

Remarks on the Future of Academic Statistics in the UK

A report for the Royal Statistical Society

Kevin McConway

Revised version, February 2013

Contents

Executive summary	3
1. Introduction	6
1.1. Background	6
1.2. Scope and outline	6
2. Funding	7
2.1. Introduction	7
2.2. Research Councils	10
2.3. NIHR	22
2.4. Conclusions	23
3. Departments and staff	25
4. Student numbers (HESA).....	30
4.1. Introduction	30
4.2. Overall trends over time	34
4.3. Study mode (full-time or part-time)	37
4.4. Domicile	40
4.5. Age and gender	42
4.6. Institution.....	45
4.7. Conclusions	50
5. Survey of taught masters courses in statistics.....	51
5.1. Introduction: the central role of the MSc.....	51
5.2. Data collection method.....	52
5.3. Results.....	54
5.4. Conclusions	62
6. Information from recruiters.....	63
7. Overall discussion and recommendations	67
7.1. Discussion.....	67
7.2. Recommendations	69
Appendix A. List of ‘mainstream’ masters courses in statistics	70
Appendix B. List of “marginal” masters courses related to statistics	71
Appendix C. List of “mainstream” masters courses in statistics that became available between 2011 and 2013	72
Appendix D. Questionnaire sent to enquire about MSc courses.....	73
Appendix E. Email sent to recruiters of statisticians.....	76

Executive summary

1. This report was requested by the Royal Statistical Society (RSS) in 2011, partly as a follow-up to the views expressed in the International Review of Mathematical Sciences 2010 (IRMS 2010) that academic statistics is under particular threat, for a series of mostly structural reasons.
2. This investigation was carried out with limited resource and does not cover all areas relevant to the future of academic statistics in the UK. The current version has been revised and, in a limited fashion, updated.
3. Evidence to IRMS 2010 indicates that the position of statistics in obtaining research funding from EPSRC is not good.
4. Evidence from returns to RAE 2008 (now dated, and self-selected to some extent) is that, compared to the other disciplines in the mathematical sciences, statistics drew research funding from a wider range of sources outside the research councils.
5. EPSRC funding for research in statistics methodology is considerable. However, amounts awarded vary hugely from year to year. Considerable EPSRC support for statistical research goes to investigators outside “traditional” statistics groups in mathematical science departments, and indeed to people who would not describe themselves as statisticians. Success rates for grant applications in statistics and applied probability have been lower than success rates across EPSRC as a whole, though no evidence was obtained on why this should be.
6. Data obtained on funding for statistics from other research councils were variable in quality and in how the discipline is defined. However, it is clear that the funding levels from ESRC, MRC and BBSRC were of the same order of magnitude as EPSRC funding, though lower than that from EPSRC. There is also appreciable funding for statistics from NERC. Overall, though no firm data could be obtained, it is possible that total funding from the other research councils to support research in statistical methodology may exceed that from EPSRC. ESRC and MRC have active research programmes in methodology across their areas of interest, that include funding for statistical methodology.
7. NIHR (National Institute for Health Research) also funds statistical research at a substantial level, some of it in (applied) methodology.
8. In past years, several research councils funded studentships for masters level study in statistics. Now, such funding is available only where the masters level study is intended to lead directly to doctoral training. There was recently a special strategic initiative whereby EPSRC continued to make earmarked funds available for some studentships to improve the supply of candidates for PhD study, and NIHR continues to fund some students as part of its aim to build research capacity. But it is clear that support from public funds for masters level study in statistics will be very limited in future, in the absence of a major policy change.
9. The number of “free-standing” statistics departments has decreased very markedly in recent years, as a consequence of a general trend in UK universities towards having fewer, larger, departments.
10. There are severe boundary problems in defining who is and who is not an academic statistician. However, it seems likely that a large proportion (though probably not a majority) of academic statisticians are not based in mathematical sciences departments.
11. A crude comparison of the age distribution of statistics academic staff in the COPS (Committee of Professors of Statistics) questionnaire returns to the distribution across all

disciplines in HESA (Higher Education Statistics Agency) data does provide some evidence that there are proportionally fewer statisticians aged in their 40s and older compared to the general picture. However, COPS data over time indicate that this may be because of increasing recruitment at younger ages. It is thus perhaps doubtful whether the continuing reported difficulty of recruiting senior statistics academics is due to an unfavourable age distribution, as has been claimed. However, the recruitment difficulty does still appear to exist, and this report has thrown no more light on why it should exist beyond the suggestions already made that it has to do with competition from business, industry, and universities in other countries.

12. HESA data on student numbers in statistics were analysed extensively. Because these are administrative data, not collected for the present purpose, there are many anomalies and artefacts that hinder their interpretation.
13. Taking the HESA student number data at face value, undergraduate student numbers in statistics appear to be increasing after a decline in the middle of the past decade, though the number of universities that teach statistics at a substantial level to undergraduates may be declining.
14. At postgraduate level, both taught and research students, recent HESA data indicate a reasonably steady state. There is no marked trend in overall student numbers, though there is some evidence of a small decline in taught postgraduate numbers. There is no marked trend in the split between UK-domiciled and overseas research students, in the number of universities engaged in postgraduate teaching and research, or in the level of concentration of postgraduate students in the larger universities.
15. There is, however, evidence of a decline in the number of UK-domiciled taught masters students in statistics since about 2005.
16. Part-time study plays an important role in undergraduate and taught postgraduate statistics, with universities that concentrate on part-time students being the biggest providers (in full-time equivalent terms) both at undergraduate level (the Open University) and at taught postgraduate level (Birkbeck College). However, there are very few universities with substantial numbers of part-time students.
17. A data collection exercise on masters courses in statistics and closely related subjects was carried out (in 2011). A list of such courses was put together from diverse sources, because no overall listing exists. The list included 60 different courses from 31 different institutions (and a listing on the same basis for 2013 would include 64 courses from 32 institutions). Requests for information about the courses were sent to all these institutions together with those responsible for another 14 courses that are less clearly “in” statistics. Response rates were good (100% on the main list, 86% on the “marginal” list).
18. Concern has been expressed by the RSS and others about University-level decisions to drop statistics masters courses against the general will of the academics providing them. A few more examples of such decisions were found. However, they appear to be outnumbered by the new courses being introduced. (In all, 13 of the courses surveyed in 2011 were introduced between 2005 and 2009, and another 15 started in 2010 or 2011.) It is clear that taught masters provision in statistics is in a dynamic state.
19. Entry requirements for postgraduate statistics differed quite considerably in terms of what would be acceptable previous study and, in particular, what statistics (if any) should have

been studied before. Provision for students whose previous studies were not in the mathematical sciences is limited, but does exist at some institutions.

20. There was no indication, on the courses for which data was obtained, of a downward trend in recruitment. Indeed the suggested trend was increasing.
21. Most courses did not have access to studentships from research councils or NIHR. Funding was often available from other sources, such as the university's own funds or from industry. However, the overall position was one of decline in the number of funded places (from industry as well as public funds), and about a quarter of the institutions said they had no student funding at all. There was no clear evidence, though, that this decline in studentships had led to a decline in student numbers. The position seemed to be more that some good potential students are increasingly deciding not to enter postgraduate study because of the lack of funding, but the places they would have filled are filled by others instead. The position on student funding was the most important area of concern reported by respondents, though it was certainly not the case that all respondents saw this as a major issue.
22. A very quick and dirty survey of recruitment agencies who recruit statisticians indicated a general level of optimism about future demand for statisticians.
23. Overall, many "reasons to be cheerful" about the state of UK academic statistics and its future development were found, though there is great uncertainty, and there are several negative issues as well. The overall tone of many of the responses on the masters data collection exercise, and of evidence to IRMS 2010 from universities and from the RSS, is however on the whole pessimistic and severely lacking in confidence about the future of the academic discipline of statistics in the UK. It seems unlikely that this pessimism is entirely justified.

1. Introduction

1.1. Background

I was originally asked to carry out this work in early 2011, by Paddy Farrington (then Vice-President for Academic Affairs of the Society) on behalf of the Academic Affairs Advisory Group of the Royal Statistical Society (RSS).

I understand that the concern that led to this request stemmed to a large extent from the International Review of Mathematical Sciences 2010 (IRMS 2010)¹, which was commissioned by the Engineering and Physical Sciences Research Council (EPSRC).

IRMS 2010, like the 2003 International Review of Mathematics², while confirming the excellence of academic research in statistics in the UK, picked statistics out as a discipline under particular threat, largely for structural reasons, and proposed some special measures that should be taken to correct this. The particular issues identified in IRMS 2010 included:

- the weakening of small statistics departments, partly simply because of their size, and partly because the provision of extra resource to a few larger centres (which arose, ironically, partly because of recommendations from the 2003 Review) has restricted the ability of the smaller groups to compete for staff;
- an unfavourable age distribution of staff (with particular emphasis being given to a lack of people in their 40s);
- a diminution of the recognition of statistics as a separate and distinctive field within the broader mathematical sciences;
- a failure to take into account the special nature of statistics as a discipline which (a) has a low profile at school level, so that students find out about it only as undergraduates after they have started out in another subject area, and (b) is important in collaborative research across a very wide range of disciplines.

The special nature of statistics requires, in the view of the international review panel, having strong statistics research and teaching programmes at a large number of UK universities, rather than concentrating statistics excellence in a few centres.

I was asked to investigate certain aspects of the UK academic statistics scene.

The original version of this Report was considered by the Council of the RSS in October 2011.

1.2. Scope and outline

The resource available for this project was not great. Hence this report concentrates on relatively few areas, which were raised as issues in IRMS 2010 and/or by the RSS, and where it appeared that useful information could be gathered and analysed in the available time. The areas selected for investigation are not the only areas of concern within the UK statistics community; this report makes

¹ See

<http://www.epsrc.ac.uk/newsevents/pubs/corporate/intrevs/2010maths/Pages/internationalreviews.aspx>.

² International Review of UK Research in Mathematics (2003), EPSRC. Available from

<http://www.epsrc.ac.uk/SiteCollectionDocuments/Publications/reports/irmaths2003.pdf>.

no pretence of being comprehensive either in the areas it investigates or in the depth of investigation of those areas. What has been done is what there was time to do.

In addition, my analysis of the data that I was able to collect has also been severely constrained by the time available; further analysis of these data would certainly throw up more insights.

The areas examined are as follows.

1. External funding for research and (where available) for studentships for masters study, concentrating particularly on funding from UK research councils and the National Institute for Health Research (NIHR).
2. The organisation of UK academic statistics into departments, together with a brief investigation on the age profile of staff.
3. An analysis of student numbers in statistics at UK universities, as recorded by the Higher Education Statistics Agency (HESA).
4. An investigation of the provision of masters courses in UK universities, in statistics and some closely related areas.
5. A very quick and dirty investigation of the job market for graduates from MSc courses in statistics.

In the time since the original report was produced, it has been possible to update it to a limited extent. The updating largely relates to points 2 and 3 above; in particular, another year's data from HESA have been obtained and analysed.

2. Funding

2.1. Introduction

Many of the contributions of evidence to IRMS 2010³, from universities, the RSS and others, mention aspects of public funding (from research councils etc.) for research and postgraduate study in statistics. Issues are raised about the overall availability of funds and about the distribution of funds between different areas of the mathematical sciences and between different groups and universities.

Particularly telling points are made in the EPSRC's own overview of its Mathematical Sciences programme (for 2010). They write (part 1, page 67 of the evidence document):

“While the RAE [Research Assessment Exercise] results show a large and high-quality community in statistics and probability, the topic continues to struggle for funding within the EPSRC programme. This may mean that researchers in this area have other sources of support and have less dependency on EPSRC funding than other topics. However, our [i.e. EPSRC's] impression is that this community is unduly critical of research proposals to the extent that proposals find it hard to get funding. Fellowships are scarce, as there is high demand for statistics graduates and PhDs from industry and Government. EPSRC funded three S&I [i.e. science and innovation] awards to increase

³ Available at

<http://www.epsrc.ac.uk/SiteCollectionDocuments/other/MathsIR2010EvidenceDocumentsParts1-3.pdf>.

capacity and more recently a CDT [i.e. centre for doctoral training] at Lancaster covering statistics and OR.”

This paragraph raises several issues. First, statistics was still struggling for EPSRC funding, according to the EPSRC. Two reasons are given for this; perhaps statistics researchers have other sources of funds and do not have to rely solely on the EPSRC, and second, we statisticians seem to be shooting ourselves in the foot by being so critical (in peer review) of statistical proposals that they are not funded. The issue about more funding having been provided through Science and Innovation awards and through doctoral training centres (where the MASDOC centre at Warwick is also relevant, as are some of the Taught Course Centres) is in itself controversial, as there is a view that the funding for these initiatives has drawn away money, and hence staff (and students) from other universities.

The IRMS review report itself does not in fact make a great play of the funding issues in its section on the specific structural problems of statistics (section 15), and indeed says rather little specifically about statistics in its other discussions of funding. Their overall recommendation (R-1) for a flexible grant scheme that could provide support for excellence in statistics, as in other areas, across a diverse range of universities, is certainly relevant (as the IRMS report points out). The Panel also propose special procedures for assessing research base funding grant proposals in statistics (section 15.3), because they often include many diverse interdisciplinary aspects that need to be examined by “knowledgeable reviewers”; it is perhaps not clear whether this would address the issue of over-critical statistical reviewers (and it is also not clear whether the review panel consider that to be a genuine problem), but it does draw attention to an important way in which statistics grant proposals may differ (on average) from those from other mathematical areas.

Most of the rest of this section will concern itself with some further examination of the availability of funding for statistics from all UK research councils and also from the National Institute for Health Research (NIHR). It should be pointed out that my analysis here does not supplant the analyses given in the evidence documents submitted to IRMS 2010. My review is in some limited respects more specific to statistics, and is more recent (though only slightly), but I did not have the resource to check and repeat the analysis that was done as IRMS evidence. Further, it has not been possible to update the evidence that I obtained in 2011.

But before considering the details of funding from different research councils, it may be worthwhile using data from the most recent RAE to examine the extent to which it may be true, as the EPSRC overview states, that researchers in statistics have access to other sources of funding support. The RAE was some time ago now (2008), and its data on external research funding cover a period of several years before that (1 January 2001 to 31 July 2007), so these figures are hardly current. Further, since responses to the RAE were self-selected, the data would not necessarily have been representative even at the time⁴. I have done a rather crude analysis, taking the analysis of external research funding for each of the three mathematical sciences units of assessment, and working out

⁴ It is also worth noting that these results apply to the Statistics and OR Unit of Assessment only. Many statisticians, perhaps particularly medical statisticians, would have submitted to other Units of Assessment. It is possible that some of these may have obtained high levels of funding from sources outside research councils, e.g. charitable trusts in the medical area. But without analysis at a personal level, it is not possible to confirm this.

the total funding per category A submitted staff member (full-time equivalent) from each of the given groups of funding sources, over the RAE submission period. The results are shown in Table 1.

Table 1. External research funding (in £) reported to RAE 2008, total for the period 1 January 2001 to 31 July 2007, per category A staff member (full-time equivalent), by source of funding, for the three mathematical units of assessment. Data taken from <http://www.rae.ac.uk/submissions/>. Abbreviations: OST/OSI: Office of Science and Technology/Office of Science and Innovation; CCLRC: Councils for the Central Laboratory of the Research Councils; JREI: Joint Research Equipment Initiative.

