient	24.8	14.0	8.7	21.0	*1,896*
None	10.2 **	6.1 **	3.8 **	13.4 **	*7,854*
Social sciences					
Grant recipient	2.5	3.5	3.7	19.2	*569*
None	0.8 **	1.7 **	2.2 **	15.1 **	*5,565*

Question: How frequently, if at all have you participated in any of the following in the past three years?
Taken out a patent
Licensed research outputs to a company
Formed a spin out company
Formed or run a consultancy via your research

Table A2(7.1.1, 7.1.2, 7.1.3) People based, problem solving and community based activities by RAE score

		RAE score (% graded 4* weighted average)			
People based activities	All	0<10	10<20	>=20	
Employee training	32.5	38.9	30.7	26.5	**
Student placements	33.3	40.8	32.3	25.0	**
Curriculum development	28.2	37.5	25.5	20.6	**
Attending conferences	87.3	88.1	87.4	86.1	**
Standard setting forums	31.0	34.5	29.9	27.6	**
Participating in networks	67.3	71.5	65.8	63.8	**
Sitting on advisory boards	38.2	39.1	36.5	38.7	**
Giving invited lectures	64.8	65.0	63.7	65.9	**
Enterprise education	6.2	9.2	5.2	3.9	**
N	*20,553*	*5,246*	*6,753*	*6,727*	
Problem solving activities					
Hosting of personnel	27.0	26.8	27.0	26.5	
External secondment	9.9	9.7	10.3	9.9	
Joint research	49.2	46.3	50.7	50.2	**
Contract research	36.8	36.3	38.0	35.9	**
Consultancy services	43.4	45.5	41.9	41.5	**
Research consortia	34.8	30.8	36.3	37.0	**
Informal advice	56.9	58.0	55.6	56.2	**
Prototyping and testing	10.2	9.9	10.4	9.5	
Setting up physical facilities	9.0	8.5	9.4	7.9	**
Joint publications	46.1	44.5	48.2	46.0	**
N	*20,571*	*5,236*	*6,773*	*6,740*	
Community based activities					
Lectures for the community	38.2	35.7	37.2	41.8	**
Community-based sports	2.9	3.9	2.3	2.1	**
Public exhibitions	14.6	14.8	13.9	14.4	
School projects	30.3	33.8	28.9	26.6	**
N	*20,853*	*5,309*	*6,832*	*6,872*	

Questions:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.1.4) People based, problem solving and community based activities by RAE score within Arts and humanities

		Arts and Humanities			
People based activities	All	0<10	10<20	>=20	
Employee training	32.5	23.8	19.4	14.9	**
Student placements	33.3	43.8	32.4	23.2	**
Curriculum development	28.2	35.3	24.5	19.7	**
Attending conferences	87.3	82.7	76.7	75.8	**
Standard setting forums	31.0	32.3	27.3	23.6	**
Participating in networks	67.3	71.2	58.3	55.9	**
Sitting on advisory boards	38.2	40.8	35.4	43.0	**
Giving invited lectures	64.8	63.7	57.3	62.8	**
Enterprise education	6.2	10.8	5.4	3.0	**
N	*20,553*	*639*	*897*	*1,519*	
Problem solving activities					
Hosting of personnel	27.0	21.6	20.6	19.4	
External secondment	9.9	8.4	7.1	6.8	
Joint research	49.2	27.2	28.6	29.4	
Contract research	36.8	16.2	13.1	17.6	**
Consultancy services	43.4	39.5	36.3	34.7	
Research consortia	34.8	19.4	16.4	21.7	**
Informal advice	56.9	54.6	52.5	55.8	
Prototyping and testing	10.2	9.1	6.9	5.2	**
Setting up physical facilities	9.0	9.8	7.2	4.5	**
Joint publications	46.1	30.9	25.6	30.9	**
N	*20,571*	*648*	*913*	*1,535*	
Community based activities					
Lectures for the community	38.2	48.2	54.6	60.3	**
Community-based sports	2.9	2.7	2.0	1.6	
Public exhibitions	14.6	35.5	23.4	24.0	**
School projects	30.3	44.9	36.2	34.2	**
N	*20,853*	*670*	*943*	*1,593*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.1.5) People based, problem solving and community based activities by RAE score within Sciences

		Sciences			
People based activities	All	0<10	10<20	>=20	
Employee training	32.5	36.5	30.8	27.1	**
Student placements	33.3	38.8	31.4	24.4	**
Curriculum development	28.2	33.4	21.5	16.9	**
Attending conferences	87.3	88.7	87.9	88.3	
Standard setting forums	31.0	34.0	28.8	28.2	**
Participating in networks	67.3	67.5	62.6	61.6	**
Sitting on advisory boards	38.2	36.8	33.1	33.7	**
Giving invited lectures	64.8	64.1	62.4	62.7	
Enterprise education	6.2	5.8	4.2	2.7	**
N	*20,553*	*2,527*	*3,955*	*3,143*	
Problem solving activities					
Hosting of personnel	27.0	28.5	29.7	30.8	
External secondment	9.9	10.5	11.2	11.4	
Joint research	49.2	55.2	58.7	61.9	**
Contract research	36.8	39.6	40.1	37.3	**
Consultancy services	43.4	43.1	39.3	37.2	**
Research consortia	34.8	36.0	41.5	43.8	**
Informal advice	56.9	56.7	53.4	52.4	**
Prototyping and testing	10.2	13.8	14.0	13.9	
Setting up physical facilities	9.0	11.6	12.4	12.6	
Joint publications	46.1	52.9	56.8	56.8	**
N	*20,571*	*2,530*	*3,953*	*3,141*	
Community based activities					
Lectures for the community	38.2	34.1	32.9	35.4	**
Community-based sports	2.9	3.7	2.3	2.3	**
Public exhibitions	14.6	13.9	14.3	13.7	
School projects	30.3	29.7	27.5	25.7	**
N	*20,853*	*2,558*	*3,962*	*3,160*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.1.6) People based, problem solving and community based activities by RAE score within Social sciences

		Social sciences			
People based activities	All	0<10	10<20	>=20	
Employee training	32.5	46.3	35.8	34.3	**
Student placements	33.3	42.3	34.2	27.4	**
Curriculum development	28.2	43.2	34.6	26.9	**
Attending conferences	87.3	89.1	91.3	90.7	**
Standard setting forums	31.0	35.6	33.6	29.7	**
Participating in networks	67.3	76.4	76.0	72.8	**
Sitting on advisory boards	38.2	41.4	44.2	43.1	
Giving invited lectures	64.8	66.4	69.4	72.8	**
Enterprise education	6.2	12.9	7.3	6.5	**
N	*20,553*	*2,078*	*1,898*	*2,064*	
Problem solving activities					
Hosting of personnel	27.0	26.5	24.6	25.3	
External secondment	9.9	9.1	10.1	9.9	
Joint research	49.2	41.2	44.3	47.6	**
Contract research	36.8	38.6	45.4	47.1	**
Consultancy services	43.4	50.3	49.9	52.7	
Research consortia	34.8	27.8	34.7	38.0	**
Informal advice	56.9	60.6	61.6	62.1	
Prototyping and testing	10.2	5.2	4.5	5.9	
Setting up physical facilities	9.0	4.1	4.3	3.4	
Joint publications	46.1	38.3	41.0	40.7	
N	*20,571*	*2,056*	*1,904*	*2,063*	
Community based activities					
Lectures for the community	38.2	33.7	37.4	37.3	**
Community-based sports	2.9	4.6	2.5	2.2	**
Public exhibitions	14.6	9.0	8.5	8.1	
School projects	30.3	35.3	28.3	22.2	**
N	*20,853*	*2,079*	*1,924*	*2,118*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.2.1, 7.2.2, 7.2.3) People based, problem solving and community based activities by grant status

		Grant status (from research council data)		
People based activities	All	Grant recipient	None	
Employee training	32.5	29.6	33.0	**
Student placements	33.3	36.0	32.9	**
Curriculum development	28.2	22.0	29.3	**
Attending conferences	87.3	90.8	86.7	**
Standard setting forums	31.0	28.7	31.4	**
Participating in networks	67.3	72.4	66.5	**
Sitting on advisory boards	38.2	48.5	36.5	**
Giving invited lectures	64.8	74.8	63.0	**
Enterprise education	6.2	4.6	6.5	**
N	*20,553*	*2,989*	*17,542*	
Problem solving activities				
Hosting of personnel	27.0	37.7	25.2	**
External secondment	9.9	11.4	9.7	**
Joint research	49.2	64.5	46.6	**
Contract research	36.8	47.6	34.9	**
Consultancy services	43.4	47.4	42.8	**
Research consortia	34.8	53.4	31.6	**
Informal advice	56.9	63.3	55.8	**
Prototyping and testing	10.2	14.4	9.5	**
Setting up physical facilities	9.0	14.9	7.9	**
Joint publications	46.1	60.0	43.7	**
N	*20,571*	*3,011*	*17,538*	
Community based activities				
Lectures for the community	38.2	47.1	36.7	**
Community-based sports	2.9	2.0	3.1	**
Public exhibitions	14.6	19.2	13.8	**
School projects	30.3	32.7	29.9	**
N	*20,853*	*3,038*	*17,793*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.2.4) People based, problem solving and community based activities by grant status within Arts and humanities

		Arts and humanities		
People based activities	All	Grant recipient	None	
Employee training	32.5	12.0	20.3	**
Student placements	33.3	27.9	31.8	
Curriculum development	28.2	21.2	26.1	**
Attending conferences	87.3	78.4	78.1	
Standard setting forums	31.0	25.7	27.5	
Participating in networks	67.3	64.0	60.4	
Sitting on advisory boards	38.2	49.8	39.0	**
Giving invited lectures	64.8	64.6	60.8	
Enterprise education	6.2	3.1	5.9	**
N	*20,553*	*400*	*2,914*	
Problem solving activities				
Hosting of personnel	27.0	21.1	20.7	
External secondment	9.9	5.9	7.4	
Joint research	49.2	38.1	27.4	**
Contract research	36.8	22.0	15.4	**
Consultancy services	43.4	37.9	36.6	
Research consortia	34.8	31.9	17.8	**
Informal advice	56.9	60.0	54.1	**
Prototyping and testing	10.2	6.9	6.6	
Setting up physical facilities	9.0	5.6	6.7	
Joint publications	46.1	33.0	29.2	
N	*20,571*	*407*	*2,951*	
Community based activities				
Lectures for the community	38.2	66.6	54.0	**
Community-based sports	2.9	0.5	2.4	**
Public exhibitions	14.6	28.1	26.0	
School projects	30.3	33.7	38.3	*
N	*20,853*	*425*	*3,051*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.2.5) People based, problem solving and community based activities by grant status within Sciences

		Sciences		
People based activities	All	Grant recipient	None	
Employee training	32.5	31.3	32.3	
Student placements	33.3	37.3	31.4	**
Curriculum development	28.2	19.5	25.3	**
Attending conferences	87.3	92.3	87.5	**
Standard setting forums	31.0	28.4	30.9	**
Participating in networks	67.3	70.3	62.9	**
Sitting on advisory boards	38.2	46.0	31.8	**
Giving invited lectures	64.8	75.2	60.0	**
Enterprise education	6.2	4.3	4.5	
N	*20,553*	*1,990*	*8,563*	
Problem solving activities				
Hosting of personnel	27.0	42.4	26.8	**
External secondment	9.9	12.3	10.7	**
Joint research	49.2	71.8	55.6	**
Contract research	36.8	49.0	36.8	**
Consultancy services	43.4	47.1	39.1	**
Research consortia	34.8	58.0	36.4	**
Informal advice	56.9	62.5	52.6	**
Prototyping and testing	10.2	18.2	13.2	**
Setting up physical facilities	9.0	19.4	11.0	**
Joint publications	46.1	68.4	52.0	**
N	*20,571*	*2,000*	*8,548*	
Community based activities				
Lectures for the community	38.2	42.9	31.8	**
Community-based sports	2.9	1.9	3.1	**
Public exhibitions	14.6	18.9	13.3	**
School projects	30.3	34.2	27.0	**
N	*20,853*	*2,002*	*8,607*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.2.6) People based, problem solving and community based activities by grant status within Social sciences

		Social sciences		
People based activities	All	Grant recipient	None	
Employee training	32.5	35.8	40.2	**
Student placements	33.3	36.9	35.5	
Curriculum development	28.2	30.6	36.5	**
Attending conferences	87.3	94.2	89.8	**
Standard setting forums	31.0	31.9	34.1	
Participating in networks	67.3	84.7	74.3	**
Sitting on advisory boards	38.2	56.0	41.8	**
Giving invited lectures	64.8	80.1	68.3	**
Enterprise education	6.2	6.8	9.5	**
N	*20,553*	*593*	*6,032*	
Problem solving activities				
Hosting of personnel	27.0	33.2	25.2	**
External secondment	9.9	12.3	9.4	**
Joint research	49.2	58.6	43.1	**
Contract research	36.8	59.4	41.6	**
Consultancy services	43.4	54.7	50.9	*
Research consortia	34.8	52.3	31.4	**
Informal advice	56.9	68.0	60.9	**
Prototyping and testing	10.2	6.7	5.5	
Setting up physical facilities	9.0	5.6	4.1	
Joint publications	46.1	50.1	39.0	**
N	*20,571*	*599*	*6,005*	
Community based activities				
Lectures for the community	38.2	47.9	34.9	**
Community-based sports	2.9	3.1	3.3	
Public exhibitions	14.6	14.2	8.5	**
School projects	30.3	27.0	29.9	
N	*20,853*	*605*	*6,101*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Table A2(7.3) Highly connected academics by RAE score and RAE score within discipline subgroups (%).