	Funding source	Unit of Assessment		
		20 Pure Mathematics	21 Applied Mathematics	22 Statistics and OR
1	OST/OSI Research Councils et al	40,785	90,099	61,237
2	OST/OSI Research Council central facilities	279	1,021	61
3	CCLRC facility development grants	-	-	-
4	Joint Infrastructure Fund (JIF)	-	4,105	1,533
5	JREI - OST/OSI Research Councils	-20	1,236	156
6	JREI - Other external sponsors	16	32	-
7	JREI - Funding bodies	-	1,869	-
8	UK-based charities	3,214	6,063	9,745
9	Other government bodies in the UK	2,389	8,558	20,773
10	Regional Development Agency (RDA)	-	126	85
11	NHS R&D funding	-	-	-
12	UK industry, commerce and public corporations	1,695	4,789	7,873
13	Government bodies in the EU	8,994	12,844	8,828
14	EU other	45	287	887
15	Other overseas	505	2,755	4,202
16	Other	2,324	2,994	10,751
	<i>Total</i>	<i>60,225</i>	<i>136,779</i>	<i>126,133</i>
	Total for RCs/JREI/JIF (sources 1 to 6)	41,059	96,494	62,988
	Total for other sources	19,166	40,285	63,145
	<i>Sources 1 to 6 as % of overall total</i>	<i>68%</i>	<i>71%</i>	<i>50%</i>

This data source does not distinguish between different research councils, and so cannot answer the question of whether statistics (and OR) research is more spread across the research councils than is the case for other areas of the mathematical sciences. Crudely speaking, one might consider funds under the first six numbered sources to correspond to a broad definition of UK government research council and similar funds. In summary, for the Pure Mathematics and Applied Mathematics units of assessment, around 70% of the total reported external research funding came from these sources, but the corresponding proportion for Statistics and OR was considerably less, at 50%. Statistics and OR researchers obtained, per capita, more funding from research council and similar sources than did the pure mathematicians, but less than the applied mathematicians. But Statistics and OR researchers obtained more, and in some cases considerably more, per capita, than the other two groups from UK charities; other UK government bodies; UK industry, commerce and public corporations, and the residual categories of “Other overseas” and “Other”. The only significant funding source, outside research councils and similar, where Statistics and OR researchers were less

successful than the other groups was Government bodies in the EU, where they obtained about the same per capita amount as in the Pure Mathematics unit of assessment, but considerably less than Applied Mathematics.

Despite the fact that the *total* per capita income was less for Statistics and OR than it was for Applied Mathematics, and despite the age and the aggregated nature of these data, they do provide a certain amount of support for the contention that statistics (at least when taken together with OR) does, or did, have effective access to a wider range of funding sources than is the case for other areas of the mathematical sciences. This report has not examined any further data on funding sources, apart from NIHR, and so cannot comment further on the question of disparities in broad access to funding sources.

2.2. Research Councils

A general enquiry was made to all UK research councils other than the Science and Technology Facilities Council (STFC)⁵. Contacts for these enquiries were provided by Vivienne Blackstone of EPSRC, who also advised me on what data might be available and on how best to approach her colleagues in other councils.

A major difficulty that emerged, and that was clearly also apparent in the evidence from research councils to IRMS 2010, was that, with the exception of EPSRC, the councils have not classified grants by subject areas in which Statistics is one of the classifications. Indeed, even with EPSRC, the nearest appropriate classification is actually “Statistics and applied probability”, which includes areas of research that some would consider out of scope in a study of academic *statistics*. (Of course, others would consider work in applied probability to be definitely *in* scope. Such definitional issues appear again and again in this study.) This very much restricts the possibility of making numerical comparisons between different councils in terms of funding for statistics. It seems likely that a new record-keeping system, recently introduced in common across all the funding councils, may enhance such comparisons in future, but for investigating past and most current grants, it has not yet helped. To obtain more precise data would have required considerable manual searching and collating work, and the resource for this was not available (either from the councils themselves or from me).

Another major difficulty is the definitional one, of what counts as statistical research anyway. Work specifically on statistical (or applied probability) methodology, and related areas, would generally be classified as “statistics and applied probability” by EPSRC, and would be visible appropriately in data collection and analysis. However, such work if funded by another research council, say as part of a wider interdisciplinary project whose primary focus is elsewhere, would not be classified as statistical, and to find it would rely on keyword searches and similar (which depend on the work being helpfully described). Trying to classify the work according to the department(s) where the investigators are based will also not always be helpful. As described in Section 3, there are now very few departments of statistics, and in several universities statisticians are based in very broad

⁵ STFC was omitted because a search of existing grants on its website (www.stfc.ac.uk) showed none to academic statisticians or to staff in mathematical sciences departments for statistical projects. It should be noted, though, that several STFC grants in the areas of astronomy and particle physics, some of them large in value, have included support for statistical work, and that a few of these may involve a certain amount of development of appropriate statistical methodology. But the grant holders all appeared to be people who would describe themselves as astronomers, cosmologists or physicists rather than any kind of statistician.

departments or schools. Further, individual academic statisticians are not always based in the main department, in a particular university, where most statisticians are located. Then, there are boundary issues about what counts as funded statistical research, because of the interdisciplinary nature of the subject. Suppose a statistician is part of a broad interdisciplinary team on a funded project, but the statistical work involved is reasonably routine and does not involve any methodological development. Is the funding supporting statistical research? Arguably not, although it is funding an academic statistician to do something that is clearly part of the work that academic statisticians should be doing. Many cases are even less clear-cut, because there is a certain amount of development of statistical methodology, that may be enough to publish as a mainly statistical paper in a topic-area journal, or even as a paper in a statistical journal. Indeed, at the time the funding is applied for, it may well not yet be clear if such a paper is likely to emerge or not.

All these provisos need to be borne in mind while reading the next few subsections, which outline in turn the positions for statistical funding of the different research councils.

2.2.1. EPSRC

The EPSRC (Engineering and Physical Sciences Research Council) provided me with data on the total amount of grants awarded in the Statistics and Applied Probability research topic of the Mathematical Sciences programme each year for the 10 years from 2001-02 to 2010-11 inclusive, together with success rates for grant proposals in this research topic, and with corresponding data for the rest of EPSRC. Data on individual funded grants were also supplied.

Figure 1 shows the total financial amount awarded on grants in Statistics and Applied Probability⁶ for each year over the period in question, while Figure 2 shows how large these totals are in relation to total EPSRC grant funding.

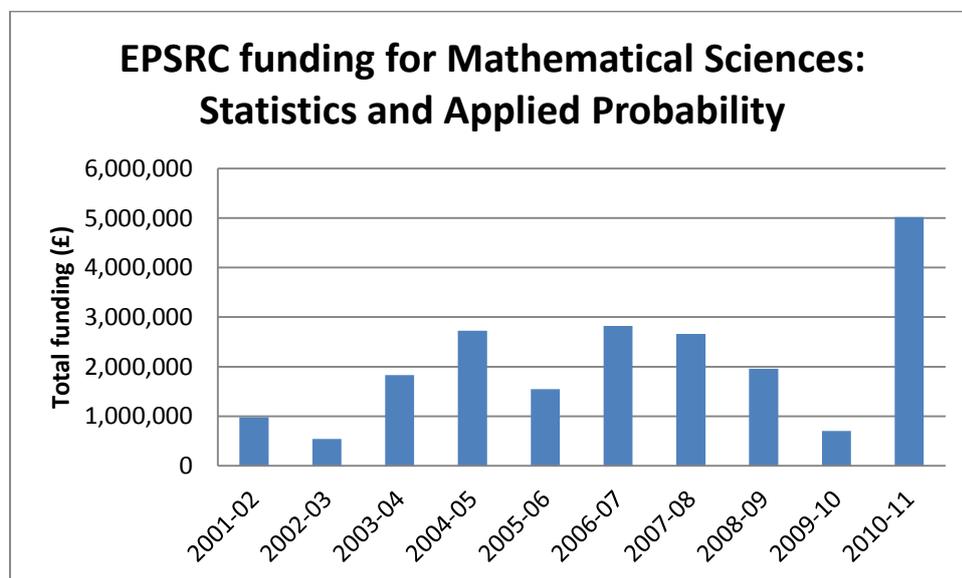


Figure 1. Total EPSRC funding for grants in the Statistics and Applied Probability research topic of the Mathematical Sciences programme, 2001-02 to 2010-11. Data provided by EPSRC.

⁶ These are “equivalent values”, accounting for only the percentage of the grant that has been coded as “Statistics and Applied Probability”. (Some grants are coded to more than one subject area)

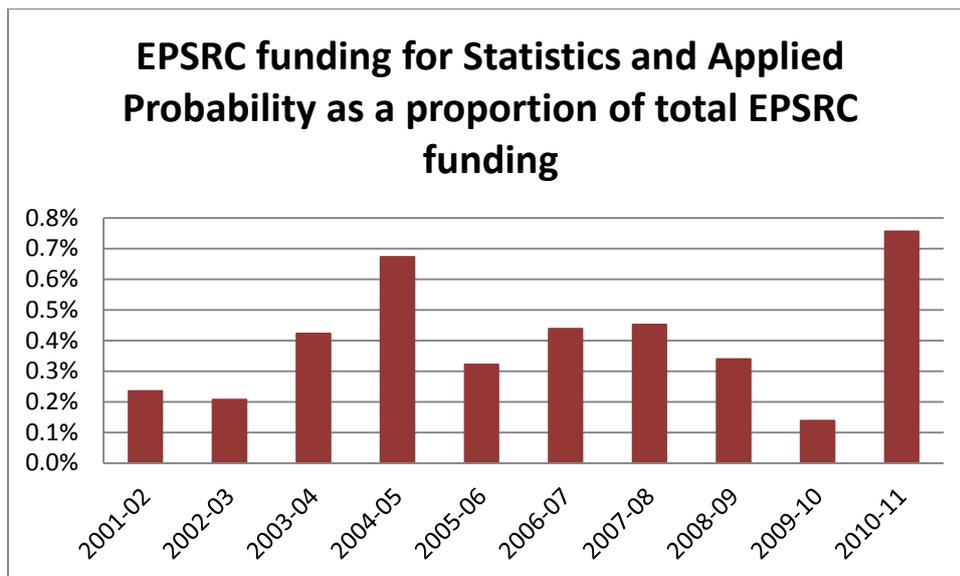


Figure 2. EPSRC funding for grants in the Statistics and Applied Probability research topic of the Mathematical Sciences programme as a proportion of total EPSRC grant funding (all programmes including other Mathematical Sciences research topics), 2001-02 to 2010-11. Data provided by EPSRC.

Funding from this programme for statistics and applied probability has varied considerably over the years, with a steady and considerable decline from 2006-07 to 2009-10 inclusive being followed by large increase to 2010-11, when the total level of funding was almost twice what it had been in the previous highest year. The share of total EPSRC funding going to Statistics and Applied Probability has varied in line with the actual amounts of Statistics and Applied Probability funding.

It should be borne in mind that the figures above include applied probability as well as statistics. Further, not all grant funding from EPSRC to academic statisticians would have been included in Figure 1. It is likely that some funding from other EPSRC programmes, or indeed other parts of the Mathematical Sciences programme, would have gone to statisticians; the amounts are not known.

The same issue, however, applies in the other direction. Funding categorised under the Statistics and Applied Probability research topic does not by any means all go to investigators in mathematical sciences department, or to investigators who would classify themselves as academic statisticians (or be generally thought of as such). Of the 32 grants in this research topic with a start date between 1/10/2010 and 1/10/2011 inclusive, the principal investigators on 9 of them were from departments other than those in the mathematical sciences or in which most statisticians in the university in question are located. These departments included, among others, computer science, psychology, and a medical school. None of the PIs in question had a job or position title that is directly in statistics, and I do not believe that any of them would consider themselves as an academic statistician. These nine grants amount to about 30% of the total for grants starting in this period, and include the largest grant in the period (£1.1m for a project on “Advanced Bayesian Computation for Cross-Disciplinary Research”, led by Zoubin Ghahramani, Professor of Information Engineering in the Engineering Department at Cambridge, and a prominent researcher in machine learning).

I must make it clear that I certainly do not mean to suggest that the EPSRC should not be awarding grants in this topic to people outside “traditional” statistics groupings, or should be preferring those in such groupings. I am merely pointing out, first, the definitional difficulty of trying to quantify grant

funding *in academic statistics*, and second, that not all funding in the most relevant topic of the most relevant programme in the most relevant research council in fact directly supports groupings of staff who would be seen as part of the UK academic statistics community in the narrow sense. (In short, drawing boundaries does not always make sense and is often positively unhelpful, in very many ways.)

Success rates for grant proposals to EPSRC in the Statistics and Applied Probability topic, and in the rest of the EPSRC’s research topics (in Mathematical Sciences and all other programmes combined), are shown in Figure 3. The overall success rate in Statistics and Applied Probability over the entire 10-year period was 28.6%; in all other research topics combined it was 35.1%.

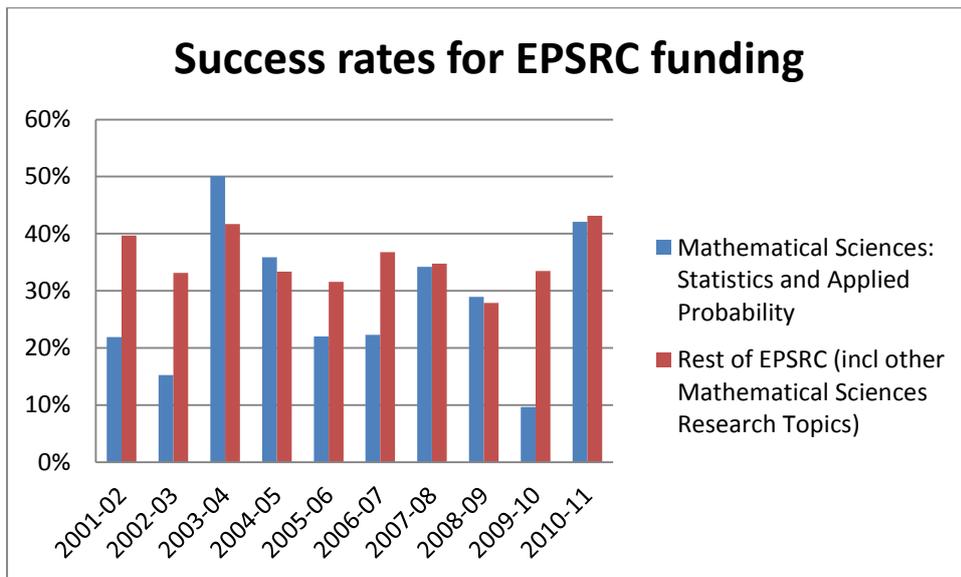


Figure 3. Success rates for grant proposals in the Statistics and Applied Probability research topic of the EPSRC Mathematical Sciences programme, and for all other EPSRC research topics (all programmes including other Mathematical Sciences research topics), 2001-02 to 2010-11. Data provided by EPSRC.

Success rates in Statistics and Applied Probability have, in aggregate and in many individual years (though not all), been lower than in other topics, and occasionally very substantially so (for instance in 2002-03 and particularly in 2009-10). One would of course expect more variability in a relatively small topic area than across the EPSRC’s operation as a whole, but the success rate variability in statistics does look very marked. These data are in accord with the EPSRC’s view in the evidence to IRMS 2010 (reported above) that the statistics and probability community may be “unduly critical of research proposals to the extent that proposals find it hard to get funding” to the limited extent that, on the whole, funding applications are more likely to be rejected in this area, but of course the data say nothing about reasons for the relatively low success rate. There are other possible reasons alongside the community being over-critical.

Before leaving the EPSRC, it is worth dealing with one other issue: the funding of studentships for taught masters degrees. The following is my own summary of the position as I understand it.

The Mathematical Sciences theme in EPSRC did provide some funding for students on certain masters courses in Statistics (and in OR), as a result of a strategic decision to secure the pipeline of PhD students in the corresponding research areas. This funding was topsliced from the mathematical Sciences Doctoral Training Grant (DTG) allocation. But this special initiative is now ceasing. EPSRC

have made it explicit that institutions may use their DTG allocation for 2013/14 onward to support PhD students in statistics and OR to begin their graduate studies on taught masters courses, where appropriate. (In fact I am assured that it has always been the position that institutions could use DTG to support masters study in cases where the masters course acted primarily as preparation for doctoral training.)

In addition, EPSRC-funded Centres for Doctoral Training (CDTs) generally, and certainly those that cover statistics, run a 1+3 model where students are admitted to a 4-year programme but spend their first year on taught masters study as preparation for their later research.

I was also informed by EPSRC that, where masters-level training is intended to enable the better exploitation of the research that EPSRC funds, then it should be funded through the CTA/KTA [Collaborative Training Accounts/Knowledge Transfer Accounts] route. Further investigation found no evidence that EPSRC CTA or KTA funds had actually been used to support masters training in statistics *per se*, and indeed, given the limited funding available and the relevant criteria, my own feeling is that it would probably be very difficult to obtain or justify such funding.

The rest of the policy on masters-level funding, which is essentially in line with that of all the other research councils, is that (because their role is to fund and promote *research*) general funding for taught masters provision from research council funds is inappropriate, except where there is a direct route to doctoral research. It was exceptional that the EPSRC continued to provide some limited funding for masters level study in statistics that was only loosely linked to doctoral training; very few other disciplines have had access to such funding.

I return later to the question of the effect of these policies on the supply of statisticians and the health of UK academic statistics.