	People-based high intensity interaction		Problem-solving high intensity interaction		Community-based high intensity interaction		All high intensity interaction	
	%	N	%	N	%	N	%	N
All	21.7	*22,018*	17.7	*21,774*	22.2	*21,240*	20.2	*22,057*
RAE score (% graded 4* weighted average)								
0<10	26.2	*5,657*	16.6	*5,570*	22.7	*5,437*	21.8	*5,663*
10<20	20.3	*7,218*	18.2	*7,150*	20.8	*6,945*	19.7	*7,229*
>=20	17.2 **	*7,184*	17.7	*7,123*	21.8 **	*6,971*	18.5 **	*7,200*
RAE score (% graded 4* weighted average) within discipline								
Arts and humanities								
0<10	20.7	*724*	8.8	*706*	39.0	*700*	14.6	*725*
10<20	17.6	*970*	6.9	*954*	31.8	*954*	14.0	*974*
>=20	14.0 **	*1,654*	8.3	*1,633*	33.9 **	*1,626*	13.1 **	*1,663*
Sciences								
0<10	24.2	*2,687*	20.8	*2,659*	21.1	*2,597*	24.1	*2,689*
10<20	18.3	*4,192*	22.3	*4,159*	20.0	*4,018*	20.8	*4,197*
>=20	16.4 **	*3,274*	23.1	*3,253*	20.5	*3,183*	21.2 **	*3,279*
Social sciences								
0<10	30.3	*2,244*	14.0	*2,203*	19.4	*2,138*	21.5	*2,247*
10<20	25.5	*2,053*	15.3	*2,034*	17.3	*1,970*	20.2	*2,055*
>=20	20.7 **	*2,255*	16.6 **	*2,236*	14.4 **	*2,161*	18.6	*2,257*

Definition of 'high interaction'
People based: A score of 6 or more out of a possible 9.
Problem solving: A score of 6 or more out of a possible 10.
Community based: A score of 2 or more out of a possible 4.
All interactions: A score of 12 or more out of a possible 23.

Table A2(7.4) Highly connected academics by grant status and grant status within discipline subgroups (%)

	People-based high intensity interaction		Problem-solving high intensity interaction		Community-based high intensity interaction		All high intensity interaction	
	%	N	%	N	%	N	%	N
All	21.7	*22,018*	17.7	*21,774*	22.2	*21,240*	20.2	*22,057*
Grant status (from research council data)								
Grant recipient	23.3	*3,168*	30.5	*3,152*	28.3	*3,082*	30.0	*3,170*
None	21.4 **	*18,828*	15.5 **	*18,600*	21.1 **	*18,136*	18.6 **	*18,865*
Grant status (from research council data) within discipline								
Arts and humanities								
Grant recipient	16.4	*438*	12.3	*431*	39.2	*431*	16.9	*439*
None	17.4	*3,195*	7.5 **	*3,140*	33.9 **	*3,127*	13.6 **	*3,210*
Sciences								
Grant recipient	23.1	*2,081*	35.9	*2,076*	27.5	*2,029*	32.9	*2,082*
None	19.3 **	*9,056*	19.1 **	*8,968*	19.4 **	*8,720*	19.6 **	*9,069*
Social sciences								
Grant recipient	28.6	*643*	25.0	*639*	23.5	*616*	29.1	*643*
None	26.2 **	*6,542*	14.5 **	*6,458*	17.2 **	*6,254*	19.6 **	*6,551*

Definition of 'high interaction'
People based: A score of 6 or more out of a possible 9.
Problem solving: A score of 6 or more out of a possible 10.
Community based: A score of 2 or more out of a possible 4.
All interactions: A score of 12 or more out of a possible 23.

Table A2(8.1) Frequency of contact with institution's Knowledge, Technology Transfer Office (KTO) or consultancy services office within the past three years by RAE score and RAE score within discipline subgroups (%)

	No contact	Some contact	Not aware of these services		Total respondents
All	35.8	43.4	20.8		*21,773*
RAE score (% graded 4* weighted average)					
0<10	32.5	47.7	19.8		*5,580*
10<20	37.2	44.6	18.2		*7,144*
>=20	39.6	36.3	24.1		*7,113*
				**	
RAE score (% graded 4* weighted average) within discipline					
Arts and humanities					
0<10	31.5	42.1	26.5		*718*
10<20	36.9	38.9	24.2		*963*
>=20	41.6	29.2	29.2		*1,643*
				**	
Sciences					
0<10	32.4	50.6	17.0		*2,654*
10<20	36.4	46.6	17.0		*4,147*
>=20	38.5	41.0	20.5		*3,233*
				**	
Social sciences					
0<10	33.0	46.0	21.0		*2,206*
10<20	38.9	43.3	17.7		*2,031*
>=20	39.6	34.8	25.6		*2,236*
				**	

How often have you been in contact with your institution's Knowledge or Technology Transfer Office (TTO) or
(4) Frequently (7+ times)
(3) Occasionally (3-6 times)
(2) Rarely (1-2 times)
(1) No contact
(5) Not aware of these services

Table A2(8.2) Frequency of contact with institution's Knowledge, Technology Transfer Office (KTO) or consultancy services office within the past three years by grant status and grant status within discipline subgroups (%)

	No contact	Some contact	Not aware of these services		Total respondents
All	35.8	43.4	20.8		*21,773*
Grant status (from research council					
Grant recipient	29.6	60.2	10.1		*3,142*
None	36.9	40.5	22.6		*18,610*
				**	
Grant status (from research council data) within discipline Arts and humanities					
Grant recipient	35.6	46.7	17.7		*435*
None	37.5	33.9	28.6		*3,175*
				**	
Sciences					
Grant recipient	26.8	65.7	7.5		*2,066*
None	37.0	42.7	20.3		*8,942*
				**	
Social sciences					
Grant recipient	34.8	51.7	13.5		*635*
None	36.5	40.6	23.0		*6,458*
				**	

How often have you been in contact with your institution's Knowledge or Technology Transfer Office (TTO) or
(4) Frequently (7+ times)
(3) Occasionally (3-6 times)
(2) Rarely (1-2 times)
(1) No contact
(5) Not aware of these services

Table A2(8.3) Way in which activities with external organisations were initiated by RAE score and RAE score within discipline subgroups (%)

	Individuals associated with the external organisation	Mutual actions following up informal contacts	Your own actions in approaching the external organisation directly	Mutual actions following up a contact at a formal conference or meeting	The university knowledge/ technology transfer office or other university administrative office	Total respondents
All	79.6	69.2	63.5	61.9	23.8	*15,257*
RAE score (% graded 4* weighted average)						
0<10	79.2	70.2	67.1	62.5	28.5	*3,939*
10<20	79.5	68.9	63.5	62.7	23.8	*4,942*
>=20	79.6	68.0 *	59.1 **	59.9 **	18.0 **	*4,982*
RAE score (% graded 4* weighted average) within discipline						
Arts and humanities						
0<10	83.5	75.1	71.5	61.1	25.7	*443*
10<20	78.8	69.8	65.7	54.7	25.1	*558*
>=20	79.8	68.0 **	54.2 **	55.0 *	17.0 **	*996*
Sciences						
0<10	78.5	68.9	64.6	62.7	28.7	*1,879*
10<20	78.8	67.0	61.4	63.2	24.0	*2,879*
>=20	77.9	66.7	59.1 **	61.0 ns	20.6 **	*2,280*
Social sciences						
0<10	78.7	70.4	68.9	62.6	28.9	*1,615*
10<20	81.3	72.0	66.6	64.7	22.8	*1,503*
>=20	81.8 *	69.8	62.0 **	61.3	15.3 **	*1,706*

Table A2(8.4) Way in which activities with external organisations were initiated by grant status and grant status within discipline subgroups (%)

	Individuals associated with the external organisation	Mutual actions following up informal contacts	Your own actions in approaching the external organisation directly	Mutual actions following up a contact at a formal conference or meeting	The university knowledge/ technology transfer office or other university administrative office	Total respondents
All	79.6	69.2	63.5	61.9	23.8	*15,257*
Grant status (from						
Grant recipient	82.8	71.9	67.9	65.8	24.7	*2,385*
None	79.0 **	68.6 **	62.7 **	61.2 **	23.6	*12,856*
Grant status (from research council data) within discipline						
Arts and humanities						
Grant recipient	79.7	66.3	62.1	53.5	21.5	*275*
None	80.9	71.5 *	62.6	57.4	21.7	*1,907*
Sciences						
Grant recipient	82.7	71.7	67.4	67.2	26.3	*1,593*
None	77.7 **	66.5 **	60.5 **	61.3 **	24.9	*6,166*
Social sciences						
Grant recipient	84.7	75.5	72.4	68.1	21.6	*513*
None	80.0 **	70.3 **	65.5 **	62.5 **	22.7	*4,758*

Table A2(9.1) Motivations and objectives for participating in activities with external organisations by RAE score and RAE score within discipline subgroups (%) (score is 1-5 where 5 is very important) (mean score)

	Gain insights in the area of my own research	Keep up to date with research in external organisations	Test the practical application of my research	Further my institution's outreach mission	Secure access to the expertise of researchers at the external organisation	Gain knowledge about practical problems useful for teaching	Secure access to specialist equipment, materials or data	Create student project and job placement opportunities	Secure funding for research assistants and equipment	Look for business opportunities linked to my own research	Source of personal income	Total respondents
All	4.0	3.6	3.5	3.2	3.1	3.1	2.8	2.8	2.8	2.3	2.2	*15,631*
RAE score (% graded 4* weighted average)												
0<10	4.0	3.7	3.5	3.4	3.1	3.4	2.8	3.0	2.7	2.4	2.1	*4,060*
10<20	4.0	3.6	3.6	3.1	3.1	3.1	2.8	2.8	2.9	2.3	2.2	*5,058*
>=20	4.0	3.5 **	3.5 **	3.0 **	3.1 **a	2.9 **	2.8 *	2.6 **	2.8 **	2.2 **	2.3 **	*5,083*
RAE score (% graded 4* weighted average) within discipline												
Arts and humanities												
0<10	4.0	3.6	3.2	3.6	3.1	3.6	2.7	3.4	2.3	2.3	2.3	*474*
10<20	3.8	3.3	3.1	3.5	2.9	3.1	2.4	2.9	2.3	2.1	2.1	*567*
>=20	3.8 **	3.3 **	3.0 **	3.4 *	3.0 *	3.0 **	2.5 **	2.8 **	2.3	1.9 **	2.2 *	*1,027*
Sciences												
0<10	4.0	3.7	3.7	3.3	3.3	3.2	3.0	3.0	3.2	2.6	2.1	*1,914*
10<20	4.0	3.6	3.7	3.0	3.3	2.9	3.0	2.9	3.3	2.5	2.1	*2,933*
>=20	4.0	3.5 **	3.7	2.9 **	3.3	2.6 **	3.1	2.7 **	3.3 **	2.4 **	2.1	*2,285*
Social sciences												
0<10	4.1	3.7	3.4	3.4	2.8	3.6	2.5	2.9	2.4	2.2	2.1	*1,670*
10<20	4.2	3.6	3.5	3.2	2.9	3.3	2.6	2.6	2.4	2.0	2.3	*1,555*
>=20	4.2 **	3.5 **	3.5 **	3.0 **	2.8 *	3.1 **	2.6 *	2.3 **	2.4	2.0 **	2.4 **	*1,771*

a) These scores are different when expressed to two decimal places. The size of the sample and the low variance within each group means they are statistically significantly different.

If you have participated in activities with external organisations, which of the following were your motivations and objectives (please indicate the importance of each statement)?

Test the practical application of my research
Gain insights in the area of my own research
Keep up to date with research in external organisations
Secure access to specialist equipment, materials or data
Secure access to the expertise of researchers at the external organisation
Gain knowledge about practical problems useful for teaching
Create student project and job placement opportunities
Source of personal income
Secure funding for research assistants and equipment
Look for business opportunities linked to my own research
Further my institution's outreach mission

Table A2(9.2) Motivations and objectives for participating in activities with external organisations by grant status and grant status within discipline subgroups (%) (score is 1-5 where 5 is very important) (mean score)

	Gain insights in the area of my own research	Keep up to date with research in external organisations	Test the practical application of my research	Further my institution's outreach mission	Secure access to the expertise of researchers at the external organisation	Gain knowledge about practical problems useful for teaching	Secure access to specialist equipment, materials or data	Create student project and job placement opportunities	Secure funding for research assistants and equipment	Look for business opportunities linked to my own research	Source of personal income	Total respondents
All	4.0	3.6	3.5	3.2	3.1	3.1	2.8	2.8	2.8	2.3	2.2	*15,631*
Grant status (from research council data)												
Grant recipient	4.1	3.5	3.6	3.0	3.2	2.6	2.9	2.7	3.4	2.3	2.0	*2,461*
None	4.0	3.6	3.5	3.2	3.1	3.2	2.8	2.8	2.7	2.3	2.2	*13,153*
		**	**	**	**	**	**	**	**		**	
Grant status (from research council data) within discipline												
Arts and humanities												
Grant recipient	3.9	3.2	3.0	3.3	3.1	2.7	2.5	2.6	2.5	1.7	1.7	*293*
None	3.9	3.4	3.1	3.5	3.0	3.3	2.5	3.0	2.3	2.1	2.3	*1,970*
		**		**		**		**	**	**	**	
Sciences												
Grant recipient	4.0	3.6	3.7	3.0	3.4	2.6	3.1	2.8	3.7	2.5	2.0	*1,633*
None	4.0	3.6	3.7	3.1	3.3	3.0	3.0	2.9	3.1	2.5	2.2	*6,219*
				**	**	**	**	**	**		**	
Social sciences												
Grant recipient	4.3	3.5	3.7	3.1	2.9	2.8	2.7	2.4	2.8	1.9	2.1	*531*
None	4.2	3.6	3.4	3.2	2.8	3.4	2.6	2.7	2.4	2.1	2.3	*4,938*
	**	*	**	**	*	**		**	**	**	**	

If you have participated in activities with external organisations, which of the following were your motivations and objectives (please indicate the importance of each statement)?
Test the practical application of my research
Gain insights in the area of my own research
Keep up to date with research in external organisations
Secure access to specialist equipment, materials or data
Secure access to the expertise of researchers at the external organisation
Gain knowledge about practical problems useful for teaching
Create student project and job placement opportunities
Source of personal income
Secure funding for research assistants and equipment
Look for business opportunities linked to my own research
Further my institution's outreach mission

Table A2(10.1) Impact that involvement with external organisations has had on amount and kind of research done by RAE score and RAE score within discipline subgroups (%)

	It has given me new insights for my work	It has led to new contacts in the field	It has led to new research projects	It has strengthened my reputation in the field	It has had very little or no impact	Total respondents
All	72.7	69.9	62.4	58.2	10.9	*14,708*
RAE score (% graded 4* weighted average)						
0<10	74.1	70.8	62.6	58.3	10.9	*3,683*
10<20	72.1	69.7	63.3	58.6	10.8	*4,833*
>=20	72.1 *	69.2	62.1	57.9	11.2	*4,920*
RAE score (% graded 4* weighted average) within discipline						
Arts and humanities						
0<10	75.3	73.4	52.3	59.8	14.8	*413*
10<20	66.9	67.5	49.4	57.7	18.7	*504*
>=20	67.6 **	67.0 *	50.6	55.6	16.0	*970*
Sciences						
0<10	70.9	69.3	67.6	57.8	10.1	*1,758*
10<20	69.0	68.1	67.0	58.1	10.8	*2,812*
>=20	68.7	69.2	68.7	57.6	10.4	*2,212*
Social sciences						
0<10	77.5	71.7	59.5	58.5	10.7	*1,510*
10<20	79.9	73.2	61.1	59.8	8.2	*1,514*
>=20	78.9	70.5	60.0	59.7	9.6 *	1,738

In the last three years, what impact has your involvement in activities with external organisations had on the amount and kind of **research** that you do? Please indicate all that apply.