2.2.2. ESRC

Although EPSRC is generally seen as the lead research council for funding of statistics, aspects of funding are spread over several other research councils, and in this respect the ESRC (Economic and Social Research Council) has always played a leading role. EPSRC's responsibilities in relation to statistics, under its Mathematical Sciences theme, are for the funding of methodological development. The ESRC has a broad range of responsibilities that do include the development of statistical methodology for the social sciences, but also cover other statistical aspects, including in particular (and in collaboration with other funders) the curation of several large data sources and services that store data, provide it to researchers, and in some cases coordinate its collection. So there are boundary issues here: for instance, what counts as statistical research, and what counts as support of the UK academic statistics community? Taking a narrow and mathematical view, ESRC does not fund the development of statistical methodology to a great extent, because this is the province of EPSRC (though there are some ESRC grants that would undoubtedly be considered by most statisticians as supporting statistical methodology development in the narrowest sense). Taking a broader view, activities such as the collection and distribution of statistical data, and methodologies for doing that, clearly do form part of the field of statistics as defined by (for example) the RSS Charter, are carried out to a large extent in universities and similar public research establishments, and in my view it would be extremely inappropriate to exclude them from consideration in a review of UK academic statistics.

ESRC provided me with data on research grants, going back to 2004, that fall within its Statistics, Methods and Computing discipline (whose name has changed, slightly, from time to time). Not all of this funding would generally be considered as supporting statistics, even in the broadest definition. To remove the projects that would fall outside would require detailed analysis of each grant, and also some fairly arbitrary decisions, and the resource to attempt this was not available. However, simply looking at the project titles gives the impression that the great majority of them are concerned with social statistics (or even general statistical) methodology, or the collection, curation and study of statistical data. I have therefore included all these grants in the analysis below.

The data provided covered, in terms of grant start dates, a period of slightly over 6 years. Grouping them into academic years (beginning on 1 October) by grant start date, and leaving out the few grants that started before October 2004, a summary time series of grant totals is shown in Figure 4.

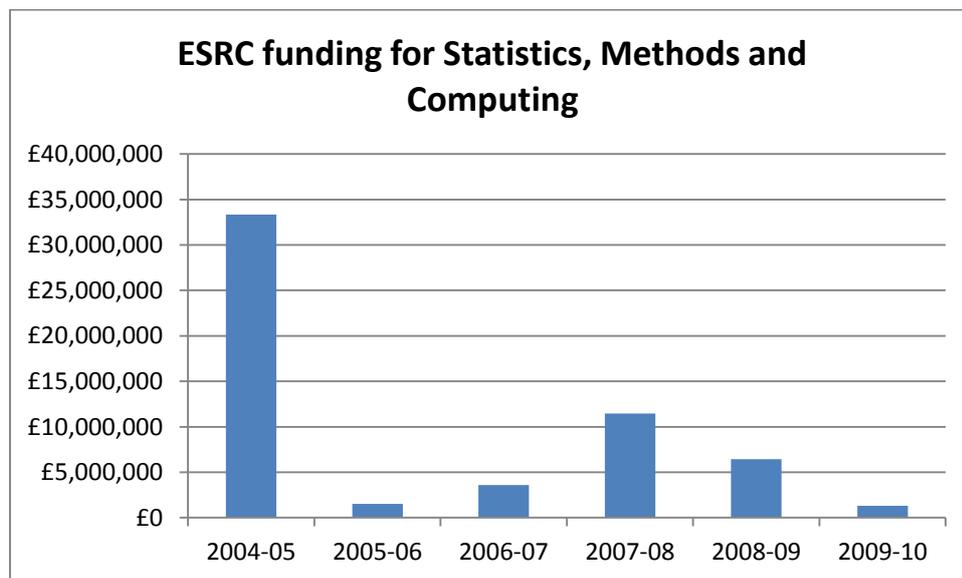


Figure 4. Total ESRC funding for grants in the Statistics, Methods and Computing discipline, 2004-05 to 2009-10. Data provided by ESRC.

Funding amounts are very variable, but also very considerable, ranging from £1.3m to £33.3m a year. In the particularly high year 2004-05, most of the funding (over £25m) was to support the Centre for Longitudinal Studies, until 2010 (and another major grant included in that year was £1.4m over five years for a major bibliography project, that would not generally be counted as statistical). Likewise, in the next highest year (2007-08), the figures include a £6.8m grant to support the Economic and Social Data Service at the University of Essex over five years.

Comparisons with EPSRC grant totals are difficult, because the definitions do not match, and because both groupings (in Figure 1 and Figure 4) include data for grants that might not be considered to cover statistics. But it is at least clear that funding from ESRC is substantial, and of the same order of magnitude as that from EPSRC, though on an annual basis rather smaller.

Application success rates by subject area are available from ESRC annual reports⁷. Those for Statistics, Methods and Computing, and for all subjects together, are shown in Figure 5.

⁷ Available from <http://www.esrc.ac.uk/publications/annual-report/index.aspx>.

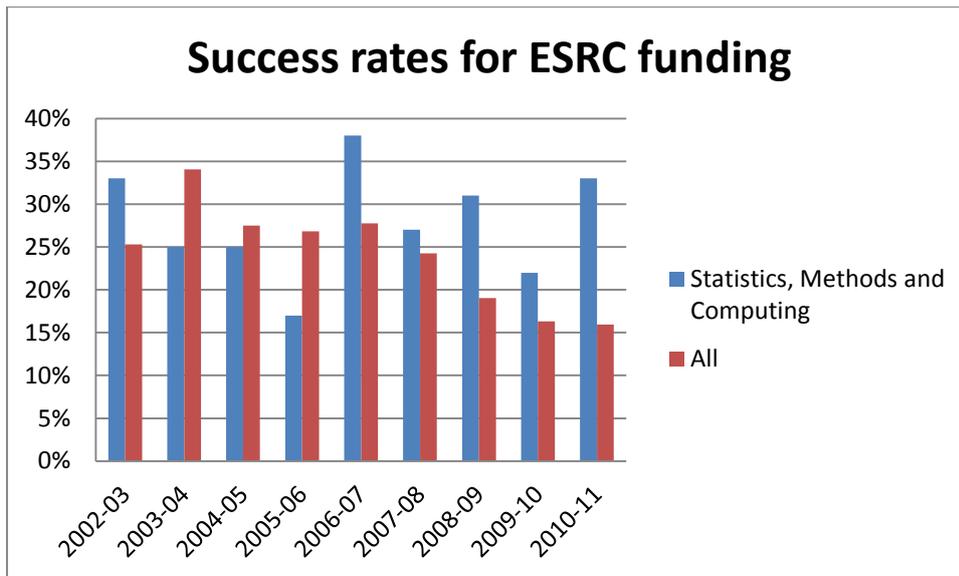


Figure 5. Success rates for grant proposals in the Statistics, Methods and Computing area of ESRC, and for all ESRC research subjects together, 2002-03 to 2010-11. Data from ESRC Annual Reports.

Success rates in the Statistics, Methods and Computing grouping have varied quite widely, as one would expect given the relatively low number of application in these subjects. But in recent years, when the overall success rate has declined considerably (from 28% in 2006-07 to 16% in 2010-11), success rates in Statistics, Methods and Computing have not shown such a marked decline, and (in contrast to the position on EPSRC funding, see Figure 3) have been consistently above the overall level.

Numbers of new studentships in the Statistics, Methods and Computing area, again taken from ESRC annual reports, are shown in Figure 6. Overall the trend has been one of increase over the years.

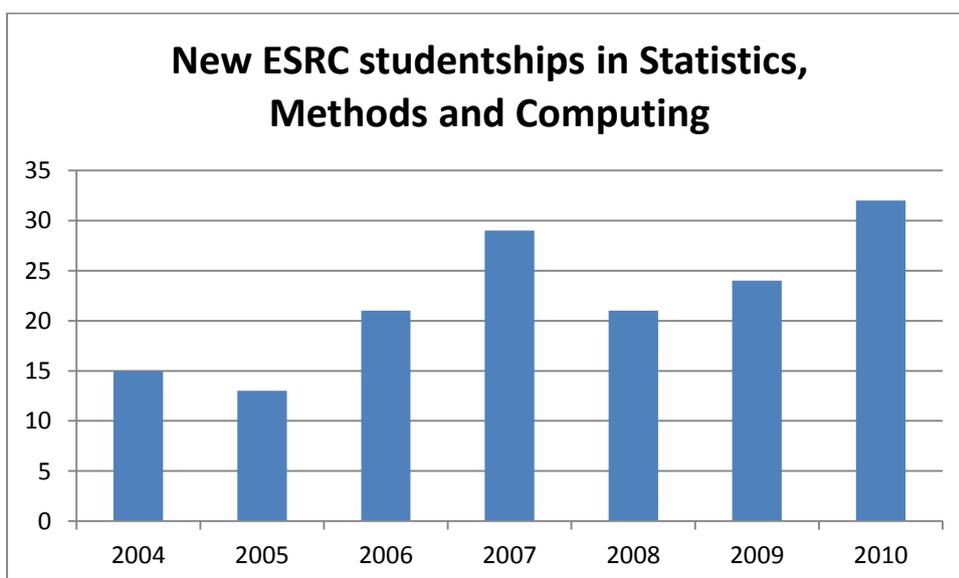


Figure 6. New studentships in the Statistics, Methods and Computing area of ESRC, 2004–2010. Data from ESRC Annual Reports.

An interesting and relevant development from the ESRC stems from concern about the low level of training in quantitative methods (including statistics) for undergraduate social science students, and

the perception by academics in the area that quantitative methods is an unattractive subject to students. In December 2009, ESRC published a report⁸ on this subject, by its Strategic Adviser for Quantitative Methods, Professor John MacInnes of Edinburgh University. Following the recommendations in Professor MacInnes' report, ESRC introduced a programme of activities designed to develop teaching resources and train those who teach social science undergraduates. A recent and prominent fruit of this work in the Quantitative Methods Programme⁹, funded by ESRC together with the Higher Education Funding Council for England (HEFCE) and the Nuffield Foundation. This programme will provide £15.5m over five years to provide major change in quantitative methods training for UK social science undergraduates. Stemming from the same concerns and also from MacInnes' recommendations, but targeting intervention at an even earlier stage in a student's educational career, ESRC has part-funded an initiative called "TISME Science & Maths - The Targeted Initiative on Science and Mathematics Education"¹⁰, which links various research projects and dissemination activities aiming to increase children and young people's participation and engagement in science and mathematics.

It is notable, first, that both ESRC and EPSRC have recognised the need to carry out strategic actions to improve weaknesses in UK research capacity in statistics and quantitative methods, and second, that the levels of intervention are quite different, with EPSRC funding places on taught postgraduate courses, and ESRC intervening at undergraduate and school level. It remains to be seen which overall approach is most effective.

2.2.3. MRC

It is clear that substantial funding from the MRC (Medical Research Council) goes to support various aspects of academic statistics. However, definitional and coding issues, and data availability, have made the actual amounts difficult to quantify.

Because the MRC do not code their funding data in a way that makes it easy to identify support for statistics, they were not able to provide me with data on specific funding amounts. In order to have some sort of quantification of grant funding for statistics, I therefore downloaded records of funded proposals from the MRC website¹¹, and somewhat arbitrarily picked out those that seemed to involve some aspects of statistical methodology. This classification was done on the basis of the project title and the name of the principal investigator only. I omitted projects that seemed to me to be clearly epidemiology rather than statistics (though there is no clear boundary). I also omitted some projects whose main concern was with the collection and curation of large data sets, such as the ALSPAC (Avon Longitudinal Study of Parents and Children) study at Bristol (which has received large amounts of MRC funding), even though they doubtless include elements of statistical methodology, and though such data projects *would* have been included in the statistical classification for ESRC. It turned out that there was at least one statistical project funded at most grant rounds, sometimes several. The resulting data, aggregated into academic years (by date of award), are shown in Figure 7.

⁸ Available online at http://www.esrc.ac.uk/_images/Undergraduate_quantitative_research_methods_tcm8-2722.pdf.

⁹ See <http://www.nuffieldfoundation.org/QM>.

¹⁰ See <http://tisme-scienceandmaths.org/>.

¹¹ See links from <http://www.mrc.ac.uk/Ourresearch/Successrates/index.htm>.

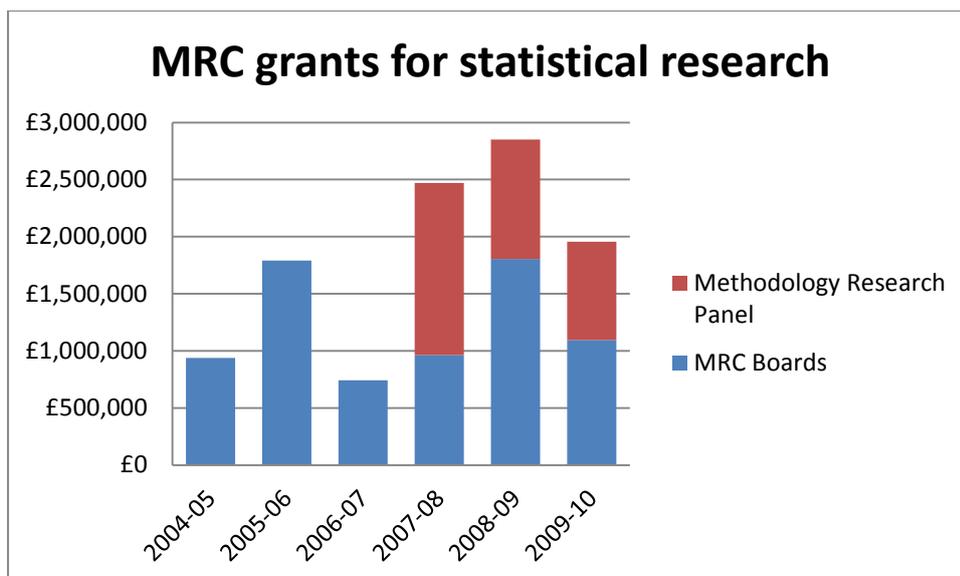


Figure 7. Total MRC funding for research grants classified by KM as being in statistics, 2004-05 to 2009-10. Grants through the Methodology Research Panel are separately identified. Base data from MRC.

Data for the full 2010-11 year were not yet available at the time of analysis, though it is notable that no grants classified by me as in statistics were awarded in the first two (of three) main funding rounds in 2010-11.

Figure 7 identifies separately grants awarded by the MRC's Methodology Research Panel. This is a relatively new (launched 2008) joint funding panel of the MRC and NIHR¹², though administered through MRC, and forms a major part of the Methodology Research Programme. Its remit is methodology across the whole of health research, not specifically in statistical areas, and statistics is not its primary concern. However, its existence so far it has provided substantial support for research into health-related statistical methodology.

The overall impression from Figure 7 is in some way comparable to that from ESRC funding; the amounts are substantial, of the same magnitude as EPSRC funding, but at a lower level overall. Over the period covered, there has generally been an increase, though there is considerable variability and funding amounts may have reduced in the last year or two.

However, it must be noted that the data in Figure 7 by no means represent all of the MRC funding that supports statistics. First, I tried to use a fairly tight definition of statistics in my classification that led to Figure 7.

Second, and more importantly, many of the projects led by non-statisticians and on topics with non-statistical titles will actually include funding for academic statisticians; this is likely to be the case, among others, for major clinical trials and for some large projects in epidemiology. The amounts involved cannot be quantified without very detailed analysis of the grants, but are likely overall to be substantial.

Third, MRC has funded a number of fellowship schemes that have supported statisticians in research. The most obviously relevant of these is the scheme for career development awards in

¹² See <http://www.mrc.ac.uk/Ourresearch/ResearchInitiatives/MRP/index.htm>.

biostatistics, which awarded 8 fellowships from 2008 to 2011. Some other fellowship schemes have also supported statistical research (among other topics); this would cover perhaps three fellowships from 2008 to 2011 in the scheme for career development awards in methodology research, and at least two Special Training Fellowships in biomedical informatics. There are possibly others. (My contacts at MRC informed me that the rate of applications for the Biostatistics fellowships had been considerably lower than for most of the fellowship schemes they run.)

Finally, the MRC funds a large number of research units which are 'intramural' in that the main employer of the staff is the MRC itself. However, these units and their staff generally have strong links to universities, to the extent that their research staff often have joint or honorary appointments with a university. Thus funding for these units does support university research (to an extent difficult to quantify). MRC supplied me with a list of their intramural units that have statistical facilities, and it appears in Table 2. Clearly, the statistical activity in some of these units is unlikely to be substantial, but the Biostatistics Unit is concerned with statistical research almost exclusively, and some others also support substantial amounts of statistical work.