It has led to new research projects
It has strengthened my reputation in the field
It has given me new insights for my work
It has led to new contacts in the field
It has had very little or no impact
Not applicable

Table A2(10.2) Impact that involvement with external organisations has had on amount and kind of research done by grant status within discipline subgroups (%)

	It has given me new insights for my work	It has led to new contacts in the field	It has led to new research projects	It has strengthened my reputation in the field	It has had very little or no impact	Total respondents
All	72.7	69.9	62.4	58.2	10.9	*14,708*
Grant status (from research						
Grant recipient	72.3	71.7	72.1	63.7	9.7	*2,455*
None	72.8	69.6 **	60.4 **	57.0 **	11.1 **	*12,239*
Grant status (from research council data) within discipline						
Arts and humanities						
Grant recipient	67.6	70.7	59.2	62.4	14.3	*287*
None	69.9	68.3	49.2 **	56.2 **	16.2	*1,767*
Sciences						
Grant recipient	69.7	70.1	73.9	62.6	9.8	*1,620*
None	69.5	68.7	65.6 **	56.5 **	10.6	*5,819*
Social sciences						
Grant recipient	82.7	76.8	73.3	68.1	7.4	*543*
None	78.0 **	71.0 **	58.3 **	58.1 **	9.8 *	*4,625*

In the last three years, what impact has your involvement in activities with external organisations had on the amount and kind of **research** that you do? Please indicate all that apply.

It has led to new research projects
It has strengthened my reputation in the field
It has given me new insights for my work
It has led to new contacts in the field
It has had very little or no impact
Not applicable

Table A2(10.3) Impact that involvement with external organisations has had on amount and kind of teaching done by RAE score and RAE score within discipline subgroups (%)

	It has led me to make changes to the course programme	It has strengthened my reputation	It has led to changes in the way I present the material	It has led to an increase in the employability of my students	It has led to an increase in entrepreneurial skills among my students	It has had very little or no impact	Total respondents
All	44.5	35.4	50.4	25.5	11.4	31.9	*12,977*
RAE score (% graded 4* weighted average)							
0<10	53.3	42.5	56.3	32.7	14.3	23.3	*3,627*
10<20	42.0	32.0	46.6	22.2	9.8	35.6	*4,100*
>=20	35.6	30.2	45.9	18.0	8.7	39.4	*3,983*
	**	**	**	**	**	**	
RAE score (% graded 4* weighted average) within discipline							
Arts and humanities							
0<10	54.5	49.9	57.8	43.3	28.9	16.0	*457*
10<20	45.3	38.1	48.9	26.9	16.8	29.1	*501*
>=20	37.1	32.2	48.4	20.5	11.6	35.8	*886*
	**	**	**	**	**	**	
Sciences							
0<10	46.9	37.9	51.0	28.1	10.3	30.4	*1,625*
10<20	34.7	25.9	40.8	20.2	8.1	43.2	*2,245*
>=20	28.2	22.9	38.2	15.5	7.1	49.2	*1,658*
	**	**	**	**	**	**	
Social sciences							
0<10	59.7	45.1	61.4	34.4	14.1	17.9	*1,544*
10<20	53.0	39.9	55.2	23.9	10.1	25.3	*1,352*
>=20	43.2	37.5	53.3	19.2	8.6	30.5	*1,439*
	**	**	**	**	**	**	

In the last three years, what impact has your involvement in activities with external organisations had on the amount and kind of **teaching** that you do?
It has led me to make changes to the course programme
It has strengthened my reputation
It has led to changes in the way I present the material
It has led to an increase in the employability of my students
It has led to an increase in entrepreneurial skills among my students
It has had very little or no impact
Not applicable

Table A2(10.4) Impact that involvement with external organisations has had on amount and kind of teaching done by grant status within discipline subgroups (%)

	It has led me to make changes to the course programme	It has strengthened my reputation	It has led to changes in the way I present the material	It has led to an increase in the employability of my students	It has led to an increase in entrepreneurial skills among my students	It has had very little or no impact	Total respondents
All	44.5	35.4	50.4	25.5	11.4	31.9	*12,977*
Grant status (from research							
Grant recipient	32.0	24.2	37.9	19.6	8.6	47.0	*2,128*
None	47.0 **	37.6 **	52.9 **	26.7 **	11.9 **	29.0 **	*10,839*
Grant status (from research council data) within discipline							
Arts and humanities							
Grant recipient	33.6	29.1	39.6	20.0	9.4	43.4	*265*
None	46.5 **	40.6 **	53.5 **	30.6 **	19.3 **	25.9 **	*1,761*
Sciences							
Grant recipient	28.1	21.4	34.9	19.8	8.2	51.5	*1,402*
None	40.9 **	31.9 **	47.3 **	24.1 **	9.3	36.0 **	*4,744*
Social sciences							
Grant recipient	43.0	29.9	46.3	18.6	9.0	35.4	*458*
None	53.8 **	42.7 **	58.9 **	27.9 **	11.8 *	22.4 **	*4,317*

In the last three years, what impact has your involvement in activities with external organisations had on the amount and kind of **teaching** that you do?
It has led me to make changes to the course programme
It has strengthened my reputation
It has led to changes in the way I present the material
It has led to an increase in the employability of my students
It has led to an increase in entrepreneurial skills among my students
It has had very little or no impact
Not applicable

Table A2(10.5) How much weight institution gives to the following criteria with regards to career advancement and promotion by RAE score and RAE score within discipline subgroups (%) (score is 1-5 where 5 is the highest)(mean score)

	Research and publications	Faculty and departmental administration	Teaching ability and workload	Work with business and industry	Work with the local community	Total respondents
All	4.4	3.1	3.0	2.9	2.1	*21,669*
RAE score (% graded 4* weighted average)						
0<10	4.0	3.3	3.0	3.1	2.4	*5,568*
10<20	4.6	3.0	2.9	2.9	2.0	*7,120*
>=20	4.7	2.9	3.0	2.7	1.8	*7,041*
	**	**	**	**	**	
RAE score (% graded 4* weighted average) within discipline						
Arts and humanities						
0<10	3.7	3.6	3.0	3.2	2.6	*716*
10<20	4.4	3.4	3.0	2.8	2.1	*972*
>=20	4.7	3.2	3.1	2.5	1.9	*1,623*
	**	**	**	**	**	
Sciences						
0<10	4.2	3.1	3.0	3.1	2.3	*2,650*
10<20	4.7	2.8	2.9	2.9	1.9	*4,126*
>=20	4.7	2.8	2.9	2.9	1.9	*3,214*
	**	**	**	**	**	
Social sciences						
0<10	3.9	3.4	3.0	3.1	2.4	*2,200*
10<20	4.6	3.0	2.9	2.7	2.0	*2,019*
>=20	4.8	2.9	2.9	2.5	1.8	*2,203*
	**	**	**	**	**	

With regards to career advancement and promotion, how much weight do you believe your institution gives to the following

Teaching ability and workload
Faculty and departmental administration
Research and publications
Work with business and industry
Work with the local community

Table A2(10.6) How much weight institution gives to the following criteria with regards to career advancement and promotion by grant status and grant status within discipline subgroups (%) (score is 1-5 where 5 is the highest) (mean score)

	Research and publications	Faculty and departmental administration	Teaching ability and workload	Work with business and industry	Work with the local community	Total respondents
All	4.4	3.1	3.0	2.9	2.1	*21,669*
Grant status (from research council data)						
Grant recipient	4.7	2.9	2.9	2.8	1.8	*3,127*
None	4.4	3.1	3.0	2.9	2.1	*18,520*
	**	**	**	**	**	
Grant status (from research council data) within discipline						
Arts and humanities						
Grant recipient	4.6	3.3	3.0	2.7	1.9	*429*
None	4.3	3.3	3.0	2.8	2.2	*3,140*
	**			**	**	
Sciences						
Grant recipient	4.7	2.8	2.8	2.9	1.7	*2,054*
None	4.5	3.0	3.0	3.0	2.1	*8,908*
	**	**	**	**	**	
Social sciences						
Grant recipient	4.7	3.1	3.0	2.7	1.9	*633*
None	4.3	3.1	3.0	2.8	2.1	*6,417*
	**	*		**	**	

With regards to career advancement and promotion, how much weight do you believe your institution gives to the following

Teaching ability and workload
Faculty and departmental administration
Research and publications
Work with business and industry
Work with the local community

Table A2(11.1) Which factors have constrained or prevented your interactions with external organisations by RAE score and RAE score within discipline subgroups (%)

		RAE score (% graded 4* weighted average)				RAE score % graded 4* weighted average within Arts and humanities			
	All	0<10	10<20	>=20		0<10	10<20	>=20	
Total respondents	*16,629*	*4,348*	*5,364*	*5,375*		*513*	*625*	*1,108*	
Lack of time to fulfil all university roles	65.9	71.4	65.9	60.0	**	76.0	73.6	65.8	**
Bureaucracy and inflexibility of administrators in your institution	31.2	38.7	29.7	24.3	**	40.9	29.1	20.8	**
Insufficient rewards from interaction	28.7	29.8	28.4	27.0	**	35.1	31.2	28.8	**
Insufficient resources devoted by your institution to activities with external organisations	25.7	33.0	24.3	18.6	**	41.3	30.7	20.2	**
Unwillingness in the external organisation to meet the full cost of the interaction	25.1	26.7	25.3	22.8	**	16.0	22.1	17.1	**
Lack of resources in the external organisation to manage the interaction	23.7	24.7	23.6	23.1		19.9	22.7	21.9	
Difficulty in identifying partners	23.2	24.2	24.3	21.0	**	22.0	24.6	20.2	
Differences in timescale	22.1	22.8	22.4	21.2		23.4	17.3	16.9	**
Lack of interest by external organisations	20.2	19.3	21.1	19.8	*	15.8	19.7	17.3	
Lack of experience in the external organisation for interacting with academics	17.3	18.5	17.3	16.2	**	17.3	17.9	15.1	
Poor marketing, technical or negotiation skills of administrators in your institution	17.0	22.9	15.8	10.7	**	28.3	17.3	11.0	**
Difficulty in reaching agreement with external organisation on terms of the interaction such as IP	10.4	9.0	11.7	10.4	**	6.8	6.2	4.6	
Cultural differences	7.0	5.9	7.2	7.8	**	4.7	7.4	7.9	*
Other	1.6	1.2	1.9	1.6	**	1.4	2.2	1.5	

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate all that apply.

Lack of time to fulfil all university roles
Insufficient rewards from interaction
Difficulty in identifying partners
Lack of interest by external organisations
Cultural differences
Differences in timescale
Lack of resources in the external organisation to manage the interaction
Lack of experience in the external organisation for interacting with academics
Unwillingness in the external organisation to meet the full cost of the interaction
Bureaucracy and inflexibility of administrators in your institution
Poor marketing, technical or negotiation skills of administrators in your institution
Insufficient resources devoted by your institution to activities with external organisations
Difficulty in reaching agreement with external organisation on terms of the interaction (such as intellectual property rights)
Other (please specify)

Table A2(11.1) Which factors have constrained or prevented your interactions with external organisations by RAE score and RAE score within discipline subgroups (%) *(Contd)*

		RAE score % graded 4* weighted average within Sciences				RAE score % graded 4* weighted average within Social Sciences			
	All	0<10	10<20	>=20		0<10	10<20	>=20	
Total respondents	*16,629*	*2,045*	*3,092*	*2,439*		*1,788*	*1,644*	*1,828*	
Lack of time to fulfil all university roles	65.9	68.1	62.3	53.6	**	73.9	69.8	64.9	**
Bureaucracy and inflexibility of administrators in your institution	31.2	35.3	28.6	25.2	**	41.9	31.8	25.2	**
Insufficient rewards from interaction	28.7	28.3	26.2	24.6	**	30.0	31.6	29.0	
Insufficient resources devoted by your institution to activities with external organisations	25.7	29.1	20.5	16.7	**	35.0	29.0	20.1	**
Unwillingness in the external organisation to meet the full cost of the interaction	25.1	31.0	28.1	27.1	**	24.8	21.4	20.5	**
Lack of resources in the external organisation to manage the interaction	23.7	25.1	24.5	25.2		25.7	22.3	21.1	**
Difficulty in identifying partners	23.2	26.6	26.0	22.9	**	22.1	21.0	19.0	*
Differences in timescale	22.1	22.2	22.4	20.0	*	23.3	24.4	25.5	
Lack of interest by external organisations	20.2	21.2	22.6	22.6		18.2	18.9	17.6	
Lack of experience in the external organisation for interacting with academics	17.3	18.1	16.8	16.2		19.2	18.1	16.9	
Poor marketing, technical or negotiation skills of administrators in your institution	17.0	20.8	15.1	11.1	**	23.8	16.4	10.0	**
Difficulty in reaching agreement with external organisation on terms of the interaction such as IP	10.4	12.1	15.2	15.8	**	5.9	7.1	6.7	
Cultural differences	7.0	6.4	6.8	7.7		5.8	7.9	7.9	**
Other	1.6	1.3	1.8	1.6		1.1	2.1	1.6	*

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate all that apply.