Overall, then, though quantification has proved difficult, it is clear that in relation to the size of the UK academic statistics community and to funding levels from elsewhere, the MRC is a very substantial funder of statistical research, and to some extent directly in statistical methodology as well as in the application of statistics. Relative to the MRC's total spending on research (£758m in 2009-10), the support for statistics looks much smaller, but that is not the issue for this review.

Table 2. Intramural MRC Units with statistical facilities, 2004-2011. Source: MRC.

MRC Laboratory of Molecular Biology
MRC Biostatistics Unit
MRC Centre for Protein Engineering
MRC Cognition and Brain Sciences Unit
MRC Mitochondrial Biology Unit
MRC Human Nutrition Research
MRC Epidemiology Unit
National Institute for Medical Research
MRC General Practice Research Framework
MRC Clinical Trials Unit
MRC Unit for Lifelong Health and Ageing
MRC International Nutrition Group
MRC Human Genetics Unit
MRC Human Reproductive Sciences Unit
MRC Virology Unit
MRC Toxicology Unit
MRC Clinical Trial Service Unit
MRC Functional Genomics Unit
MRC Mammalian Genetics Unit
MRC Health Services Research Collaboration
MRC Epidemiology Resource Centre

2.2.4. BBSRC

The BBSRC (Biotechnology and Biological Sciences Research Council) funds a certain amount of research in statistical methodology (applied to biology) and appropriate areas of applied statistics. Generally this comes under its Mathematical Biology portfolio; though many statisticians would not usually put statistics under this heading, in BBSRC terms, that is clearly where it belongs.

BBSRC provided me with a listing of their grants in mathematical biology that had been supplied in evidence for IRMS 2010. It covered grants on which there had been expenditure since 2005-06, as at May 2010 (and so was not totally up to date at the time it was supplied to me). They also helpfully carried out a partial analysis of the data to help to identify grants that were (at least partially) for research in statistics, by picking out those where the principal investigator was from a department of statistics or the mathematical sciences generally, or where a keyword search for “statist*”¹³ turned up a hit in the project title or abstract. The keyword search in particular resulted in many false positive hits for projects that happened to mention some use of statistics in their abstract. I refined the classification by subjectively assessing whether projects did in fact include aspects of development of statistical methods. Further, I looked through the list of projects titles and abstracts that had not been classified as hits by BBSRC, and added a few that seemed to me to involve development of statistical methodology. This classification process is arbitrary to a large extent; it may be a little more precise than that used for the MRC grants since I had help from BBSRC staff and since I had access to the abstracts as well as project titles.

The resulting data are represented in Figure 8. Note that what is recorded is the total spend on the grants in question in the year in question. Spend in the final year given (2009-10) may be incomplete because the date of production of the data was before the end of that year.

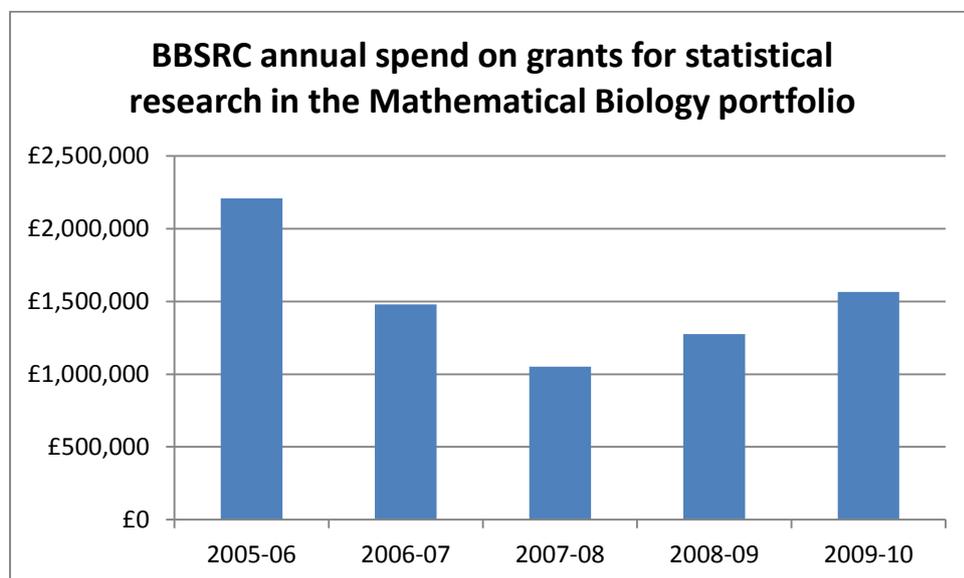


Figure 8. Total BBSRC spend on research grants within the Mathematical Biology portfolio classified by KM as being in statistics, 2005-06 to 2009-10. Base data from BBSRC.

¹³ Here and in similar places, the asterisk denotes a wild card for the search – any letter or letters will be matched.

The overall impression can again be described in broadly similar terms to that for ESRC and MRC; grant expenditure of the same order of magnitude but considerably less than that from EPSRC (and indeed, generally, less than that from ESRC and MRC).

My impression, though I have not done a formal analysis, is that recipients of BBSRC grants on statistical methods development are rather more likely to be based entirely outside statistics/mathematical sciences departments, and rather more likely to have job titles which do not identify them as statisticians, than is the position for ESRC and MRC (or indeed NERC, see below). Thus much of this financial support is support for statistical research being carried out in universities (and indeed in research establishments such as Rothamsted Research), rather than direct support for UK academic statisticians, or UK academic statistics defined in terms of departmental and institutional structures.

2.2.5. NERC

The NERC (Natural Environment Research Council) does not fund statistical methodology research to the same kind of levels as do the research councils previously considered, but some such funding does exist.

The specific NERC funding programme most relevant to statistics over the past 10 years was Environmental Mathematics and Statistics (EMS) programme, which no longer exists. At various times, NERC part funded the National Centre for Statistical Ecology, though EPSRC has funded that Centre over a longer term.

With some guidance on sources from NERC contacts, I have attempted to identify funding support for statistical projects by querying the NERC online grants database¹⁴ with the term “statisti*”, and then (in a similar manner to that used for MRC) deciding on whether a grant really was supporting statistical methodology to some extent using a rather crude process of judgement based on the grant title, the principal investigator, and the PI’s department. (The same process was carried out on records of grants in the EMS programme, though all the resulting records had previously been obtained through the text search.) The total funding amounts, classified by academic year according to the start date of the grant, are shown in Figure 9. The record for the last year shown may not be complete.

Funding levels have been very variable, but generally an order of magnitude lower than those from EPSRC, ERC, MRC and BBSRC.

NERC provides research student support in its areas of activity, and these have in a small number of cases funded research in environmental statistics. Most of this support came under the now-complete EMS programme. In addition, NERC used to provide funding for studentships on taught masters degrees. This seems not to have been used to fund studentships on masters courses identifiably in statistics, and in any case NERC have decided not to fund any such studentships after the end of the 2010-11 academic year.

¹⁴ Available at <http://gotw.nerc.ac.uk/>.

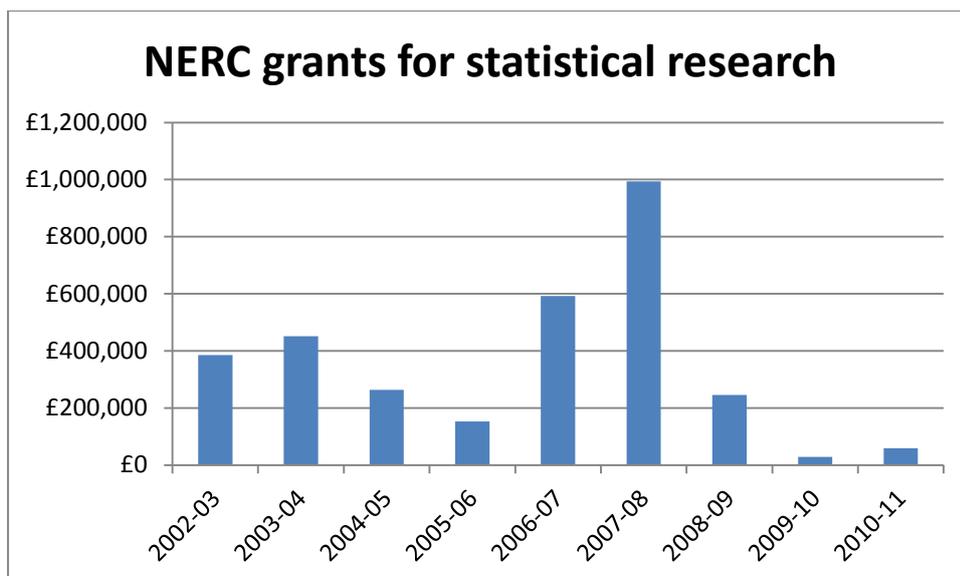


Figure 9. Total NERC funding for research grants classified by KM as being in statistics, 2002-03 to 2010-11. Base data from NERC.

2.2.6. AHRC

The Arts and Humanities Research Council (AHRC) should seem an unlikely source of funding for statistical research. Initially they were not included on my list of research councils to investigate. However, a superficial reading of some of their grant titles¹⁵, and the fact that they are jointly responsible (with ESRC and several other funders) for the “Digging into Data project”¹⁶, which aims to “address how ‘big data’ changes the research landscape for the humanities and social sciences”, persuaded me to enquire further.

AHRC sent me a list of all research awards containing either “statistic*” or “mathematic*” in their title or summary. Many of these were in the history of mathematics or statistics. Others did involve the application of statistics. A few did suggest that there might be some development of statistical methodology, but not on a large scale; the total funding involved was a few hundred thousand pounds in total over the last ten years.

2.3.NIHR

Another major source of funding for statistics, in the medical and health area, is the National Institute for Health Research (NIHR). The NIHR, which is technically part of the National Health Service (NHS) and is funded by a levy on the overall NHS budget, had a budget in 2010-11 of £922m¹⁷, considerably in excess of the Government funding allocation to the largest Research Council (which is EPSRC).

The structure of the NIHR, and its modes of operation, are, unsurprisingly, quite complex, and the nature and scope of its research funding has varied over the years. This is not the place to go into all the details¹⁸. As well as funding specific research projects (under a number of individual schemes), NIHR has a role in research capacity building, particularly in strategic skills, which include

¹⁵ See www.ahrc.ac.uk.

¹⁶ See <http://www.diggingintodata.org/>.

¹⁷ Source: <http://www.nihr.ac.uk/about>.

¹⁸ Those interested are directed to the NIHR home page at <http://www.nihr.ac.uk/Pages/default.aspx>.

appropriate aspects of statistics. For instance it has a Programme to build capacity in Applied Research Methods¹⁹ (which include statistics) that follows development beginning with opportunities for internships during undergraduate vacations, followed by Fellowships that are available to those in their early postgraduate years, or returning after a career break, or changing career direction in particular ways (and which would generally include study of an appropriate masters degree). In some cases these Fellowships would lead on to an NIHR Doctoral Training Fellowship. More recently this programme has also covered the provision of a number of studentships for masters study in medical statistics; in 2011 this paid for 16 studentships annually at five different universities, and the scheme continues. Currently (in my opinion), none of the Research Councils is acting to build research capacity in any area of statistics in such a thoroughgoing way.

Data provided by NIHR on funding amounts from 2009 to 2011 is summarised in Table 3. These figures may well underestimate slightly the level of support to statisticians who are contributing to research led by another researcher in a different area.

Table 3. Summary data on NIHR funding for statistics, 2009-11. Summarised from data provided by NIHR.

	Total (£)
Personal research awards to statisticians or others in statistics departments	£1,052,380
Payments to statisticians as indirect costs of other award holders	£121,672
Funding for medical statistics masters	£883,470
Awards to statisticians/statistics departments under Research Methods Opportunity Funding Scheme	£298,000
Awards to statisticians/statistics departments under Research Methods Fellowship Scheme	£3,216,486
Total	£5,572,008

The overall support to statisticians and statistics departments is thus on a similar scale to that provided by several of the research councils.

2.4. Conclusions

Because of the very different ways in which support for statistics was defined (and allocated between years) for the different funding councils, it would be misleading and pointless to attempt to aggregate them. However, it is clear that, while EPSRC almost certainly remains the biggest funder of research into statistical methodology, there are also major contributions from other research councils (ESRC, MRC and to a somewhat smaller extent BBSRC), which may possibly, in aggregate, surpass the EPSRC funding total. This other funding does, in some cases at least, support the development of new statistical methodology. Of course such developments are not funded by the non-EPSRC councils as general statistical methodology research; the aim will be to develop methodology relevant to the area covered by the Council in question. Nevertheless, some of the

¹⁹ More details at <http://www.nihr.ac.uk/files/pdfs/Implementation%20Plan%203.2b%20NIHR%20Programme%20to%20build%20capacity%20and%20capability%20in%20Applied%20Research%20Methods%20%28PDF%29.pdf>.

methodology whose development is funded in these ways will move to more general contexts at a later stage.

2.4.1. What are the funders' objectives and where are the boundaries between them?

In addition to their primary aims of supporting research in their own areas of responsibility, several (arguably, all) research councils have, in different ways, instituted programmes specifically to develop methodology in their area, and/or to build research capacity (rather than directly funding research). Many of these methodology or capacity building initiatives have, or could, provide support for statistics. But a major problem for all concerned is that all these developments remain somewhat uncoordinated.

In principle, further, there is a reasonably clear distinction between the sort of statistical research the EPSRC is responsible for, and the more applied research involving statistics that would be the province of one of the other councils, and (in the case of medical research), work funded by NIHR. In practice, the boundaries tend to be somewhat blurred — there is a rough gradient, but it is not always clear where particular work might fall on it.

Medical statisticians can at the same time be funded from the EPSRC, the MRC and NIHR, to do work that is roughly distinguishably different in character at each stage, but actually expressing these differences is not straightforward. It has been pointed out to me that these distinctions have a link to impact, as it will be measured in the forthcoming REF. As one moves from research funded by EPSRC, to MRC, to NIHR, the timescale for good research to have impact should tend to shorten. This could have uncomfortable consequences for those working mostly at “the EPSRC end”, depending on how impact is in the end assessed.

In its evidence to IRMS 2010 (part 3, p. 41)²⁰, the RSS wrote, “Collectively, these concerns and the diverse nature of statistics lead the Society to comment on the findings of the last IRM with the following: ‘Consultations with other Research Councils towards establishing a one-stop-shop for statistics funding, both core and applied: Such an initiative would be able to take a strategic view of the discipline, and maintain a balance between applications and methodology. It would be a natural development from the existing systems of cooperation.’ This comment is still strongly patent in today’s research landscape.” Indeed. Further, it seems (to me) unlikely that any single Research Council would wish to take on this responsibility alone in the current climate (and, given the specific aims and orientations of all of the research councils, it is unlikely that the statistics community would welcome the overall effect if that did happen). Is there a role for the RSS or some similar body in setting up the one-stop shop, or at least a one-stop advice centre (looking both to the community and the research councils)?

2.4.2. What is left out?

Given this complicated landscape, it seems likely that certain types of research might fall through the gaps between funders. In fact I have found no specific evidence that this happens on a major and systematic scale. But a definite gap arises in the funding of masters level study. The recent introduction of funding from NIHR is a welcome addition, but basically the position from all Research

²⁰ Available at

<http://www.epsrc.ac.uk/SiteCollectionDocuments/other/MathsIR2010EvidenceDocumentsParts1-3.pdf>.

Councils is that there is no support for taught masters student *except* where such funding supports other goals, such as CDTs and the use of DTGs from EPSRC, or ESRC 1+3 funding where the aim is to fit individuals to take on a PhD. Individuals wishing to get a masters degree in statistics for other reasons (such as direct entry to the job market) are not covered by these public funding sources at all, and this position seems unlikely to change in the foreseeable future. In this respect statistics is no different from most other disciplines. These aspects are discussed further in Section 5 below.

3. Departments and staff

IRMS 2010 (Section 15) recorded, amongst the reasons for specific serious concern about the UK statistics research community, several to do with the existence of small groups of researchers, the position of small statistics departments, and the age profile of academic statisticians. On age, particular concern was expressed about the relative lack of people in their 40s.

It is noteworthy that the IRMS states “Evidence to support the statements in this section [Section 15 on ‘Structural Issues Specific to Statistics’] was brought strongly to the Panel’s attention during the site visits by individual comments (which are not appropriate for inclusion in this report).” Many statements on the position in statistics are given in the evidence from universities and other bodies to IRMS 2010²¹, but it is not always clear which (if any) of these the Panel relied on in their conclusions. Thus it is not easy to investigate more widely the reasons why the Review came to the conclusions it did. In fact, the position on the ground is rather complicated.

First, it must be pointed out that a great number of UK academic statisticians seem not to be located in what would conventionally (and historically) be seen as statistics departments. The IRMS bemoans the fact that “there is now no free-standing statistics department in Scotland or Wales”. This is indeed true; it applies further to Northern Ireland, and to the best of my knowledge there are very few such departments left in England. (I know of just four – LSE, Oxford, UCL (Statistical Science) and Warwick.) Until fairly recently, there were many more, but there has been a marked recent tendency for UK universities to amalgamate smaller departments (in all subjects) into larger groupings (sometimes still called departments, sometimes with other names such as Schools). The reasons given for these changes are diverse but often involve notions of administrative or organisational efficiency. Thus several previously free-standing statistics departments have ended up as part of a Department or Mathematics and Statistics, or of Mathematical Sciences, or an even broader grouping involving perhaps computing, or business, or physical science, or engineering.

While such changes probably always involve a certain loss of autonomy for the statisticians, they do not *necessarily* lead to a reduction in the number of statisticians or of the resource available for statistical teaching and research. Cases certainly do exist where such reductions did occur, but there are also cases where they did not. It must also be borne in mind that some prominent statistics research groupings (for instance, that at Imperial College) were never based in a free standing statistics department. The question is, to what extent a group of academic statisticians can retain its distinctive culture and hence its presence, when it is organisationally part of some broader structure – perhaps one that follows the IRMS’s wish to emphasise the unity of the mathematical sciences. It seems very unlikely that UK universities will, in the near future, go back to preferring smaller

²¹ Available at

<http://www.epsrc.ac.uk/SiteCollectionDocuments/other/MathsIR2010EvidenceDocumentsParts1-3.pdf>.

departmental groupings, and it has to be said that there are certain advantages as well as disadvantages of being part of a larger and more diverse department.

A wider question is that many UK academic statisticians are not located in departments which fall obviously into the mathematical sciences. Here it is not at all easy to assess the exact position, for many reasons, not least because it is far from clear exactly who counts as an “academic statistician”. But one loose indicator comes from the Directory of Academic Statisticians²². This information source has not been kept up to date, and so any conclusion drawn from it must be shaky²³. Nevertheless, a count of names was carried out in March 2011. In departments which are easily identified as belonging (in part at least) to the mathematical sciences (including departments of statistics, mathematics and statistics, mathematical sciences, computer science and mathematics (and the like), and including social statistics groupings), there were 673 names. In all other types of department there were 546 names, so not many fewer. (These counts omit names in the Republic of Ireland because it is out of scope for a study of UK academic statistics – though it would not have made a huge difference to include them.) Most of the “others” were medical statisticians of one kind or another, working in departments in medical schools and medical research establishments, but with reasonable numbers also in business schools too, or in research groups like the MRC Biostatistics Unit in Cambridge or BIOSS in Scotland.

This complicated organisational landscape means that many who are properly regarded as academic statisticians will have an “academic home” that is not primarily statistical or even, in some cases, broadly mathematical. My feeling (based on no substantive data) is that this dispersion has got more acute in recent decades, with the decline in single-discipline statistics departments and the (welcome) increased use of statistical perspectives and skills in biomedical research of all kinds. However, there have always been considerable numbers of statisticians based in departments and groupings whose main subject interest lies elsewhere, and these have at times included some of the most prominent statistical researchers (think of Fisher at Rothamsted, and indeed at UCL (Eugenics) and Cambridge (Genetics)). The diversity is not going to go away; what is required is effective means of support and interaction between statisticians in this context.

One interesting feature of the UK academic statistics landscape is the relative lack, compared to the position in some North American universities, of joint appointments for statisticians involving a department in statistics or the broader mathematical sciences, and another department in a discipline that collaborates with statistics. There are a few such posts in the UK, and although the arrangements for them may be administratively messy, it may be worth investigating whether such arrangements could support both the statistical needs of the collaborating department and the need for statisticians to have an academic home where they can also collaborate with other statisticians.

Turning now to the age distribution of academic statisticians, this is another area where good data are not easy to come by. The Higher Education Statistics Agency (HESA) publishes data on UK academic staff, including information on age, but the data on the discipline(s) they are involved in is

²² <http://www.swan.ac.uk/statistics/das/>

²³ The hopes and recommendations of Smith and Staetsky (2007) that the Directory would be developed further into an authoritative and reliable data source have not yet been fulfilled; indeed the state of the Directory has become considerably less useful since their study. (T. M. F. Smith and L. Staetsky (2007), ‘The teaching of statistics in UK universities’, *J. Roy. Stat. Soc. A*, **170**, 581–622.)

not helpful for the present purpose. One source of data is the Committee of Professors of Statistics (COPS), which carries out an annual data collection exercise from departments and groups involving statisticians. The results of these surveys are acknowledged to be incomplete in several respects, and the omissions are unlikely to be treatable as random; in particular they appear to omit some of the smaller staff groupings, particularly those based outside departments of mathematical sciences. However, in terms of age of academic staff in statistics, they may be the best we have.

The results of the latest data collection exercise are available at <https://www.jiscmail.ac.uk/cgi-bin/filearea.cgi?LMGT1=COPSTAT&a=get&f=/COPSQ12.PDF>.

They show that 24% of the staff are in the age group 40-49, the age group about which the IRMS expressed particular concern. But is 24% low? Table 4 contains the COPS data on age (aggregated across staff grade), and also HESA data on the age distribution of all full-time academic staff (excluding those on “atypical” contracts) in UK universities in 2010/11, the latest available at the time of writing.

Table 4. Percentages in various age groups of 118,110 full-time academic staff in all subjects in UK universities (excluding those on atypical contracts) in 2010/11, and of 775.1 FTE academic statistics staff in universities in the UK at 1 January 2012. Sources:
http://www.hesa.ac.uk/images/stories/hesa/Pubs_Intro_Graphics/STAFF_1011/Staff_1011_table_E.xls
<https://www.jiscmail.ac.uk/cgi-bin/filearea.cgi?LMGT1=COPSTAT&a=get&f=/COPSQ12.PDF>

All subjects		Statistics	
Age group	Per cent of total	Age group	Per cent of total
<31	13	<30	17
31-40	30	30-39	35
41-50	29	40-49	24
51-60	23	50-59	17
61+	5	60+	7

There are several obvious reasons why these figures are not directly comparable (e.g. different age groups, necessitated because of the groupings used in the source reports; different times, different staff definitions). However, a crude comparison does indicate some differences. There is a greater proportion of staff in the two youngest groups in statistics than generally. There are rather fewer, proportionally, in the over 50 groups taken together. It is true that the percentage in the 40s age group is somewhat less in statistics than in the overall figures, but it is not entirely clear that the difference is large enough to be of substantive significance.

Something that in any case cannot be answered from the data in Table 4 is the *reason* for the relatively low proportion of academic statisticians in the older age groups. Two possible explanations — obviously there are others — are, firstly, that the overall numbers entering on academic statistics careers are increasing, so that larger numbers in the younger age groups will gradually move up as the younger statisticians get older, or secondly, that academic statisticians are leaving the profession as they reach middle age, and not being replaced in adequate numbers. To throw clear light on this would require longitudinal data in individuals, which are not available. But looking at the change in numbers in the age groups over time could help. However, the only data source for this is the annual COPS surveys, and there are complications.

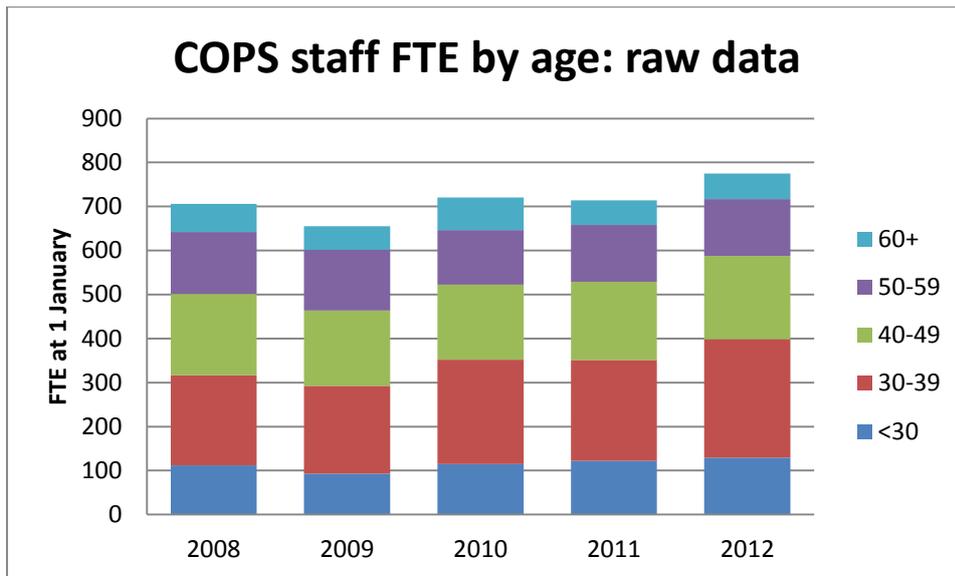


Figure 10. Numbers (FTE) of statistics academic staff by age group, as at 1 January in each year 2008-2012. Source: annual COPS questionnaire reports.

Figure 10 shows the numbers taken from unadjusted COPS data. However, the institutions that reply to the COPS questionnaire vary from year to year, so that changes in numbers may be in part due to the respondent institutions changing. Because of this, since 2009 the annual COPS reports have also included staff numbers (and other data) for those institutions that responded both in the year in question and the previous year. I used these data to produce a (rather crudely) adjusted set of data, by starting with the raw 2012 data and projecting the numbers in each age group back a year at a time, assuming that the annual percentage change in each age group across all reporting institutions was the same as the change for institutions that reported in each pair of successive years. The data are shown in Figure 11.

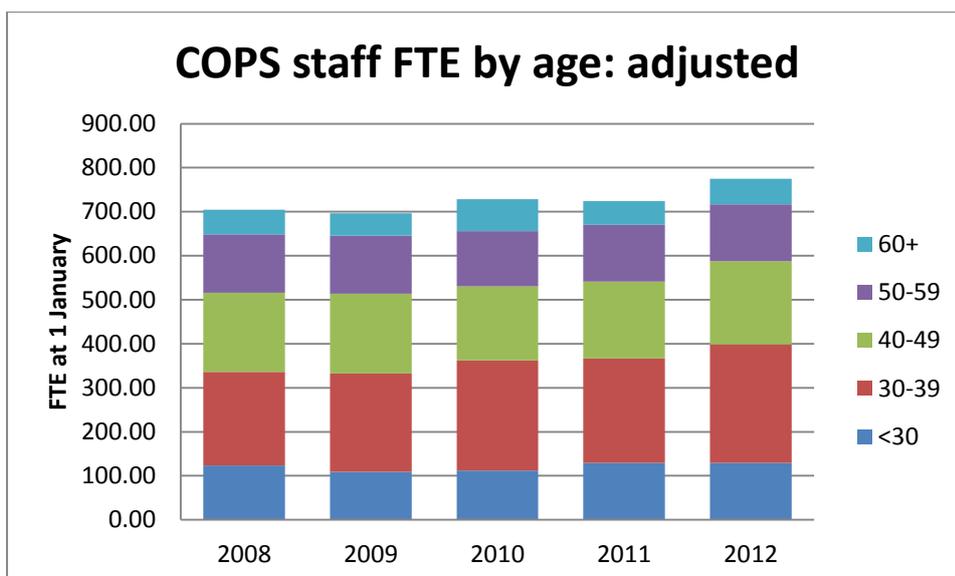


Figure 11. Adjusted numbers (FTE) of statistics academic staff by age group, as at 1 January each year. Data from annual COPS questionnaire reports, adjusted as described in the text.

This gives a slightly different impression. Total (adjusted) numbers have generally risen over this 5-year period (as was indeed the case with the unadjusted data after 2009). The increase is most marked in the younger age groups, particularly the 30–39 group, and with a particularly large increase from 2011 to 2012. But numbers aged in the 40s also show an increase over the period, and numbers of over 50s have remained roughly stable (apart from a one-year ‘bulge’ in 2010, which I suspect to be a data error).

As a summary, one might tentatively conclude that the position on academic staff age in statistics is not remarkably unfavourable compared to that in other subjects. One might even take the relatively optimistic view that the number of statistics academics in their 40s is very similar to the number of staff aged 50 and over that they will have to replace eventually, but that there are proportionally rather more younger staff (20s and 30s) in statistics than in other subjects, so that the longer term future of the discipline is in relatively good shape. Further, problematic though the evidence is, there are signs that overall numbers of younger statisticians, and even perhaps those aged in their 40s are increasing, and that at the very least things are not worsening in the older age groups.

I am aware that the guarded optimism here is somewhat at odds with the much gloomier view presented to the Society by Smith and Staetsky in 2007²⁴ (though I have looked at rather different data, and the main sources used by Smith and Staetsky are not all still available in up-to-date form). Further, evidence from several universities to IRMS 2010 made the point that it is more difficult to recruit to the more senior research-based posts in statistics (and OR) than in many other subjects, a problem which has been evident going back at least to the time when Smith and Staetsky did their work (and probably much further). This difficulty is attributed by some universities to a lack of upcoming middle-level staff. But my work has thrown no light on why this should be a particular issue in *statistics*. In its evidence to IRMS 2010²⁵, the RSS suggests (part 3, p. 151) that an issue may be that “the flow of skilled statisticians tends to be away from the (academic) research base into industry” with only rare moves in the opposite direction (and in contrast to the situation in the US where the flow appears to be “more bi-directional”. Further (p. 200) the fact that statisticians move into application areas may be leaving statistics departments (and the equivalent) insufficiently staffed to train the next generation. Evidence to IRMS from other sources²⁶ also suggests that competition from business and industry may be a major reason for the difficulty of recruiting senior staff.

Maybe a partial solution would be to involve those who have moved into application areas more thoroughly in the training of the next generation? Smith and Staetsky (2007) concluded that “On present trends the UK academic system within statistics is unlikely to be self-sustaining; it will depend on recruiting qualified statisticians from overseas.” They effectively assume, however, that the only real route for staff into academic statistics is through doctoral training conducted in groups based in the mathematical sciences (and hence, for instance, that groups of statisticians based elsewhere, such as in departments of medicine or public health, are contributing to the demand for trained statisticians but not substantially to the supply). While this is arguably a somewhat

²⁴ T. M. F. Smith and L. Staetsky (2007), ‘The teaching of statistics in UK universities’, *J. Roy. Stat. Soc. A*, **170**, 581–622.

²⁵ Available at

<http://www.epsrc.ac.uk/SiteCollectionDocuments/other/MathsIR2010EvidenceDocumentsParts1-3.pdf>.

²⁶ See for instance evidence from the University of Manchester (part 3, p. 22).

exaggerated view – there *are* PhD places in statistics in medical and public health departments (and elsewhere) – it is certainly the case that the predominant route into academic statistics is through groups in the mathematical sciences. But one has to ask whether it needs to be like that.

Going back several decades, it was less common than it now is for academic statisticians to have come up through such a route; some statisticians had come via other routes, and many prominent academic statisticians had no PhD. A general assumption seems to be that this was because academic statistics is a relatively recent discipline, and because generally in the past the possession of a PhD was not always so important a requirement for entry to academic posts. It is assumed to follow that as the discipline has continued to mature, and as the PhD requirement has become more important across all disciplines, academic statisticians would enter via similar routes to those that are the norm in other areas of the mathematical sciences; that is, via a PhD from a mathematical sciences department. On the view that statistics is a mathematical science like any other, this is reasonable. But statistics is a very applied discipline with strong links elsewhere. In some other disciplines with such characteristics, for example in some areas of technology, routes in from industry or via research training in another discipline are more frequent, and a PhD may not be such an essential requirement. Should the statistics discipline think of itself more in those terms, and act accordingly in academic recruitment and development?

But to make any definite conclusion here would require more data and more analysis.