Lack of time to fulfil all university roles
Insufficient rewards from interaction
Difficulty in identifying partners
Lack of interest by external organisations
Cultural differences
Differences in timescale
Lack of resources in the external organisation to manage the interaction
Lack of experience in the external organisation for interacting with academics
Unwillingness in the external organisation to meet the full cost of the interaction
Bureaucracy and inflexibility of administrators in your institution
Poor marketing, technical or negotiation skills of administrators in your institution
Insufficient resources devoted by your institution to activities with external organisations
Difficulty in reaching agreement with external organisation on terms of the interaction (such as intellectual property rights)
Other (please specify)

Table A2(11.2) Which factors have constrained or prevented your interactions with external organisations by grant status and grant status within subgroups (%)

	All	Grant status (from research council data)			Grant status (from research council data) within Arts and humanities		
		Grant recipient	None		Grant recipient	None	
Total respondents	*16,629*	*2,550*	*14,061*		*312*	*2,146*	
Lack of time to fulfil all university roles	65.9	68.6	65.4	**	71.8	70.5	
Bureaucracy and inflexibility of administrators in your institution	31.2	28.9	31.6	**	21.8	29.6	**
Insufficient rewards from interaction	28.7	28.4	28.7		28.2	31.6	
Insufficient resources devoted by your institution to activities with external organisations	25.7	20.1	26.7	**	24.7	29.0	
Unwillingness in the external organisation to meet the full cost of the interaction	25.1	32.9	23.7	**	22.4	17.8	*
Lack of resources in the external organisation to manage the interaction	23.7	29.3	22.7	**	29.5	20.6	**
Difficulty in identifying partners	23.2	26.4	22.7	**	26.0	21.3	*
Differences in timescale	22.1	26.6	21.3	**	22.4	18.0	*
Lack of interest by external organisations	20.2	25.5	19.2	**	18.3	17.4	
Lack of experience in the external organisation for interacting with academics	17.3	18.2	17.1		20.5	15.7	**
Poor marketing, technical or negotiation skills of administrators in your institution	17.0	15.2	17.3	**	12.5	18.5	**
Difficulty in reaching agreement with external organisation on terms of the interaction such as IP	10.4	16.7	9.2	**	6.4	5.5	
Cultural differences	7.0	8.8	6.6	**	9.9	6.7	**
Other	1.6	1.5	1.6		1.9	1.6	

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate all that apply.

Lack of time to fulfil all university roles
Insufficient rewards from interaction
Difficulty in identifying partners
Lack of interest by external organisations
Cultural differences
Differences in timescale
Lack of resources in the external organisation to manage the interaction
Lack of experience in the external organisation for interacting with academics
Unwillingness in the external organisation to meet the full cost of the interaction
Bureaucracy and inflexibility of administrators in your institution
Poor marketing, technical or negotiation skills of administrators in your institution
Insufficient resources devoted by your institution to activities with external organisations
Difficulty in reaching agreement with external organisation on terms of the interaction (such as intellectual property rights)
Other (please specify)

Table A2(11.2) Which factors have constrained or prevented your interactions with external organisations by grant status and grant status within subgroups (%) *(Contd)*

	All	Grant status (from research council data) within Sciences			Grant status (from research council data) within Social sciences		
		Grant recipient	None		Grant recipient	None	
Total respondents	*16,629*	*1,685*	*6,664*		*549*	*5220*	
Lack of time to fulfil all university roles	65.9	67.4	60.7	**	70.5	69.3	
Bureaucracy and inflexibility of administrators in your institution	31.2	30.0	30.1		29.9	34.3	**
Insufficient rewards from interaction	28.7	28.1	26.4		29.5	30.5	
Insufficient resources devoted by your institution to activities with external organisations	25.7	18.5	23.6	**	22.2	29.6	**
Unwillingness in the external organisation to meet the full cost of the interaction	25.1	36.7	26.9	**	27.1	21.9	**
Lack of resources in the external organisation to manage the interaction	23.7	29.9	23.4	**	27.3	22.5	**
Difficulty in identifying partners	23.2	28.5	24.7	**	20.0	20.7	
Differences in timescale	22.1	25.5	20.8	**	32.2	23.4	**
Lack of interest by external organisations	20.2	28.3	20.8	**	20.8	17.8	*
Lack of experience in the external organisation for interacting with academics	17.3	17.2	16.9		19.9	18.0	
Poor marketing, technical or negotiation skills of administrators in your institution	17.0	16.0	16.3		14.2	18.1	**
Difficulty in reaching agreement with external organisation on terms of the interaction such as IP	10.4	21.1	12.7	**	8.9	6.4	**
Cultural differences	7.0	8.1	6.5	**	10.2	6.9	**
Other	1.6	1.3	1.7		1.8	1.6	

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate all that apply.

Lack of time to fulfil all university roles
Insufficient rewards from interaction
Difficulty in identifying partners
Lack of interest by external organisations
Cultural differences
Differences in timescale
Lack of resources in the external organisation to manage the interaction
Lack of experience in the external organisation for interacting with academics
Unwillingness in the external organisation to meet the full cost of the interaction
Bureaucracy and inflexibility of administrators in your institution
Poor marketing, technical or negotiation skills of administrators in your institution
Insufficient resources devoted by your institution to activities with external organisations
Difficulty in reaching agreement with external organisation on terms of the interaction (such as intellectual property rights)
Other (please specify

Annex 3 Tables, Exhibits and Tests of Significance for the Analysis of the Matched Sample of grant holders and non-grant holders

To enable the examination of differences in activity between research council grant holders responding to the CBR academic survey and non- grant holders in a multi-variate context we used a matched sample approach. This enabled us to examine variations in commercialisation and pathway variables across academics who do and do not hold grants holding constant some key "demographic" data. We thus successfully matched 1347 male and 468 female research council grant holders with 1347 male and 468 female non-grant holders matched by institution (157 categories) by subject (16 categories) by seniority (3 categories) and by age (3 categories).[26]

We then analysed differences between the combined matched sample datasets across all the variables analysed for the full sample. This was done for the matched sample as a whole and then for subgroups within this matched sample. These disciplinary subgroups were Arts and humanities; Biology, Chemistry, and Veterinary science; Engineering and Materials science; Health sciences; Physics and Mathematics; and Social sciences.

Table A3.1 compares the Grant holders with the Non-grant holders by gender, age, seniority, type of institution and discipline.

From Exhibit A3(4.2) and Table A3(4.2) onwards the numbering is designed to link the exhibits and tables to the discussion in the main text. Thus Exhibit A3(4.2) corresponds to the discussion following Exhibit 4.2 for the whole sample in the main text.

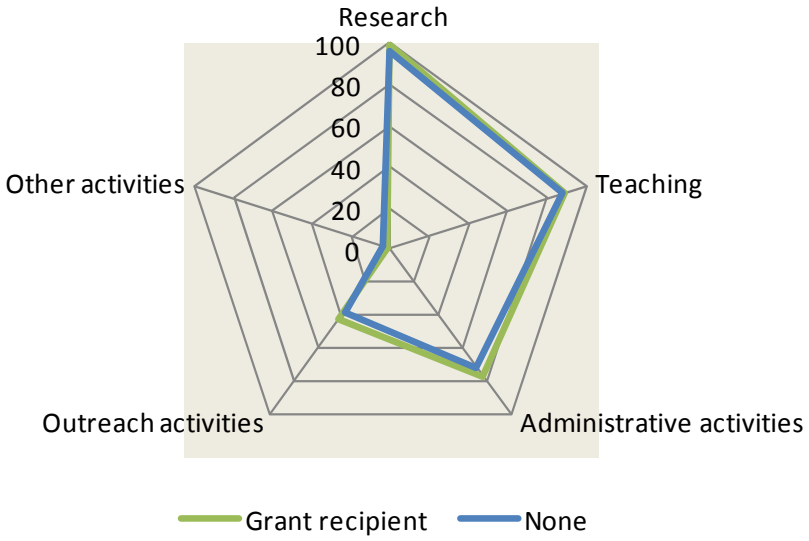
In each table tests of significance are reported. For pair-wise or three-way comparisons of proportions between groups the Chi-Square Test is reported. For pair-wise grant and non-grant holder comparisons of scores the Mann-Whitney U-Test result is shown. For three-way comparisons of scores across RAE ratings the results of the Kruskal-Wallis Test are shown.

[26] Out of the 2244 men that received a grant, this number was reduced to 1617 when taking account of the fact that the same institution, subject, seniority and age had to be present for both grant and non-grant holders. This figure was further reduced when there were not enough non-grant holders in a particular cell to match from. The final matched number of men was 1347 pairs. Similarly for women, the 1192 women that received a grant were first reduced to 509 and the final number of women that were matched was 468.

Table A3.1 Comparison of grant holders with non-grant holders in the matched sample by gender, age, seniority, type of institution and discipline

	----- Grant holders -----				---- Non grant holders ----		
	Un-matched	Matched	N		Un-matched	Matched	N
All	41.8	58.2	3,176	All	90.2	9.8	18,972
Gender				Gender			
Males	40.0	60.0	2,244	Males	87.5	12.5	10,765
Females	46.6	53.4	876	Females	94.0	6.0	7,813
Age				Age			
Under 30	50.0	50.0	52	Under 30	97.9	2.1	1,268
30-39	37.7	62.3	755	30-39	90.8	9.2	5,129
40-49	49.4	50.6	1,114	40-49	89.2	10.8	5,241
50 and over	38.6	61.4	1,229	50 and over	89.4	10.6	7,113
Seniority				Seniority			
Professor	49.9	50.1	1,319	Professor	78.1	21.9	3,020
Reader, Senior Lecturer/Lecturer	38.1	61.9	1,481	Reader, Senior Lecturer/Lecturer	91.1	8.9	10,347
Other position	32.0	68.0	350	Other position	95.6	4.4	5,391
Institution type				Institution type			
Russell Group	38.2	61.8	1,824	Russell Group	84.8	15.2	7,399
Older universities (est pre-1992)	48.1	51.9	1,046	Older universities (est pre-1992)	90.0	10.0	5,430
Younger universities (est post-1992)	54.1	45.9	283	Younger universities (est post-1992)	97.7	2.3	5,580
Specialist institutions	39.1	60.9	23	Specialist institutions	97.5	2.5	563
Discipline				Discipline			
Arts and humanities	45.0	55.0	440	Arts and humanities	92.5	7.5	3,234
Health sciences	20.6	79.4	301	Health sciences	92.8	7.2	3,321
STEM	51.1	48.9	1,786	STEM	84.9	15.1	5,799
Social sciences	28.5	71.5	643	Social sciences	93.0	7.0	6,583

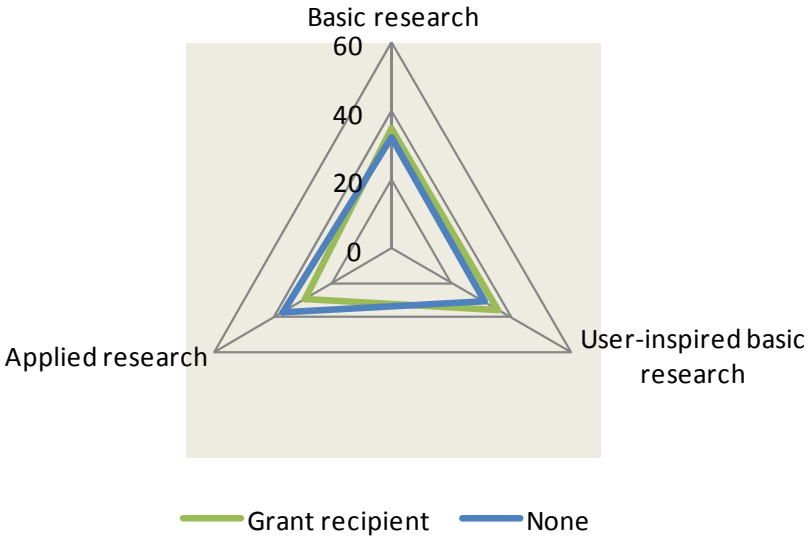
Exhibit A3(4.2) and Table A3(4.2) Self-reported academic activity by grant status – matched sample



	Research	Teaching	Administrative activities	Outreach activities	Other activities	Total respondents
All	98.2	88.6	73.8	40.2	2.7	*3,630*
Grant status (from research council data)						
Any grant received	99.7	89.6	76.6	42.5	1.9	*1,815*
None	96.6 **	87.5 **	71.0 **	37.9 **	3.6 **	*1,815*
Arts and humanities						
Any grant received	100.0	94.6	86.4	51.2	0	*242*
None	96.7 **	92.6	82.2	45.0	1.7 **	*242*
Biology, Chemistry, Veterinary science						
Any grant received	100.0	88.9	73.3	38.6	1.1	*360*
None	96.9 **	82.5 **	70.8	38.9	2.5	*360*
Engineering, Materials science						
Any grant received	98.9	88.4	73.5	38.7	0.6	*181*
None	97.2	86.2	68.0	38.7	0	*181*
Health sciences						
Any grant received	99.2	87.4	71.1	36.4	10.0	*239*
None	94.1 **	89.1	65.3	23.8 **	17.6 **	*239*
Physics, Mathematics						
Any grant received	99.7	89.5	77.5	49.2	0	*333*
None	96.4 **	86.2	65.8 **	42.6 *	0.3	*333*
Social sciences						
Any grant received	100.0	89.3	77.4	40.9	1.1	*460*
None	97.4 **	89.3	73.3	36.7	2.0	*460*

Question:
Please indicate whether you participate in the following activities:
Teaching
Research
Administrative activities
Outreach activities
Other activities

Exhibit A3(4.5) and Table A3(4.5) Which statements most closely describes the research you undertake by grant status – matched sample



	Basic research	User-inspired basic research	Applied research	Total respondents	
All (%)	33.6	33.3	33.1		
All (N)	*1,173*	*1,162*	*1,153*	*3,488*	
Grant status (from research council data)					
Any grant received	34.8	35.6	29.6	*1,778*	**
None	32.4	30.9	36.7	*1,710*	
Arts and humanities					
Any grant received	60.2	24.4	15.4	*221*	
None	59.4	21.7	18.9	*212*	
Biology, Chemistry, Veterinary science					
Any grant received	50.8	34.7	14.4	*360*	**
None	39.6	33.2	27.2	*346*	
Engineering, Materials science					
Any grant received	6.7	36.5	56.7	*178*	
None	5.7	37.4	56.9	*174*	
Health sciences					
Any grant received	12.3	28.4	59.3	*236*	**
None	6.8	23.1	70.1	*221*	
Physics, Mathematics					
Any grant received	44.5	39.6	15.9	*328*	
None	43.9	37.0	19.1	*319*	
Social sciences					
Any grant received	25.5	42.2	32.3	*455*	**
None	28.8	30.6	40.6	*438*	

The table excludes those that ticked 'None of the above apply to my research'.