Before I leave questions of staffing, an important issue that is (it seems to me) almost impossible to deal with from existing data relates to the position of academic statistics, and development of statistical methodology, carried out by academics who are certainly not in a mathematical sciences department, who would never describe themselves as statisticians, but who may be very competent statistically (albeit sometimes in a limited area). Much statistical methodology does develop through the route of being introduced, perhaps in a fairly general context, by academic statisticians who would see themselves as methodologists or even theoreticians, then moving into a narrow or wide range of appropriate application areas, and eventually even becoming routine amongst workers in those areas whose do not see themselves as statisticians. But this is far from being the only route. (As previously mentioned, a sizeable proportion of EPSRC funding for statistics research is not going to academic statisticians in mathematical science department.) IRMS 2010 emphasises the inappropriateness of erecting barriers between different parts of the mathematical sciences. Recognising differences of approach and orientation is fine; using these to set boundaries does not help. The same surely applies to making boundaries between people called academic statisticians and people carrying out research and development of statistical methodologies who are not so labelled. (Was R.A. Fisher a statistician, a geneticist, or a mathematician? The question does not make sense, if we have to choose just one alternative.)

4. Student numbers (HESA)

4.1. Introduction

In terms of numbers of students and courses, this report generally concentrates on masters level provision. However, this section takes a wider view, looking at counts (full-time equivalent (FTE)) of

students studying statistics at all levels in higher education in the UK. It is based on data supplied by the Higher Education Statistics Agency (HESA).

Statistics as a subject features in a highly unusual way at undergraduate level in UK universities. There are very few single honours degrees in statistics available. The number of such courses has fluctuated to some extent over time, but has never been great. For 2013 entry, the UCAS (Universities and Colleges Admissions Service) database of courses includes reasonably conventional single honours first degrees in statistics from only nine²⁷ UK universities:

- Bath (including a sandwich degree)
- University of the West of England, Bristol
- Glasgow
- Greenwich
- Heriot-Watt (degree title is Statistical Modelling)
- Lancaster
- Newcastle
- St Andrews
- UCL

Many students study statistics at undergraduate levels as part of other courses that are not single honours in statistics. These would include joint honours courses, courses where statistics is studied as a “major” alongside some other named “minor” (or vice versa), and broad courses in the mathematical sciences where what might be a considerable proportion of statistics is studied by at least some of the students, but where “statistics” does not appear in the degree title. In addition, courses in a great number of disciplines involve greater or smaller amounts of what might be called “service teaching” in statistics, which might be run as service teaching in the narrow sense by statistical staff from a statistics or mathematical sciences department, or which might be taught by staff (statistically qualified or otherwise) from the “home” department of the students involved.

Though it is hard to find data to establish the facts firmly, it would seem probable that most university level undergraduate statistics is taught to students who would not regard themselves as statistics students, and would not appear as statistics students in any externally available data. As we shall see, in HESA data even students who *would* generally be regarded as statistics students might well not be counted as such. No attempt has been made (for this report) to obtain internal data from universities on numbers of undergraduate students studying statistics, but I suspect that, in many universities, such data may not exist. Most universities have no separate statistics department, and many may not classify individual modules in such a way as to allow the identification of those that are in statistics.

If the only consequence of this complication and potential invisibility were simply difficulties in getting together data for a report such as this, maybe that would not matter. My main concern, however, is that the resultant limited visibility of the large amount of undergraduate statistics teaching that undoubtedly does go on in every UK university may lead to decisions about the future

²⁷ There were ten for 2011 and 2012 entry; the University of Reading had degree courses in both Statistics and Applied Statistics.

of the subject (in individual universities, or nationally) being made on the basis of very inadequate evidence.

It is a cliché that academics from every discipline claim that their discipline is unlike all others; however, I do not know of any other academic discipline where (a) the great majority of teaching of the discipline to undergraduates is directed at students whose main interest is in another discipline, and (b) a substantial majority of teaching even to those who would admit to having a substantial interest in the subject is on joint honours and other broad degree programmes rather than single honours degrees.

Turning back to the HESA data, the considerations just described cause severe problems of interpretation and of continuity of data over time. The data obtained from HESA cover the academic years from 2002/03 to 2010/11 inclusive. The latest data available at the time of the updated analysis for this report was for 2010/11, but the choice of 2002/03 as a starting point was made because in that year, HESA made a major change to the way it treats data on students whose courses cover more than one subject. From 2002/03, a student on a course in more than one subject would be allocated amongst the subjects involved. For instance, a full-time student studying a joint honours degree in statistics and some other subject would count as 0.5 of a student (full-time equivalent, FTE) in statistics and 0.5 of a student in the other subject. (There were, and still are, different rules for students in initial teacher training.)

Until 2006/07 (inclusive), universities were supposed to do this apportionment on an individual student basis, so someone on a mathematical sciences degree who was (in the relevant year) studying only pure mathematics would be recorded as a 100% pure mathematics student, while another on the same degree course who was spending half their time on statistics modules would be recorded as 50% statistics (the other 50% going to whatever other subjects they were studying). In practice, it is unclear to what extent this apportionment was actually done on an individual basis, and it certainly seems to me, after working on these data, not to have been done consistently across universities.

From 2007/08, the apportionment is meant to be done on a course by course basis, so that all students on a particular course in a particular university would be apportioned in the same way, ignoring the possibility that different individuals on the course might be studying different subjects within the classification scheme that HESA uses. Just as in previous years, the allocation is done by the university involved, and while superficially the HESA rules might seem to be detailed, in practice there seems to be a great deal of room for interpretation by universities.

The upshot of all this is that there are anomalies in the HESA data, at subject level, that are impossible to explain without going back to the universities concerned and asking them for much more detail. I have not done so, because the time available did not allow it (and indeed it is not certain that any university would wish to comply with such a request, or indeed be able to). These anomalies apply to postgraduate students as well, though the reasons for their existence at postgraduate level are even less clear to me.

Just a few of the anomalies I spotted are as follows. (There are many others. I am not claiming that the particular universities I mention are particularly bad – I merely wish to exemplify the issues that have arisen.)

- According to the data they supplied to HESA, the University of Cambridge had no students at all in statistics (postgraduate research, postgraduate taught, or undergraduate) from 2002/03 to 2007/08 inclusive. (This despite the then existence of their postgraduate MPhil in Statistics, for instance.) Then in 2008/09 they suddenly acquired almost 40 (FTE) research students, and some taught postgraduate students (but still no undergraduates).
- The University of Oxford did have students at all three levels throughout the period for which I obtained data from HESA. The recorded number of postgraduate research students (FTE) was between 35 and 50 from 2002/03 to 2004/05, and again in 2009/10. In 2010/11 it rose to just over 60. However, from 2005/06 to 2008/09 the corresponding number was considerably higher, between 70 and 80. Of course it is possible that the university recruited a very large cohort of new research students in statistics in 2005/06, perhaps because of some special initiative, and that they stayed till they had finished their degrees in 2008/09 and left, not to be replaced. But it is also possible that the change was due to some change in the way the university recorded or reported its student numbers to HESA. One cannot tell without asking further questions direct to the university.
- LSE had no statistics undergraduates at all from 2002/03 to 2008/09 inclusive, according to their HESA returns. However, in 2009/10 they had 175 such students (FTE) and this rose to 207 in the following year. Can this really be the whole story?
- The Open University, had (according to its HESA return) no undergraduate statistics students in 2002/03, then had between 125 and 150 a year (FTE) for the next three years, then in 2006/07 the FTE number suddenly rose to about 260 and has since then gradually increased to about 300. Since this is my own university, I know that there have been no such step changes, that the figures for 2006/07 onwards are accurate and that the figures for the earlier years should have been at a broadly similar level. But I also have no idea how the anomalies arose, and I think the same applies to other people in my own department. (I mention this simply to point out that going back to statistics academics and asking about anomalies may not settle what really happened.)

In the words of Smith and Staetsky (2007), referring also to HESA data on student numbers in statistics, “Basically any set of data generated by administrators should be treated with caution.”

Having described this rather uncomfortable position, I shall now summarise the main features that I found in the HESA data. However, the data problems and anomalies must constantly be borne in mind in reading the following.

The data obtained from HESA gave the full-time equivalent (FTE) numbers of students recorded as studying statistics for each of the academic years 2002/03 to 2010/11 inclusive²⁸. In this context, “studying statistics” means that the recorded subject had the JACS (Joint Academic Coding System) principal subject code G3 (Statistics). JACS subject codes²⁹ consist of a letter followed by 3 digits, and any such code beginning with G3 is included under the G3 (Statistics) principal subject code, which therefore includes (among others) G311 (Medical statistics) and G320 (Probability) as well as G300 (Statistics).

²⁸ More precise definitions of the terms used here are given in various places on the HESA website

(www.hesa.ac.uk)

²⁹ www.hesa.ac.uk/jacs2

These FTE numbers were classified by:

- Level of study (Postgraduate (taught)/postgraduate (research)/undergraduate)
- Mode of study (Full-time / part-time)
- Domicile (UK/EU [i.e. the rest of the EU outside the UK]/other)
- Course aim [a broad categorisation of the qualification for which a student is aiming]
- Institution
- Age (grouped) (17 and under, 18-20, 21-24, 25-29, 30 and over)
- Gender

It turned out that, within each level of study, the course aim of the great majority of students (generally over 90%) was the most obvious kind of qualification in that level of study (so research doctorate for postgraduate (research), taught masters degree for postgraduate (taught), and honours degree or some extended form thereof for undergraduate)³⁰. Thus course aim was not analysed further in what follows.

The HESA data come from the HESA Student Record 2010/11, and are Copyright Higher Education Statistics Agency Limited, 2012. HESA cannot accept responsibility for any inferences or conclusions derived from the data by third parties. The data should not be reproduced or published further without further permission from HESA.

In the following subsections, the data are presented graphically and not in tabular form. This is largely because the quality of the data does not support high accuracy.

4.2. Overall trends over time

The diagram in Figure 12 (“stacked” so that the upper limit of the Undergraduate area of the bars shows the total number of FTEs across all three levels of study) shows that, as in most main subjects, undergraduate numbers dominate the two postgraduate categories.

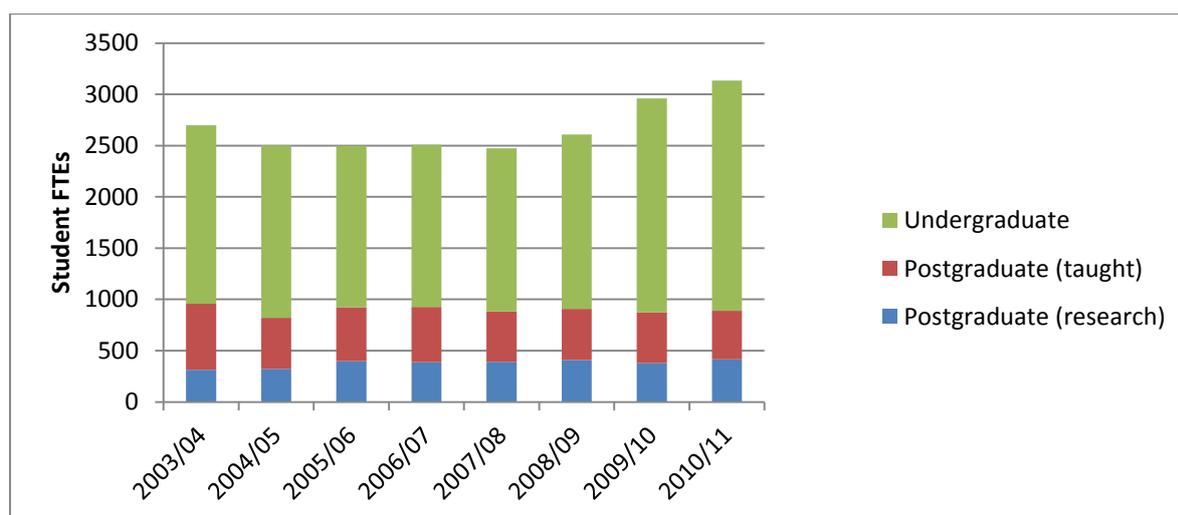


Figure 12. Numbers of student FTEs in Statistics by level of study, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

³⁰ These are not the official designations of these course aims. The official designations are longer-winded and changed in 2007/08. See HESA website for details.

Anecdotally, though, there is a view that the proportion of statistics students that are postgraduate is relatively high. The extent to which this is true depends on which subject(s) the comparison is being made with. In 2010/11, the data for Figure 12 show that 28% of statistics FTEs were at postgraduate level. FTE data for other subjects are not routinely downloadable from HESA, but estimates from data that are easily available³¹ show that over all subjects, the corresponding percentage is 21%. Compared to that, the proportion in Statistics is indeed high, though not hugely so. However, compared to the general position in the mathematical sciences, Statistics does indeed have a large proportion of postgraduates. In the 18 broad “subject groups” on which HESA reports, the percentage postgraduate varies from 11% (Creative Arts and Design) to 43% (Education). The percentage for the mathematical sciences is fourth smallest of all these subject groups, at 14% (so above Creative Arts and Design, and also above Veterinary Science at 12% and Languages at 13%, but smaller than (for instance) Engineering and Technology (25%), Physical Sciences (21%) or Computer Science (19%)). This arises because the principal subject Mathematics, which dominates the Mathematical Sciences group in numbers, has only 11% of its FTEs at postgraduate level. That percentage is remarkably low in comparison to most subjects across the spectrum. (Perhaps the closest analogy is with English Studies or History (each 10%), other subjects with large student numbers that follow on in a direct and immediate way from a popular A-level.) The upshot is that Statistics, in its distribution of student numbers across levels of study, does look very different from the other mathematical sciences overall (though Operational Research has an even higher percentage of postgraduates, 61%), but is much more similar to a wide range of other subjects in other areas.

Changes over time are most easily dealt with in the three levels of study separately.

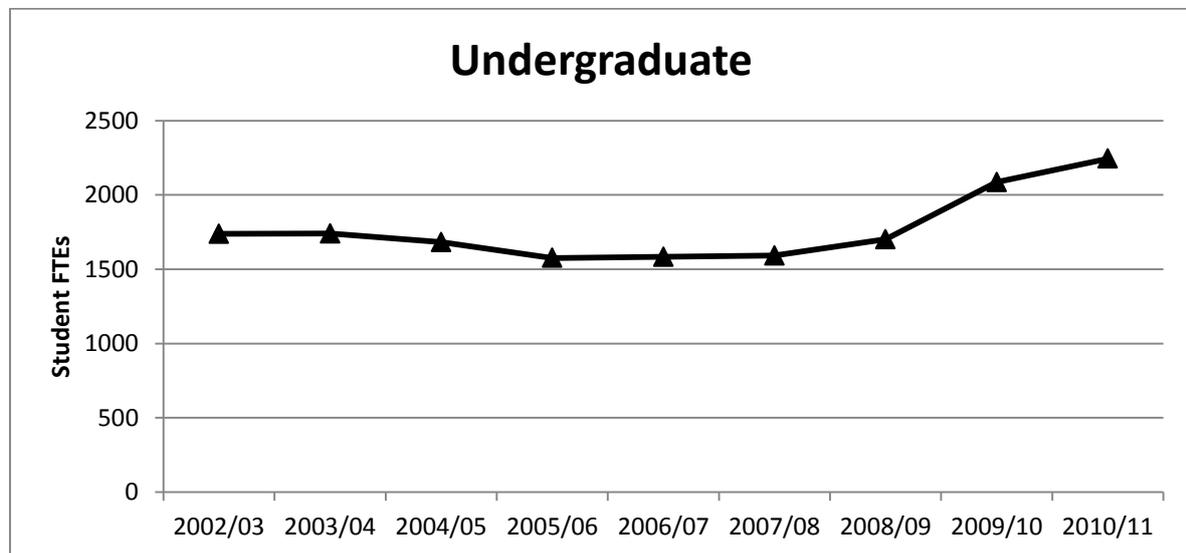


Figure 13. Numbers of undergraduate student FTEs in Statistics, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Undergraduate student numbers (Figure 13) show a decline to the middle of the decade, followed by a marked increase. To a limited extent this increase seems to have arisen because of changes in the way some universities code subjects, but in my judgment it is largely real, and matches a similar

³¹ Data from <http://www.hesa.ac.uk/dox/dataTables/studentsAndQualifiers/download/subject1112.xls>. FTEs roughly estimated by counting all full-time students as 1 and all part-time students as 0.5.

pattern seen in student numbers in other areas of the mathematical sciences. The current undergraduate position, to 2010/11, looks generally encouraging for statistics.