Question:

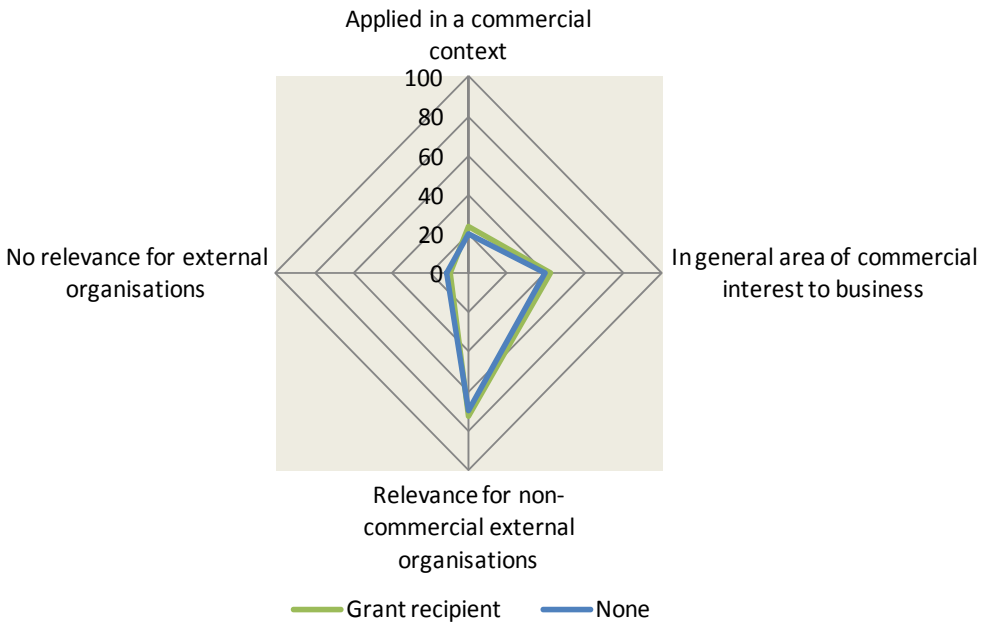
If undertaking research, which of the following statements most closely describes it?

Basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, without any particular application or use in view.

User-inspired basic research: theoretical, empirical or experimental work, undertaken primarily to acquire new knowledge about the underlying foundation of phenomena or observable facts, but also inspired by considerations of use.

Applied research: original investigation undertaken in order to acquire new knowledge directed towards an individual, group or societal need or use.

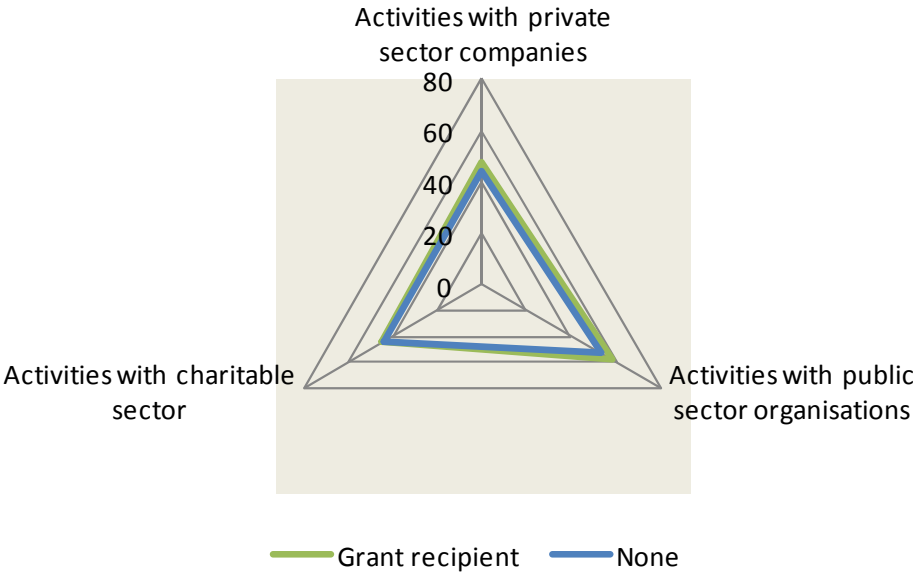
Exhibit A3(5.2) and Table A3(5.2) 'If undertaking research, which of the following statements apply?' by grant status – matched sample



	Applied in a commercial context	In general area of commercial interest to business	Relevance for non-commercial external organisations	No relevance for external organisations	Total respondents
All	22.2	40.8	71.2	10.7	*3,539*
Grant status (from research council data)					
Any grant received	23.9	42.0	72.2	9.6	*1,794*
None	20.5 **	39.5	70.1	11.7 **	*1,745*
Arts and humanities					
Any grant received	9.9	9.5	69.0	25.4	*232*
None	8.5	10.7	65.4	29.1	*234*
Biology, Chemistry, Veterinary science					
Any grant received	24.0	48.9	64.8	11.5	*358*
None	21.8	51.3	68.8	9.7	*349*
Engineering, Materials science					
Any grant received	56.2	82.6	50.0	0.6	*178*
None	49.7	85.1	48.6	0.6	*175*
Health sciences					
Any grant received	25.3	42.2	81.4	2.5	*237*
None	17.4 **	33.5 **	84.4	3.6	*224*
Physics, Mathematics					
Any grant received	23.6	49.4	61.5	16.1	*330*
None	23.5	42.6 *	54.9 *	21.9 *	*319*
Social sciences					
Any grant received	17.9	32.0	91.3	2.8	*459*
None	13.5 *	28.2	85.8 **	5.2 *	*444*

Question:
If undertaking research, which of the following statements apply to it? Please indicate all that apply.
It has been applied in a commercial context
It is in a general area of commercial interest to business and/or industry
It has relevance for non-commercial external organisations (including the public sector)
It has no relevance for external organisations

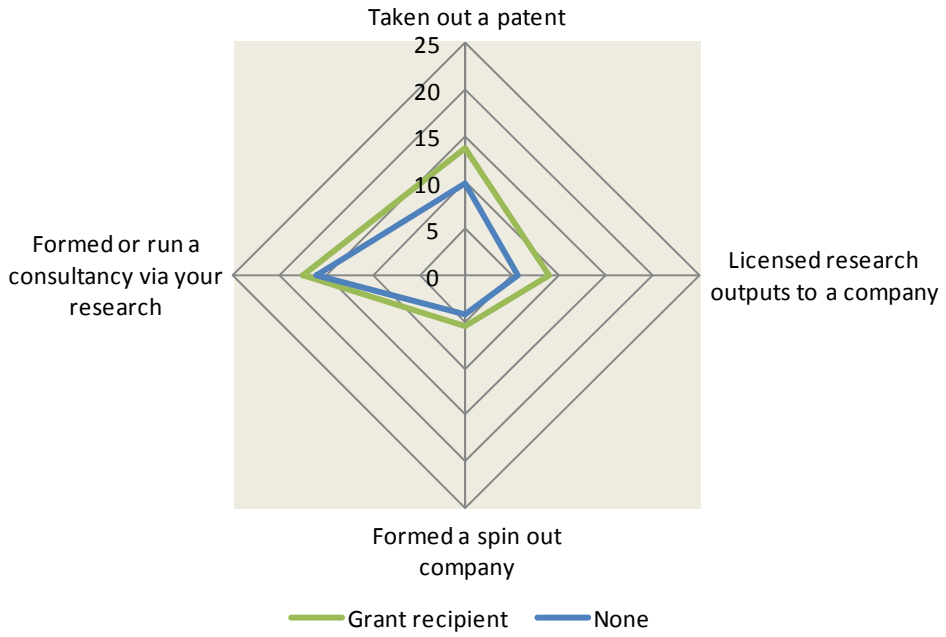
Exhibit A3(5.4) and Table A3(5.4) Private, Public and Third sector activities by grant status – matched sample



	Activities with private sector companies		Activities with public sector organisations		Activities with charitable sector	
	%	N	%	N	%	N
All	46.0	*3,606*	55.9	*3,592*	44.3	*3,567*
Grant status (from research council data)						
Any grant received	47.9	*1,804*	58.5	*1,797*	45.0	*1,785*
None	44.1 **	*1,802*	53.3 **	*1,795*	43.5	*1,782*
Arts and humanities						
Any grant received	19.3	*238*	40.4	*240*	45.8	*238*
None	26.1 *	*238*	36.3	*240*	44.6	*242*
Biology, Chemistry, Veterinary science						
Any grant received	52.8	*360*	49.4	*356*	45.6	*355*
None	47.8	*358*	48.6	*356*	44.2	*355*
Engineering, Materials science						
Any grant received	84.5	*181*	59.4	*180*	23.6	*178*
None	81.7	*180*	55.6	*178*	29.1	*175*
Health sciences						
Any grant received	57.6	*238*	70.9	*237*	69.1	*236*
None	51.5	*239*	65.8	*237*	62.2	*233*
Physics, Mathematics						
Any grant received	52.3	*329*	48.3	*327*	25.5	*325*
None	43.5 **	*331*	44.5	*330*	27.1	*325*
Social sciences						
Any grant received	36.5	*458*	75.5	*457*	53.9	*453*
None	32.5	*456*	65.0 **	*454*	50.2	*452*

Questions:
1. Have you undertaken activities with private sector companies in the last three years?
2. Have you undertaken activities with public sector organisations in the last three years?
3. Have you undertaken activities with any charitable orvoluntary organisationsector organisations in the last three years?

Exhibit A3(6.2) and table A3(6.2) **Commercialisation: Whether participated in patenting licensing spin outs or consultancy in the last three years by grant status – matched sample**



	Taken out a patent	Licensed research outputs to a company	Formed a spin out company	Formed or run a consultancy via your research	Total respondents
All	11.8	7.3	4.8	16.9	*3,238*
Grant status (from research council data)					
Any grant received	13.6	8.9	5.5	17.6	*1,646*
None	9.9 **	5.5 **	4.2 *	16.1	*1,592*
Arts and humanities					
Any grant received	0.9	1.8	1.4	6.0	*217*
None	0	1.5	1.0	5.2	*194*
Biology, Chemistry, Veterinary science					
Any grant received	23.0	10.3	5.0	16.0	*326*
None	18.3	6.7	4.3	14.3	*328*
Engineering, Materials science					
Any grant received	34.6	28.6	19.4	42.9	*162*
None	27.3	15.4 **	13.0	31.1 **	*161*
Health sciences					
Any grant received	25.6	13.7	5.4	15.2	*227*
None	11.7 **	7.5 **	4.3	16.5	*214*
Physics, Mathematics					
Any grant received	8.9	7.7	6.0	17.1	*304*
None	10.0	5.9	4.8	14.9	*291*
Social sciences					
Any grant received	1.5	2.2	2.5	16.4	*410*
None	0 **	1.2	1.5	17.5	*404*

Question:
How frequently, if at all have you participated in any of the following in the past three years?
Taken out a patent
Licensed research outputs to a company
Formed a spin out company
Formed or run a consultancy via your research

People based, problem solving, and community based activities by grant status: All (%)

Exhibit A3(7.2.1) People based activities by grant status - matched sample

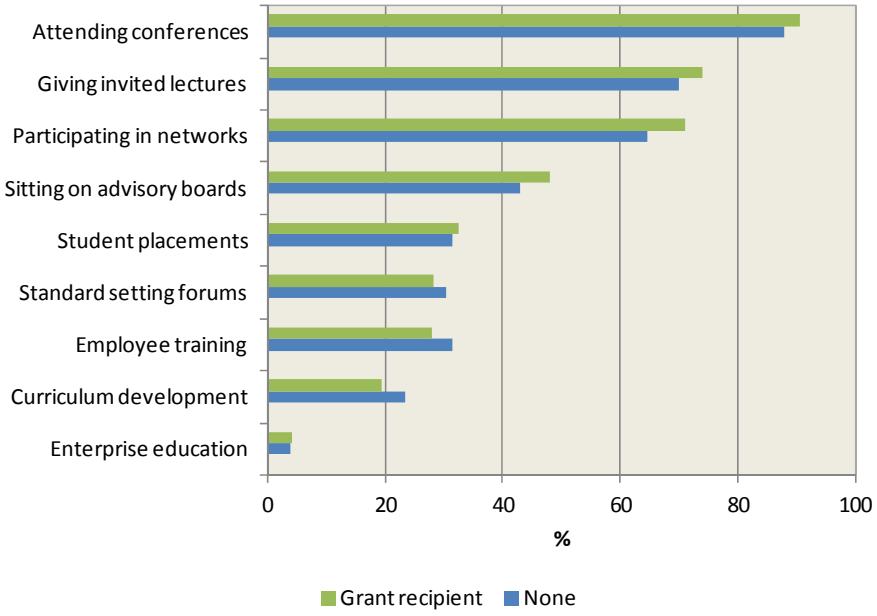


Exhibit A3(7.2.2) Problem solving activities by grant status - matched sample

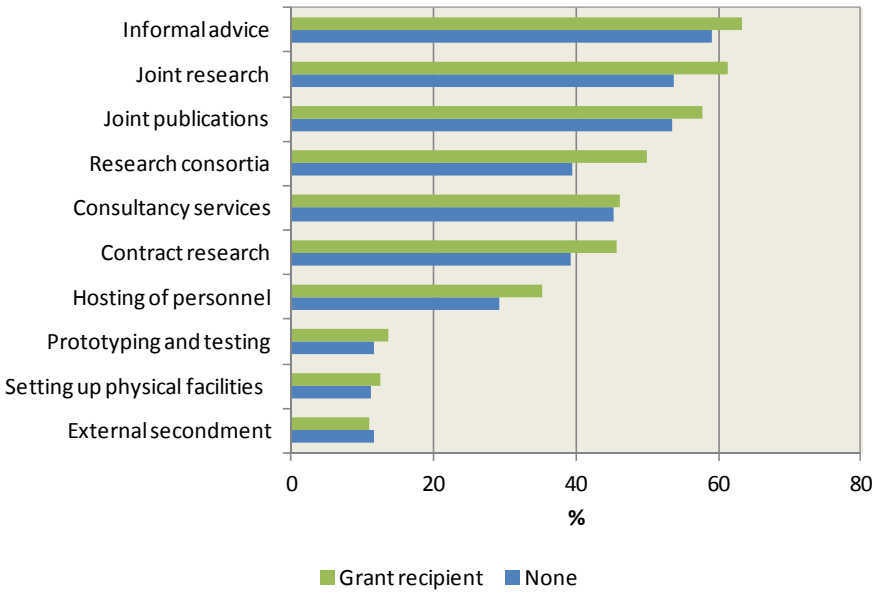


Exhibit A3(7.2.3) Community based activities by grant status - matched sample

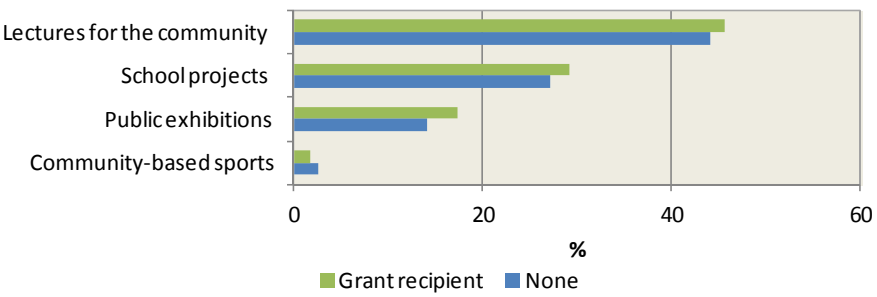


Exhibit A3(7.2.1, 7.2.2, 7.2.3) Underlying data and tests to Exhibits A3(7.2.1)-A3(7.2.3)