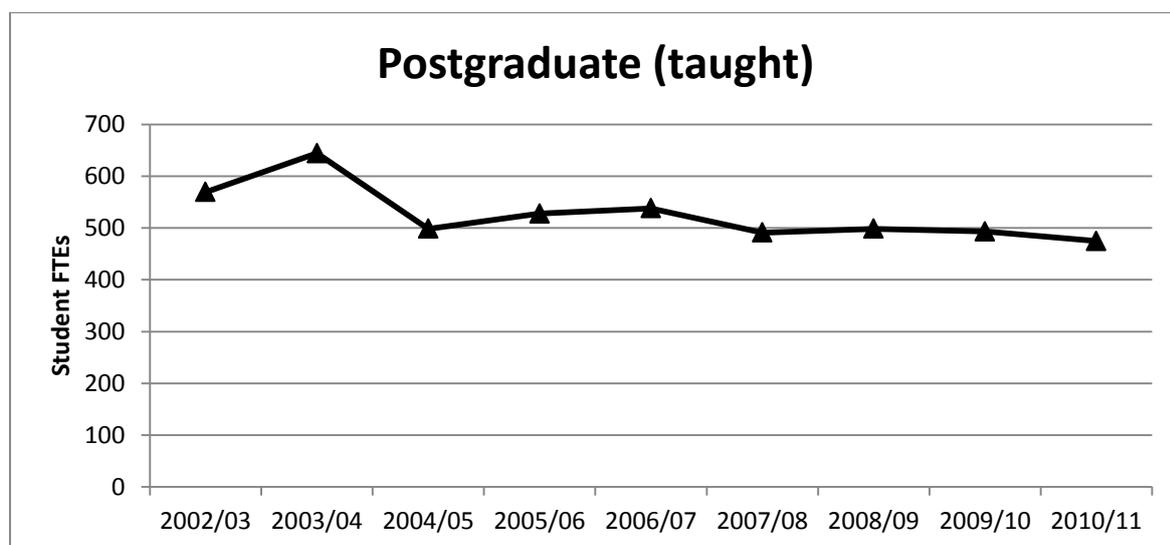


Figure 14. Numbers of postgraduate (taught) student FTEs in Statistics, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

The most obvious visual feature of the graph for taught postgraduate students (Figure 14) is the marked increase over the first two years shown, followed by a steep decline from 2003/04 to 2004/05. Looking at data for individual institutions, the increase occurred over a large number of universities and thus may well have been real. The decline between 2003/04 and 2004/05 is very largely due to just one university, Abertay Dundee, which recorded 130 FTEs in 2002/03 and 109 in 2003/04 (being the largest recorded provider of taught postgraduate statistics in both of those years), but has recorded none since then. I have not enquired about the details of this change. Apart from that, taught postgraduate student numbers remained relatively stable between 2004/5 and 2010/11. Despite repeatedly expressed concerns about student numbers at this level, the overall picture is not one of major decline – although it is certainly not a picture of growth either.

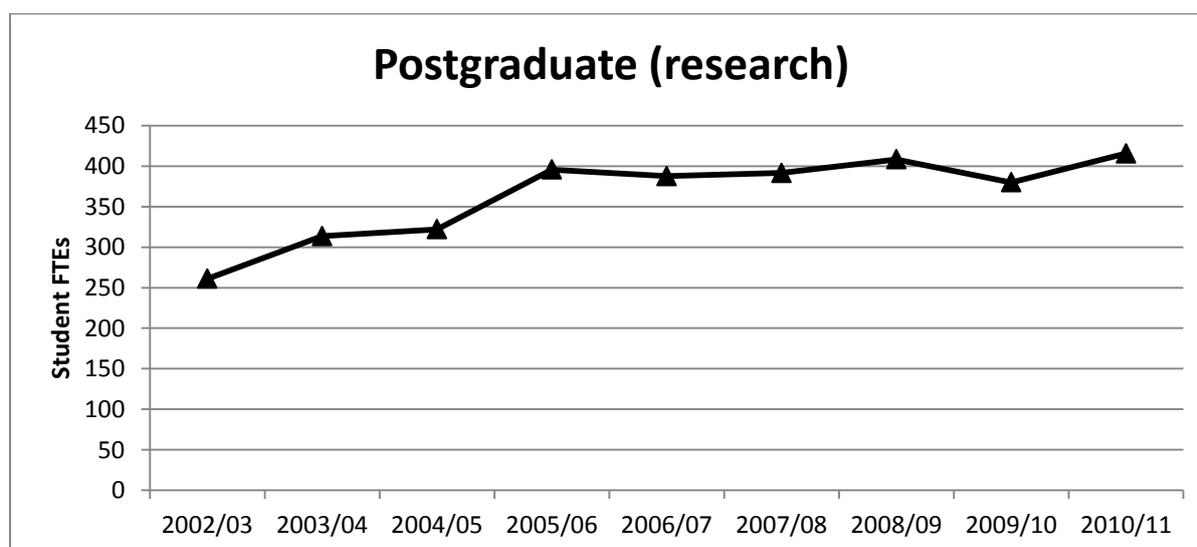


Figure 15. Numbers of postgraduate (research) student FTEs in Statistics, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Numbers of postgraduate research students in statistics (Figure 15) grew fairly substantially over the first few years covered, and have remained relatively stable since then. The reasons for the dip in 2009/10 are not entirely clear. To a considerable extent it reflects the recorded drop in research student numbers at Oxford (the largest provider overall) that was mentioned above as an anomaly in the data. Further, most of that dip was in UK-domiciled students – numbers from outside the UK remained almost unchanged. In any case, numbers recovered in 2010/11, rising for both UK-domiciled and other students. Again the picture looks reasonably optimistic for statistics.

4.3. Study mode (full-time or part-time)

Though the majority of statistics students study full-time, there are appreciable numbers of part-time students at all three levels of study.

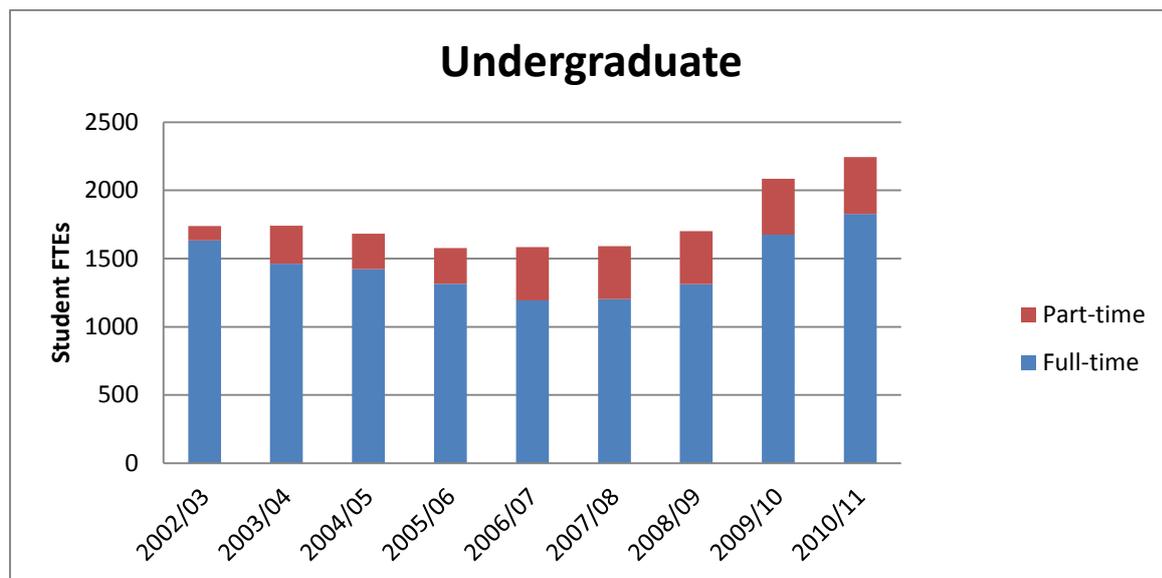


Figure 16. Numbers of undergraduate student FTEs in Statistics, by study mode, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

In undergraduate study (Figure 16), in 2010/11 one fifth of the student FTEs came from part-time study. Part-time student FTEs seem not to have been affected by the decline and rise in undergraduate student numbers that are seen very clearly in full-time students. There appears to have been considerable growth in part-time student FTEs over the period covered, but I believe this to be largely artefactual, stemming from the way that Open University student numbers were allocated to subjects (see above). Two institutions, the Open University and Birkbeck College, dominate the part-time picture, accounting between them for 91% of part-time FTEs in 2010/11. (Part-time numbers at the University of Sheffield have increased considerably over recent years, but at 23 FTEs in 2010/11 remain far smaller than those at Birkbeck, 75, and the Open University, 302.) This generally matches the position in other areas of the mathematical sciences, where part-time study is relatively uncommon except at Birkbeck and the OU.

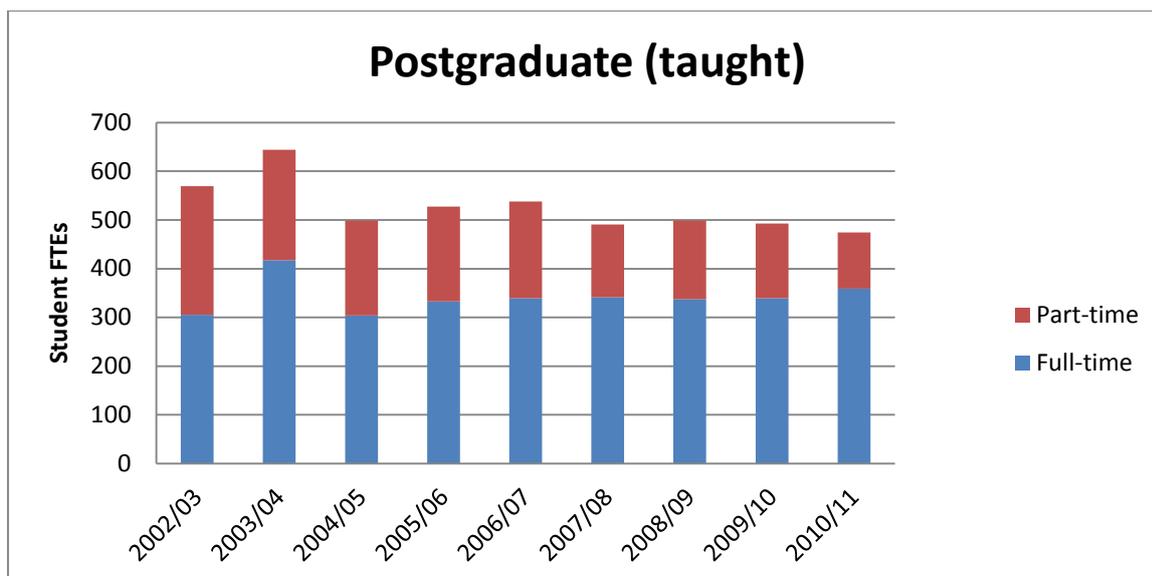


Figure 17. Numbers of postgraduate (taught) student FTEs in Statistics, by study mode, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Part-time study is relatively more common at the taught postgraduate level (Figure 17), with around one third of student FTEs coming from part-time study throughout most of the period covered. However, this proportion fell to under one quarter in 2010/11. As with undergraduate study, the part-time taught postgraduate sector is now dominated by a small number of providers, with 80% of the part-time FTEs in 2009/10 coming from just three institutions, Birkbeck College (57 FTEs), the University of Sheffield (24 FTEs) and Sheffield Hallam University (12 FTEs). For both the Sheffield institutions, these students would primarily have been taught at a distance. Part-time FTEs at the University of Sheffield have increased consistently over the period covered, as did those at Birkbeck except in the final year when there was a considerable decrease. Those at Sheffield Hallam have shown a decrease, particularly in the last year covered, and indeed that university has now closed the part-time distance-taught statistics masters courses on which most or all of these students would have been enrolled. In some previous years of the period covered, a few other universities (Abertay Dundee, Edinburgh Napier, Oxford, Southampton) had relatively large numbers of part-time taught postgraduate FTEs, but none approached the current level of Birkbeck (apart from Essex for one year, 2002/03, with 69 FTEs – since then Essex has had almost zero so this may have been a miscoding). It is not clear whether the large fall in part-time numbers between 2009/10 and 2010/11 is due to a decrease in demand or in supply.

The number of part-time research students (Figure 18) is relatively small, both in absolute terms and as a proportion of all research students. Part-time students are spread more evenly across a large number of institutions than is the case for undergraduates and taught postgraduates.

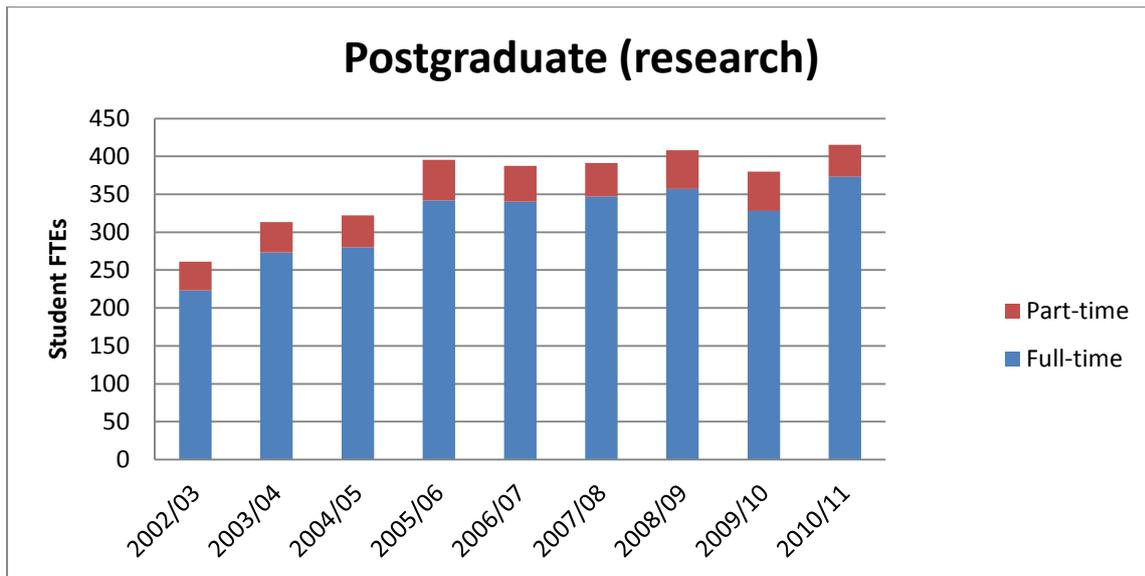


Figure 18. Numbers of postgraduate (research) student FTEs in Statistics, by study mode, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

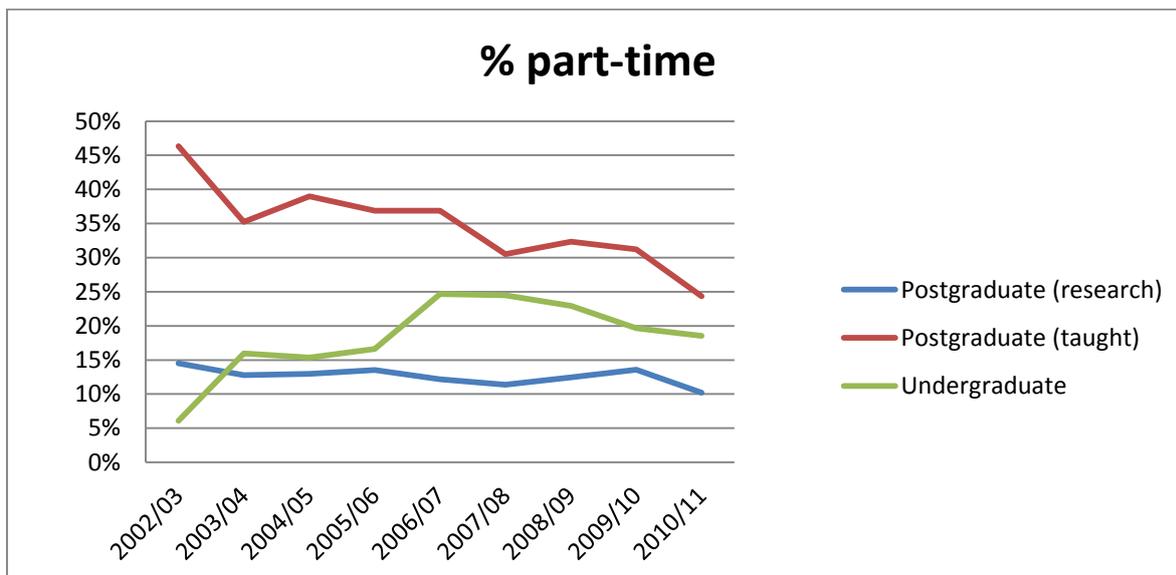


Figure 19. Percentage of student FTEs in Statistics that are part-time, UK universities, by level of study, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Figure 19 shows how the proportion of part-time student FTEs has changed over time, by level of study. The proportion of part-time research students has remained roughly steady. The proportion of part-time undergraduates appears to show a substantial increase over the period, but this seems to be largely an artefact of the failure to include all Open University students appropriately before 2006/07. The (smaller) decline since then does not represent an absolute decline – absolute numbers of part-time FTEs have actually increased over this period. Instead it reflects the more substantial increase over this period in full-time undergraduate numbers. The proportion of part-time taught postgraduate students does appear to have declined considerably over time. The apparent major decline from 2002/03 to 2003/04 is due to the removal of the 69 FTEs from Essex, mentioned above. However, the decline in later years is spread over several universities.