		Grant status (from research council data)		
People based activities	All	Any grant received	None	
Employee training	29.7	27.9	31.4	**
Student placements	32.0	32.6	31.4	
Curriculum development	21.4	19.3	23.5	**
Attending conferences	89.3	90.6	87.9	**
Standard setting forums	29.3	28.1	30.5	
Participating in networks	67.9	71.2	64.6	**
Sitting on advisory boards	45.5	48.1	42.8	**
Giving invited lectures	71.9	73.9	69.9	**
Enterprise education	4.1	4.2	4.0	
N	*3,401*	*1,709*	*1,692*	
Problem solving activities				
Hosting of personnel	32.3	35.3	29.2	**
External secondment	11.3	10.9	11.7	
Joint research	57.5	61.3	53.7	**
Contract research	42.5	45.8	39.2	**
Consultancy services	45.8	46.3	45.4	
Research consortia	44.8	50.0	39.6	**
Informal advice	61.2	63.3	59.1	**
Prototyping and testing	12.7	13.7	11.7	*
Setting up physical facilities	11.9	12.6	11.1	
Joint publications	55.7	57.8	53.6	**
N	*3,440*	*1,727*	*1,713*	
Community based activities				
Lectures for the community	44.9	45.7	44.1	
Community-based sports	2.1	1.8	2.5	
Public exhibitions	15.7	17.3	14.0	**
School projects	28.2	29.3	27.2	
N	*3,397*	*1,714*	*1,683*	

Question:
1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Exhibit A3(7.2.1, 7.2.2, 7.2.3) **People based, problem solving and community based activities by grant status within Arts and humanities and Biology, Chemistry, Veterinary science - matched sample (Contd)**

		Arts and humanities			Biology, Chemistry, Veterinary science		
People based activities	All	Any grant received	None		Any grant received	None	
Employee training	29.7	9.9	13.9		21.7	26.0	
Student placements	32.0	21.8	23.8		27.9	31.4	
Curriculum development	21.4	17.3	18.1		10.6	20.1	**
Attending conferences	89.3	77.4	78.4		92.5	89.5	
Standard setting forums	29.3	23.0	26.0		21.1	29.0	**
Participating in networks	67.9	58.3	56.6		61.6	61.2	
Sitting on advisory boards	45.5	48.4	49.1		41.4	37.9	
Giving invited lectures	71.9	60.9	65.5		69.9	70.7	
Enterprise education	4.1	1.4	2.4		2.9	3.4	
N	*3,401*	*223*	*216*		*346*	*334*	
Problem solving activities							
Hosting of personnel	32.3	20.3	20.4		37.6	31.2	*
External secondment	11.3	3.6	7.2	*	7.9	5.7	
Joint research	57.5	32.8	30.2		62.3	62.1	
Contract research	42.5	18.3	12.0	*	40.1	37.9	
Consultancy services	45.8	36.2	40.6		37.3	39.5	
Research consortia	44.8	27.9	18.9	**	45.6	40.9	
Informal advice	61.2	58.0	57.9		58.9	55.9	
Prototyping and testing	12.7	7.2	3.4	*	14.7	14.6	
Setting up physical facilities	11.9	2.7	3.2		17.6	16.7	
Joint publications	55.7	31.3	33.8		64.8	61.4	
N	*3,440*	*227*	*225*		*348*	*340*	
Community based activities							
Lectures for the community	44.9	64.7	62.9		39.9	43.8	
Community-based sports	2.1	0.5	0.9		1.8	4.2	*
Public exhibitions	15.7	23.8	17.9		20.9	16.4	
School projects	28.2	30.6	34.4		34.8	34.2	
N	*3,397*	*235*	*229*		*348*	*345*	

Question:
1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

Exhibit A3(7.2.1, 7.2.2, 7.2.3) **People based, problem solving and community based activities by grant status within Engineering, Materials science and Health sciences - matched sample (Contd)**

		Engineering, Materials science			Health sciences		
People based activities	All	Any grant received	None		Any grant received	None	
Employee training	29.7	52.1	47.3		36.1	44.3	*
Student placements	32.0	62.8	54.8		26.5	30.8	
Curriculum development	21.4	29.1	28.5		23.1	32.3	**
Attending conferences	89.3	96.1	96.6		93.3	90.6	
Standard setting forums	29.3	34.1	39.1		44.4	43.0	
Participating in networks	67.9	83.9	71.5	**	74.9	72.0	
Sitting on advisory boards	45.5	43.8	42.7		61.8	57.0	
Giving invited lectures	71.9	83.1	75.4	*	86.0	79.1	**
Enterprise education	4.1	7.2	6.7		1.8	2.2	
N	*3,401*	*169*	*169*		*227*	*230*	
Problem solving activities							
Hosting of personnel	32.3	48.6	37.7	**	40.9	33.9	
External secondment	11.3	22.1	16.6		11.9	15.7	
Joint research	57.5	82.7	77.1		76.1	64.1	**
Contract research	42.5	73.1	66.7		53.6	44.0	**
Consultancy services	45.8	70.9	59.5	**	54.5	52.4	
Research consortia	44.8	77.4	62.2	**	52.6	46.1	
Informal advice	61.2	76.4	71.6		71.5	63.1	**
Prototyping and testing	12.7	36.7	31.3		17.5	13.2	
Setting up physical facilities	11.9	22.4	23.8		21.2	14.4	*
Joint publications	55.7	82.1	72.2	**	67.1	61.8	
N	*3,440*	*175*	*167*		*232*	*230*	
Community based activities							
Lectures for the community	44.9	36.3	32.5		46.8	44.0	
Community-based sports	2.1	1.8	3.0		1.3	3.5	
Public exhibitions	15.7	20.0	13.9		13.1	11.8	
School projects	28.2	32.1	23.5	*	24.5	21.7	
N	*3,397*	*171*	*169*		*237*	*232*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

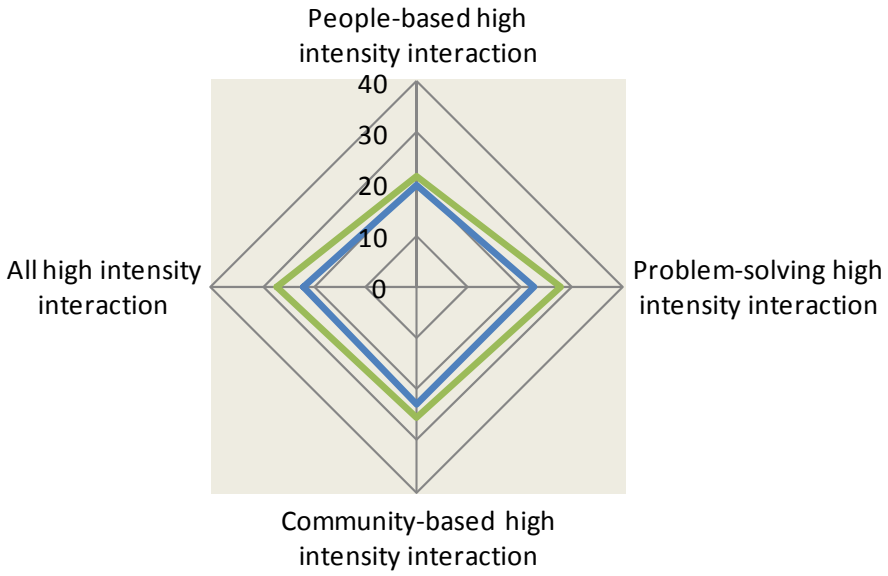
Exhibit A3(7.2.1, 7.2.2, 7.2.3) **People based, problem solving and community based activities by grant status within Physics, Mathematics and Social sciences - matched sample (Contd)**

		Physics, Mathematics			Social sciences		
People based activities	All	Any grant received	None		Any grant received	None	
Employee training	29.7	22.4	25.0		32.6	36.0	
Student placements	32.0	32.1	28.2		33.5	28.9	
Curriculum development	21.4	13.9	17.4		25.6	26.7	
Attending conferences	89.3	88.5	82.1	**	93.9	91.0	
Standard setting forums	29.3	21.7	22.0		30.0	30.0	
Participating in networks	67.9	63.9	54.7	**	83.7	71.8	**
Sitting on advisory boards	45.5	41.1	33.5	**	52.8	42.8	**
Giving invited lectures	71.9	66.1	57.5	**	79.3	73.7	**
Enterprise education	4.1	4.9	4.3		6.3	4.8	
N	*3,401*	*317*	*312*		*427*	*431*	
Problem solving activities							
Hosting of personnel	32.3	38.1	30.5	**	30.7	25.7	
External secondment	11.3	12.5	14.6		11.0	12.5	
Joint research	57.5	65.2	54.7	**	55.7	43.4	**
Contract research	42.5	36.2	35.6		56.4	43.1	**
Consultancy services	45.8	35.4	34.7		52.3	50.8	
Research consortia	44.8	55.5	41.1	**	48.4	34.9	**
Informal advice	61.2	53.6	50.2		67.2	61.5	*
Prototyping and testing	12.7	12.1	13.1		5.9	3.7	
Setting up physical facilities	11.9	12.4	12.5		5.2	2.8	*
Joint publications	55.7	62.5	57.1		47.6	42.7	
N	*3,440*	*315*	*315*		*430*	*436*	
Community based activities							
Lectures for the community	44.9	41.4	41.2		46.3	41.3	
Community-based sports	2.1	1.9	2.0		2.6	1.5	
Public exhibitions	15.7	16.8	18.4		12.7	8.2	**
School projects	28.2	30.7	28.1		24.4	21.6	
N	*3,397*	*321*	*318*		*438*	*438*	

Question:

1. Have you engaged in the following **people-based** activities with external organisations within the past three years?
2. Have you engaged in the following **problem-solving** activities with external organisations within the past three years?
3. Have you engaged in the following **community-based** activities with external organisations within the past three years?

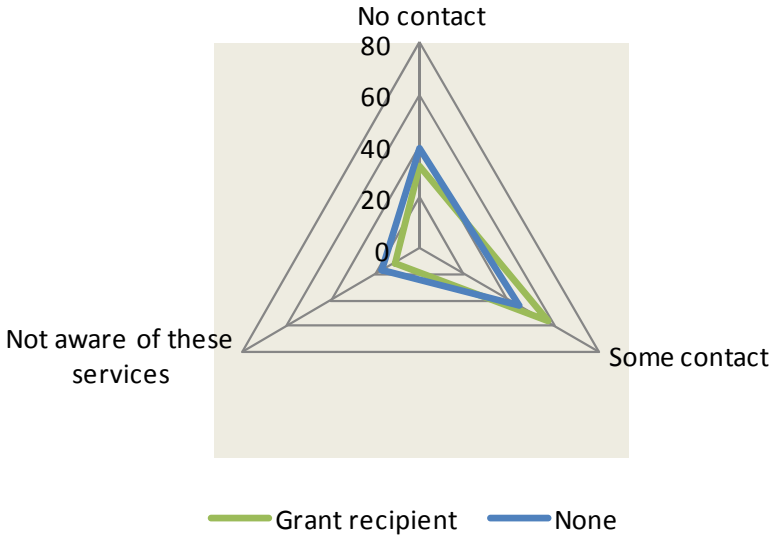
Exhibit A3(7.4) and Table A3(7.4) Highly connected academics by grant status – matched sample



	People-based high intensity interaction		Problem-solving high intensity interaction		Community-based high intensity interaction		All high intensity interaction	
	%	N	%	N	%	N	%	N
All	20.7	*3,617*	25.2	*3,595*	24.3	*3,515*	24.6	*3,623*
Grant status (from research council data)								
Any grant received	21.4	*1,811*	27.8	*1,804*	25.4	*1,768*	27.3	*1,812*
None	19.9	*1,806*	22.6 **	*1,791*	23.1	*1,747*	22.0 **	*1,811*
Arts and humanities								
Any grant received	13.3	*241*	11.4	*237*	36.1	*238*	13.3	*241*
None	15.6	*237*	7.7	*235*	33.2	*232*	13.3	*241*
Biology, Chemistry, Veterinary science								
Any grant received	14.4	*360*	24.2	*359*	26.9	*353*	22.8	*360*
None	16.7	*359*	23.4	*355*	29.7	*347*	21.7	*359*
Engineering, Materials science								
Any grant received	36.7	*180*	56.9	*181*	26.2	*172*	47.5	*181*
None	29.4 *	*180*	41.9 **	*179*	17.1	*170*	36.5	*181*
Health sciences								
Any grant received	30.1	*239*	37.7	*239*	19.7	*238*	39.3	*239*
None	28.5	*239*	31.1	*238*	19.7	*234*	31.0 *	*239*
Physics, Mathematics								
Any grant received	16.0	*331*	28.0	*329*	25.3	*324*	25.7	*331*
None	14.2	*332*	23.2 **	*328*	25.4	*319*	20.5 **	*332*
Social sciences								
Any grant received	24.6	*460*	22.4	*459*	21.2	*443*	25.2	*460*
None	20.5	*459*	17.3 **	*456*	15.3 *	*445*	17.4 **	*459*

Definition of 'high interaction':
People based: A score of 6 or more out of a possible 9.
Problem solving: A score of 6 or more out of a possible 10.
Community based: A score of 2 or more out of a possible 4.
All interactions: A score of 12 or more out of a possible 23.

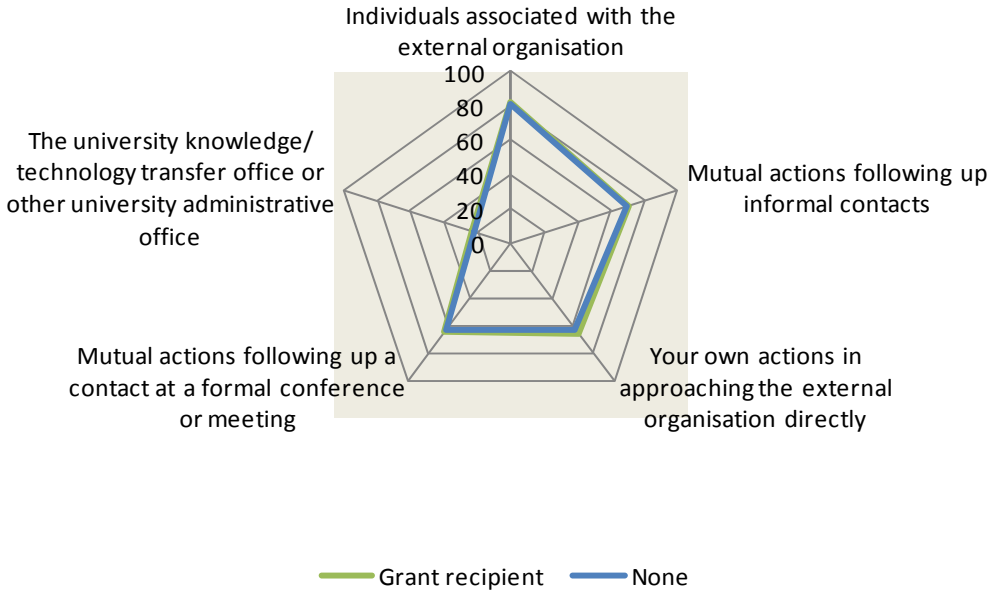
Exhibit A3(8.2) and Table A3(8.2) **Contact with Knowledge, Technology Transfer Office or consultancy services office within the past three years by grant status – matched sample**



	No contact	Some contact	Not aware of these services	Total respondents	
All	35.3	50.5	14.2	*3,610*	
Grant status (from research council data)					
Any grant received	31.9	57.0	11.1	*1,806*	**
None	38.7	44.1	17.2	*1,804*	
Arts and humanities					
Any grant received	39.7	41.4	18.8	*239*	**
None	43.1	27.6	29.3	*239*	
Biology, Chemistry, Veterinary science					
Any grant received	27.6	65.7	6.7	*359*	**
None	34.8	51.7	13.5	*356*	
Engineering, Materials science					
Any grant received	17.7	77.9	4.4	*181*	
None	25.6	70.0	4.4	*180*	
Health sciences					
Any grant received	25.1	64.0	10.9	*239*	**
None	39.3	44.8	15.9	*239*	
Physics, Mathematics					
Any grant received	36.7	54.5	8.8	*330*	**
None	41.4	41.7	16.9	*331*	
Social sciences					
Any grant received	37.1	48.0	14.8	*458*	**
None	42.3	37.9	19.8	*459*	

How often have you been in contact with your institution's Knowledge or Technology Transfer Office (TTO) or consultancy services office within the past three years?
(Frequently (7+ times)
Occasionally (3-6 times)
Rarely (1-2 times)
No contact
Not aware of these services

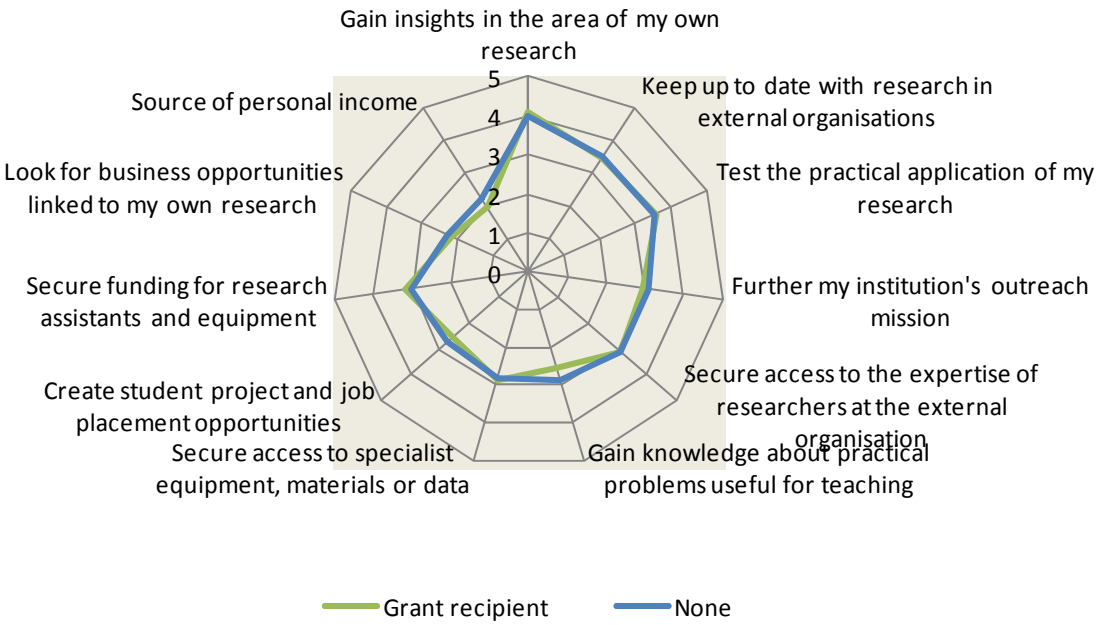
Exhibit A3(8.4) and Table A3(8.4) Way in which activities with external organisations were initiated by grant status – matched sample



	Individuals associated with the external organisation	Mutual actions following up informal contacts	Your own actions in approaching the external organisation directly	Mutual actions following up a contact at a formal conference or meeting	The university knowledge/ technology transfer office or other university administrative office	Total respondents
All	81.3	69.5	64.1	63.4	22.3	*2,646*
Grant status (from research council data)						
Any grant received	81.8	70.1	65.7	63.9	22.8	*1,366*
None	80.8	68.8	62.4 *	62.8	21.7	*1,280*
Arts and humanities						
Any grant received	76.5	60.8	60.5	52.1	17.8	*146*
None	76.1	69.1	52.9	61.3	14.7	*136*
Biology, Chemistry, Veterinary science						
Any grant received	80.0	65.6	57.9	58.8	20.3	*266*
None	78.2	69.4	64.1	55.7	23.5	*255*
Engineering, Materials science						
Any grant received	87.7	73.3	79.3	76.1	34.2	*158*
None	87.6	71.4	71.3	71.2	40.7	*150*
Health sciences						
Any grant received	84.1	70.2	65.4	63.6	26.6	*207*
None	76.1 **	68.0	61.9	69.7	16.8 **	*196*
Physics, Mathematics						
Any grant received	78.3	69.8	61.0	63.6	23.1	*221*
None	77.9	68.6	58.9	60.3	22.0	*205*
Social sciences						
Any grant received	83.5	75.7	70.3	67.4	19.3	*368*
None	85.9	67.7 **	63.5 **	62.5	17.5	*338*

If you have participated in activities with external organisations over the past three years, have these been initiated by the following?
The university knowledge/ technology transfer office or other university administrative office
Individuals associated with the external organisation
Your own actions in approaching the external organisation directly
Mutual actions following up a contact at a formal conference or meeting
Mutual actions following up informal contacts

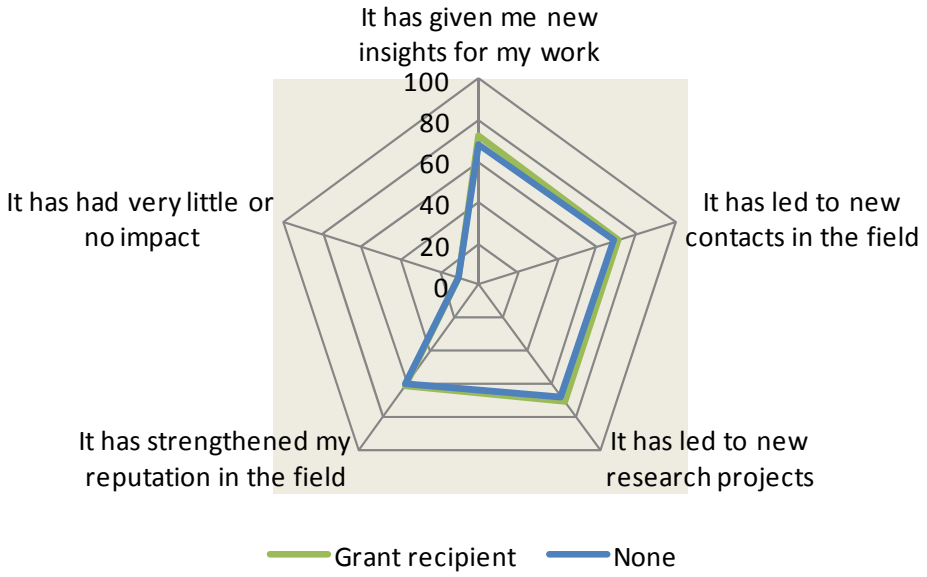
Exhibit A3(9.2) and Table A3(9.2) **Motivations and objectives for participating in activities with external organisations for interactions by grant status (score is 1-5 where 5 is very important) (mean score) – matched sample**



	Gain insights in the area of my own research	Keep up to date with research in external organisations	Test the practical application of my research	Further my institution's outreach mission	Secure access to the expertise of researchers at the external organisation	Gain knowledge about practical problems useful for teaching	Secure access to specialist equipment, materials or data	Create student project and job placement opportunities	Secure funding for research assistants and equipment	Look for business opportunities linked to my own research	Source of personal income	Total respondents
All	4.0	3.5	3.5	3.0	3.1	2.7	2.9	2.7	3.1	2.2	2.1	*2,697*
Grant status (from research council data)												
Any grant received	4.1	3.5	3.6	3.0	3.1	2.5	2.9	2.6	3.2	2.2	2.0	*1,390*
None	4.0	3.5	3.5	3.1 **	3.1	2.9 **	2.8	2.7 **	3.0 **	2.3 **	2.2 **	*1,307*
Arts and humanities												
Any grant received	3.8	3.0	2.8	3.3	2.9	2.5	2.4	2.4	2.4	1.6	1.7	*151*
None	3.8	3.2	2.9	3.5 *	2.9	2.8 **	2.3	2.6	2.3	1.9 **	2.2 **	*140*
Biology, Chemistry, Veterinary science												
Any grant received	4.0	3.5	3.5	2.8	3.4	2.3	3.1	2.8	3.6	2.4	1.8	*266*
None	3.9	3.3	3.5	3.0	3.3	2.4	3.1	2.8	3.4	2.4 **	1.9	*262*
Engineering, Materials science												
Any grant received	4.2	3.8	4.1	3.0	3.3	2.9	3.2	3.0	4.0	3.0	2.3	*162*
None	4.3	3.9	4.1	3.1	3.3	3.4 **	3.2	3.5 **	3.8 *	3.2	2.5	*154*
Health sciences												
Any grant received	3.9	3.4	3.6	2.9	3.2	2.4	3.0	2.4	3.5	2.2	1.9	*206*
None	3.9	3.7 **	3.7	3.0	3.4	2.8 **	3.1	2.6	3.2 *	2.3	2.1 *	*191*
Physics, Mathematics												
Any grant received	3.9	3.5	3.5	2.9	3.2	2.5	2.9	2.8	3.4	2.4	2.0	*227*
None	3.9	3.4	3.4	2.9	3.1	2.7 *	2.8	2.9	3.3	2.4	2.3 **	*208*
Social sciences												
Any grant received	4.3	3.5	3.6	2.9	2.9	2.7	2.7	2.2	2.7	1.8	2.0	*380*
None	4.2	3.5	3.5	3.1 **	2.8	3.2 **	2.6	2.4	2.5 *	1.9	2.4 **	*354*

If you have participated in activities with external organisations, which of the following were your motivations and objectives (please indicate the importance of each statement)?
Test the practical application of my research
Gain insights in the area of my own research
Keep up to date with research in external organisations
Secure access to specialist equipment, materials or data
Secure access to the expertise of researchers at the external organisation
Gain knowledge about practical problems useful for teaching
Create student project and job placement opportunities
Source of personal income
Secure funding for research assistants and equipment
Look for business opportunities linked to my own research
Further my institution's outreach mission

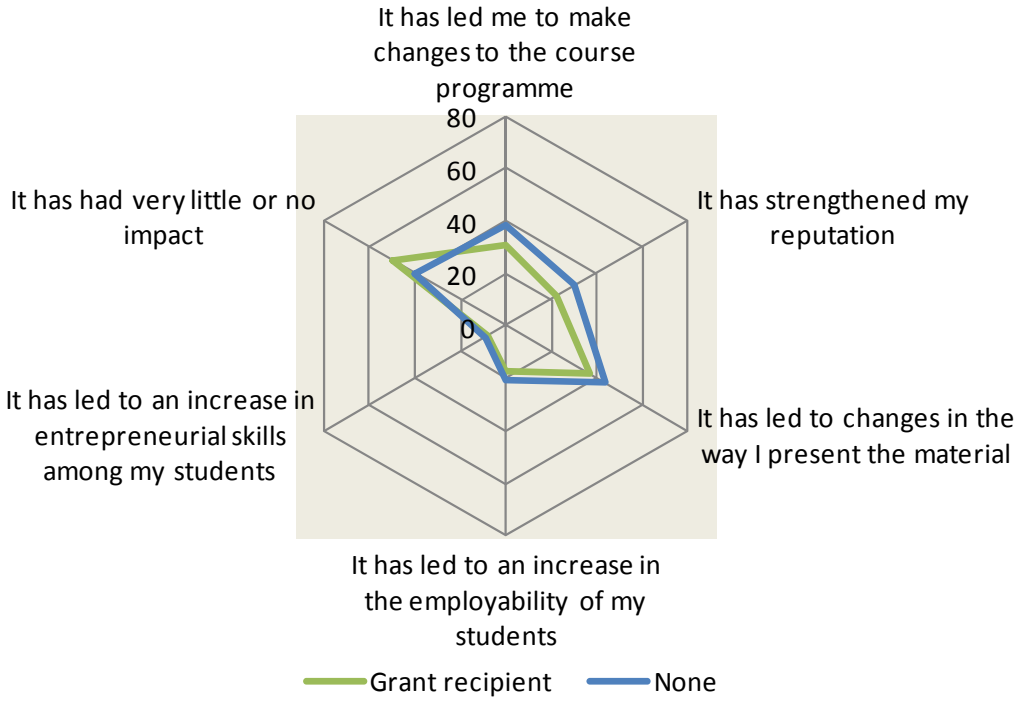
Exhibit A3(10.2) and Table A3(10.2) Impact that involvement with external organisations has had on amount and kind of research done by grant status – matched sample



	It has given me new insights for my work	It has led to new contacts in the field	It has led to new research projects	It has strengthened my reputation in the field	It has had very little or no impact	Total respondents
All	70.4	70.2	68.6	60.5	10.5	*2,660*
Grant status (from research council data)						
Any grant received	72.0	71.1	70.2	60.8	10.3	*1,394*
None	68.6 *	69.1	66.9 *	60.0	10.7	*1,266*
Arts and humanities						
Any grant received	61.4	69.0	52.4	57.9	19.3	*145*
None	65.1	69.8	46.5	55.0	17.8	*129*
Biology, Chemistry, Veterinary science						
Any grant received	63.3	69.7	67.4	51.7	12.4	*267*
None	61.5	64.6	64.6	54.1	13.2	*257*
Engineering, Materials science						
Any grant received	80.5	79.3	84.8	72.0	1.8	*164*
None	78.7	75.3	85.3	70.7	3.3	*150*
Health sciences						
Any grant received	67.0	68.5	71.9	61.6	12.8	*203*
None	65.0	71.0	73.2	65.6	8.2	*183*
Physics, Mathematics						
Any grant received	71.2	65.9	73.0	60.2	8.8	*226*
None	58.2 **	64.4	69.6	51.0 *	13.4	*194*
Social sciences						
Any grant received	81.5	73.8	70.2	63.5	8.7	*389*
None	78.5	71.1	63.5 **	63.7	9.3	*353*

In the last three years, what impact has your involvement in activities with external organisations had on the amount and kind of **research** that you do? Please indicate all that apply.
- It has led to new research projects
- It has strengthened my reputation in the field
- It has given me new insights for my work
- It has led to new contacts in the field
- It has had very little or no impact

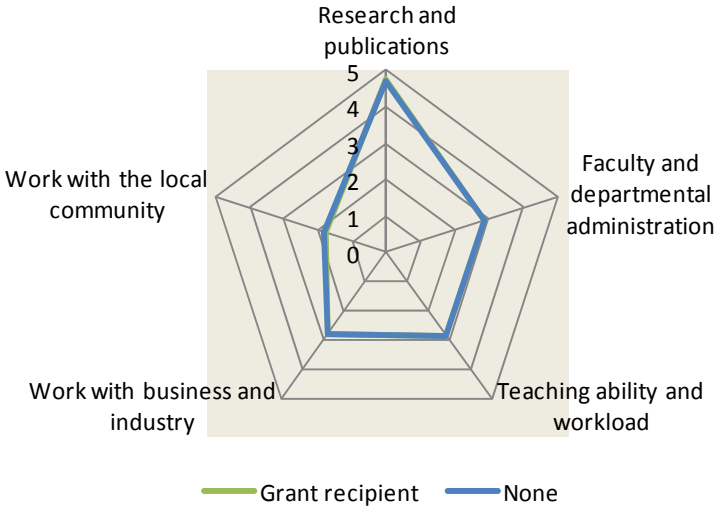
Exhibit A3(10.4) and Table A3(10.4) Impact that involvement with external organisations has had on amount and kind of teaching done by grants status – matched sample



	It has led me to make changes to the course programme	It has strengthened my reputation	It has led to changes in the way I present the material	It has led to an increase in the employability of my students	It has led to an increase in entrepreneurial skills among my students	It has had very little or no impact	Total respondents
All	34.1	26.3	40.3	19.1	8.5	45.1	*2,294*
Grant status (from research council data)							
Any grant received	30.3	22.4	37.1	17.4	7.9	50.1	*1,197*
None	38.3	30.5	43.8	21.1	9.1	39.6	*1,097*
	**	**	**	**		**	
Arts and humanities							
Any grant received	27.0	22.6	35.8	12.4	7.3	51.8	*137*
None	39.5	31.1	52.1	20.2	16.0	32.8	*119*
	**		**	*	**	**	
Biology, Chemistry, Veterinary science							
Any grant received	18.4	13.6	26.3	14.5	7.0	62.7	*228*
None	26.0	16.3	27.0	14.4	4.7	58.1	*215*
	**						
Engineering, Materials science							
Any grant received	40.9	26.3	48.9	31.4	12.4	35.8	*137*
None	44.2	31.0	55.0	33.3	16.3	29.5	*129*
Health sciences							
Any grant received	20.7	27.8	28.4	12.4	3.0	56.8	*169*
None	34.8	35.4	46.6	14.9	4.3	38.5	*161*
	**		**			**	
Physics, Mathematics							
Any grant received	28.6	20.6	37.2	24.1	12.6	53.8	*199*
None	34.9	22.3	37.1	24.6	12.0	44.0	*175*
						*	
Social sciences							
Any grant received	41.6	25.1	44.6	14.1	6.4	41.0	*327*
None	48.0	42.6	50.3	22.1	7.4	31.2	*298*
		**		**		**	

In the last three years, what impact has your involvement in activities with external organisations had on the amount and kind of teaching that you do?
It has led me to make changes to the course programme
It has strengthened my reputation
It has led to changes in the way I present the material
It has led to an increase in the employability of my students
It has led to an increase in entrepreneurial skills among my students
It has had very little or no impact

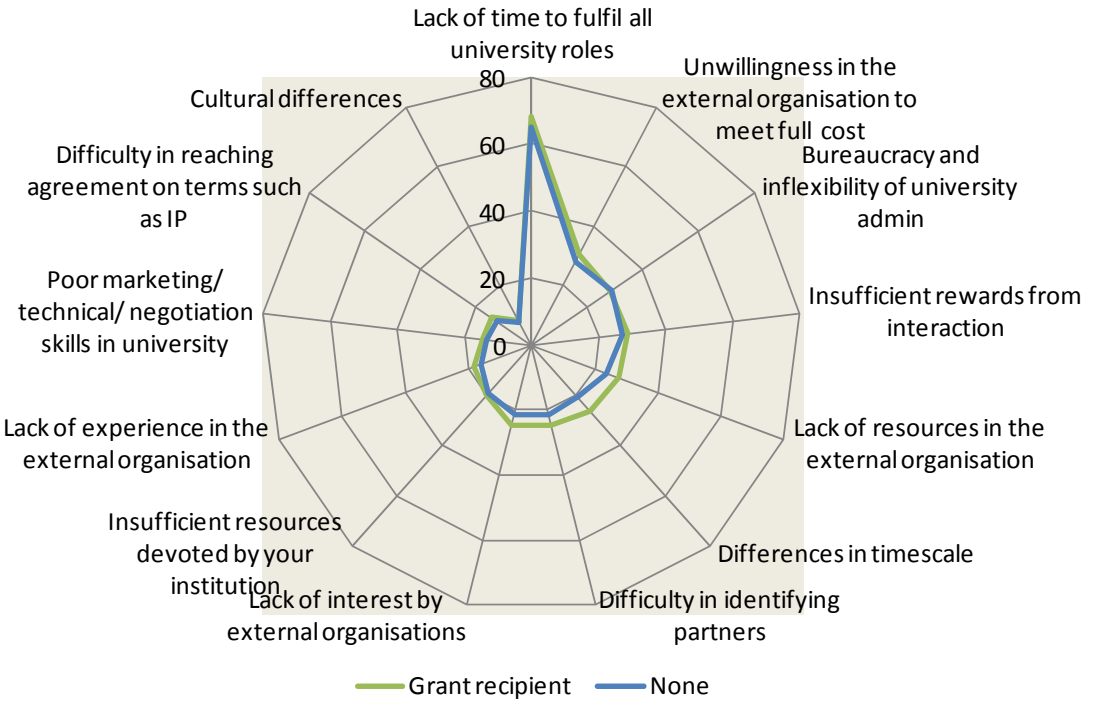
Exhibit A3(10.6) and table A3(10.6) How much weight institution gives to the following criteria with regards to career advancement and promotion by grant status (score is 1-5 where 5 is the highest) (mean score) – matched sample



	Research and publications	Faculty and departmental administration	Teaching ability and workload	Work with business and industry	Work with the local community	Total respondents
All	4.7	2.9	2.8	2.8	1.8	*3,584*
Grant status (from research council data)						
Any grant received	4.7	2.9	2.8	2.7	1.8	*1,794*
None	4.7	2.9	2.8	2.8	1.9 *	*1,790*
Arts and humanities						
Any grant received	4.7	3.3	3.0	2.5	1.9	*237*
None	4.6	3.2	3.0	2.6	1.9	*237*
Biology, Chemistry, Veterinary science						
Any grant received	4.8	2.8	2.8	2.7	1.7	*355*
None	4.8	2.7	2.7	2.8	1.7	*356*
Engineering, Materials science						
Any grant received	4.7	2.5	2.6	3.3	1.7	*178*
None	4.7	2.7	2.8	3.1	1.9 *	*180*
Health sciences						
Any grant received	4.8	2.8	2.6	2.9	1.9	*239*
None	4.7	2.9	2.8 *	3.0	2.1 **	*236*
Physics, Mathematics						
Any grant received	4.7	2.7	2.9	2.7	1.7	*330*
None	4.7	2.8	2.9	2.8	1.7	*329*
Social sciences						
Any grant received	4.7	3.0	3.0	2.6	1.9	*455*
None	4.8	2.9 *	2.9 *	2.7	1.9	*452*

With regards to career advancement and promotion, how much weight do you believe your institution gives to the following criteria (on a score of 5-1, where 5 is the highest)?
Teaching ability and workload
Faculty and departmental administration
Research and publications
Work with business and industry
Work with the local community

Exhibit A3(11.2) and Table A3(11.2) Which factors have constrained or prevented your interactions with external organisations by grant status – matched sample



	All	Grant status (from research council data)			Arts and humanities			Biology, Chemistry, Veterinary science			Engineering, Materials science		
		Any grant received	None		Any grant received	None		Any grant received	None		Any grant received	None	
Total respondents	*2,828*	*1,449*	*1,379*		*160*	*149*		*280*	*279*		*167*	*157*	
Lack of time to fulfil all university roles	66.7	68.0	65.2		72.5	73.2		64.6	62.0		69.5	66.2	
Unwillingness in the external organisation to meet the full cost of the interaction	29.1	30.2	27.8		16.3	18.8		35.0	31.9		44.9	43.9	
Bureaucracy and inflexibility of administrators in your institution	28.5	28.4	28.6		18.1	22.1		27.5	26.2		38.9	36.3	
Insufficient rewards from interaction	27.9	28.4	27.3		26.9	32.2		25.7	26.2		34.7	30.6	
Lack of resources in the external organisation to manage the interaction	25.7	27.7	23.6	**	26.3	17.4	*	22.9	21.9		42.5	37.6	
Differences in timescale	23.4	26.2	20.4	**	15.6	10.7		18.6	13.3	*	36.5	29.3	
Difficulty in identifying partners	23.0	24.7	21.2	**	25.0	15.4	**	31.1	21.5	**	24.6	22.9	
Lack of interest by external organisations	23.0	24.6	21.3	**	15.6	17.4		30.4	20.8	**	33.5	29.3	
Insufficient resources devoted by your institution to activities with external organisations	19.7	20.3	19.1		25.0	18.1		15.4	17.9		24.0	16.6	*
Lack of experience in the external organisation for interacting with academics	17.4	18.5	16.2		20.0	16.1		11.4	10.8		29.3	22.3	
Poor marketing, technical or negotiation skills of administrators in your institution	14.1	14.7	13.4		6.9	10.7		14.6	14.7		21.6	15.3	
Difficulty in reaching agreement with external organisation on terms of the interaction such as IP	13.6	14.6	12.6		3.8	4.0		14.6	13.6		24.6	26.1	
Cultural differences	8.1	8.3	7.8		8.1	5.4		5.4	4.3		7.2	10.2	
Other	1.3	1.4	1.1		3.1	0.0	*	1.4	1.1		0.0	0.0	

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate all that apply.

Table A3(11.2) **Which factors have constrained or prevented your interactions with external organisations by grant status – matched sample (Contd)**

	All	Health sciences			Physics, Mathematics			Social sciences		
		Any grant received	None		Any grant received	None		Any grant received	None	
Total respondents	*2,828*	*212*	*206*		*238*	*218*		*392*	*370*	
Lack of time to fulfil all university roles	66.7	62.3	59.7		70.2	61.5	**	69.9	69.2	
Unwillingness in the external organisation to meet the full cost of the interaction	29.1	33.5	23.8	**	30.7	28.9		24.2	23.2	
Bureaucracy and inflexibility of administrators in your institution	28.5	33.5	31.1		21.0	25.7		30.4	30.0	
Insufficient rewards from interaction	27.9	25.9	21.4		29.0	26.6		29.3	28.4	
Lack of resources in the external organisation to manage the interaction	25.7	23.1	24.8		30.7	22.5	**	26.0	21.4	
Differences in timescale	23.4	18.9	20.9		30.3	22.5	*	33.2	24.6	**
Difficulty in identifying partners	23.0	25.0	21.4		25.2	25.2		19.6	20.3	
Lack of interest by external organisations	23.0	18.4	17.0		29.8	27.5		20.4	18.6	
Insufficient resources devoted by your institution to activities with external organisations	19.7	24.5	22.8		14.3	17.4		21.7	20.3	
Lack of experience in the external organisation for interacting with academics	17.4	14.6	18.0		19.7	13.8	*	19.6	18.4	
Poor marketing, technical or negotiation skills of administrators in your institution	14.1	17.0	13.6		14.7	12.8		13.8	13.0	
Difficulty in reaching agreement with external organisation on terms of the interaction such as IP	13.6	20.8	18.4		18.5	11.9	**	8.9	6.8	
Cultural differences	8.1	7.1	9.7		8.8	9.6		11.2	8.4	
Other	1.3	0.9	1.0		1.7	2.8		1.5	1.1	

Have the following factors constrained or prevented your interactions with external organisations over the past three years? Please indicate all that apply.

UK-INNOVATION RESEARCH CENTRE

UK~IRC Cambridge
University of Cambridge
Top Floor
Judge Business School
Building
Trumpington Street
Cambridge CB2 1AG

UK~IRC London
Imperial College Business School
Tanaka Building
South Kensington Campus
London
SW7 2AZ

Email: enquiries@ukirc.ac.uk
www.ukirc.ac.uk