In summary, part-time study (both distance-taught and classroom based) plays an important, though far from dominant, role in undergraduate and taught postgraduate statistics. In each case, though, this market is served by a very small number of major providers. Given that one previous major provider (Sheffield Hallam) has now withdrawn because of University-level decisions, this sector must be particularly vulnerable.

4.4.Domicile

Concern has been expressed, for instance in IRMS 2010, about the difficulty of attracting UK-based individuals to PhD study in statistics. What do the HESA data reveal?

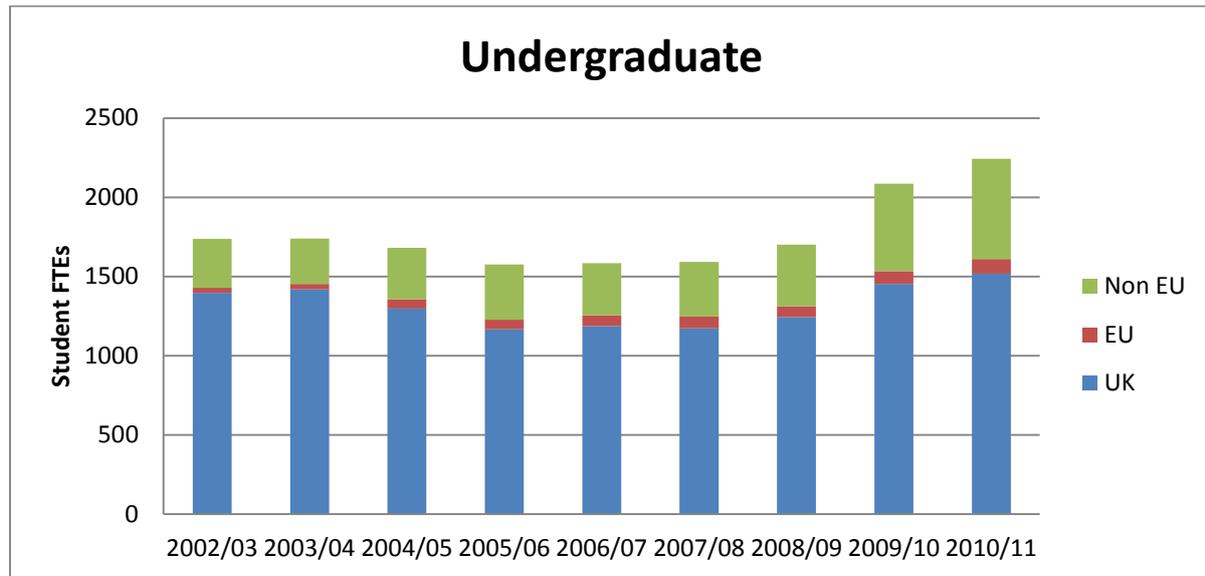


Figure 20. Numbers of undergraduate student FTEs in Statistics, by domicile, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

At undergraduate level (Figure 20), the proportion of overseas students is relatively low, compared to postgraduate levels at least (though it has increased somewhat over the period considered; see Figure 23 below). Numbers from the rest of the EU outside the UK (inaccurately labelled “EU” in Figure 20 and elsewhere) are relatively very small.

At taught postgraduate level (Figure 21), the proportions of overseas students (both from the EU and from elsewhere) are considerably greater, amounting to roughly half the student FTE population in recent years. As mentioned above, data for the first two years shown may be anomalous. Numbers of UK-based student FTEs were at around the 275 level for 2004/05 to 2006/07 inclusive, then fell (in one year) to around 240–250, and then again to about 220 in 2010/11. This is a substantial fall of roughly 20%. (It may be worth noting, though, that the fall from 2006/07 to 2007/08 was more than accounted for by decreases at just two universities, Sheffield Hallam and Southampton. Elsewhere, overall, numbers increased slightly.) Numbers of overseas students, on the other hand, have remained reasonably steady at about 250 FTEs since 2005/06.

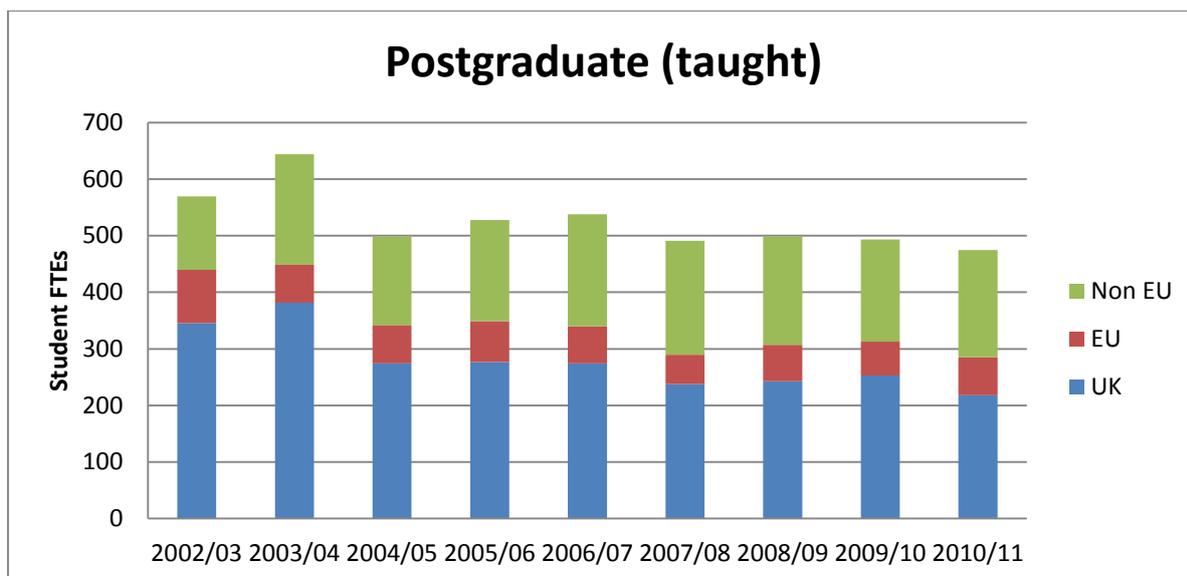


Figure 21. Numbers of postgraduate (taught) student FTEs in Statistics, by domicile, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

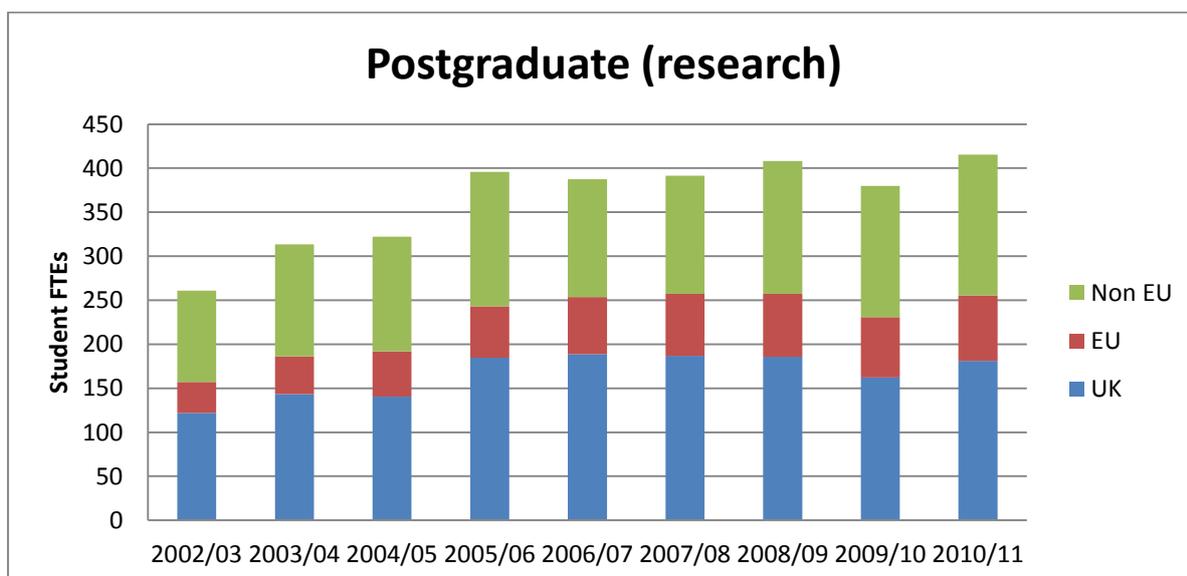


Figure 22. Numbers of postgraduate (research) student FTEs in Statistics, by domicile, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

The proportion of overseas student FTEs is higher again for research students (Figure 22); at this level, the majority of students (though not an overwhelming majority – 56% in 2010/11) comes from outside the UK. Compared to both undergraduate and taught postgraduate students, the proportion of students from the EU outside the UK is considerably higher for research students. Perhaps this reflects the preferential availability of some research student funding (e.g. from UK research councils) to EU students (compared to other overseas students).

It is worth noting that UK-based research student numbers rose up to 2005/06 and then remained remarkably steady, between 180 and 190 FTEs, until 2010/11, apart from a dip in 2009/10. However, a major proportion of this dip was due to a reduction in numbers at one university (Oxford), which may or may not be an artefact.

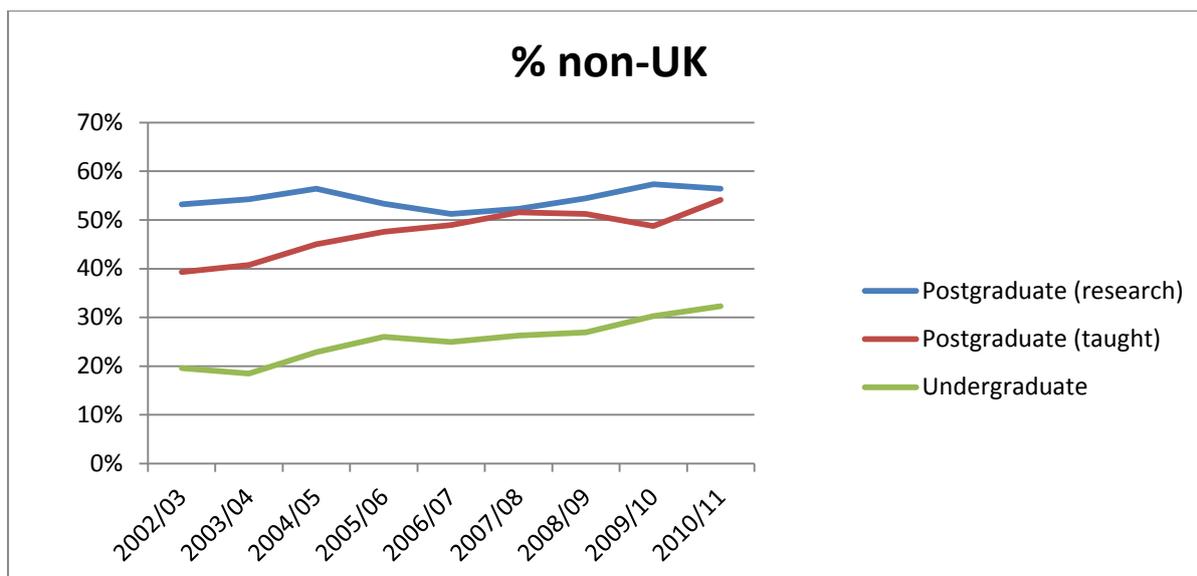


Figure 23. Percentage of student FTEs in Statistics that are domiciled outside the UK, UK universities, by level of study, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Figure 23 shows how the proportion of student FTEs that are domiciled outside the UK has changed over time, by level of study. It shows that the proportions of overseas students at undergraduate and taught postgraduate level have tended to rise fairly substantially over the period considered.

Overall, the data do not provide any strong support for the hypothesis that recruitment of UK-based research students is in decline. Nor do they provide much support the notion that any such decline is due to a lack of students coming from taught postgraduate study. It is true, however, that UK-domiciled taught postgraduate numbers have fallen by about a fifth from their peak in 2006 to 2010/11. Even if this is indeed not causing difficulties for recruitment of UK-domiciled research students in statistics, it must raise concerns about the supply of UK-based professional statisticians qualified at taught masters level

4.5. Age and gender

I know of no hypotheses about the state of UK academic statistics that have been laid at the door of the age and gender of students, but since I have the data, here are a few comments on them.

For undergraduate students (Figure 24), a small majority (61% in 2009/10, but as low as 54% in 2006/07 and 2007/08) is aged 20 or less. The overwhelming majority (84–87% since 2006/07, the first years in which the OU numbers were allocated correctly) of those aged 25 and over are studying at either the Open University or Birkbeck College, though the numbers in these age groups have been rising rapidly at the University of Sheffield in recent years. Students of these ages make up between a sixth and a quarter of the total FTEs. It is notable that the decline followed by a rise in undergraduate numbers over the period is entirely driven by younger students (20 or less). This is in line with the concern that student numbers fell in the mathematical sciences in mid-decade because of decreasing numbers taking mathematics A-level, and that this decline has now been reversed. Such an explanation would not affect older students.

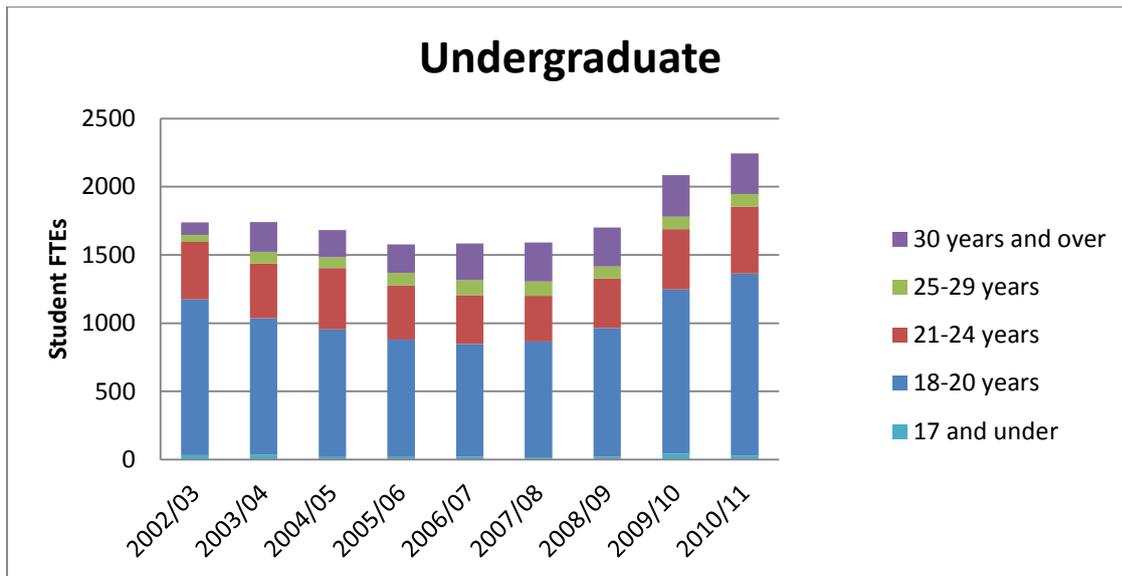


Figure 24. Numbers of undergraduate student FTEs in Statistics, by age group, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

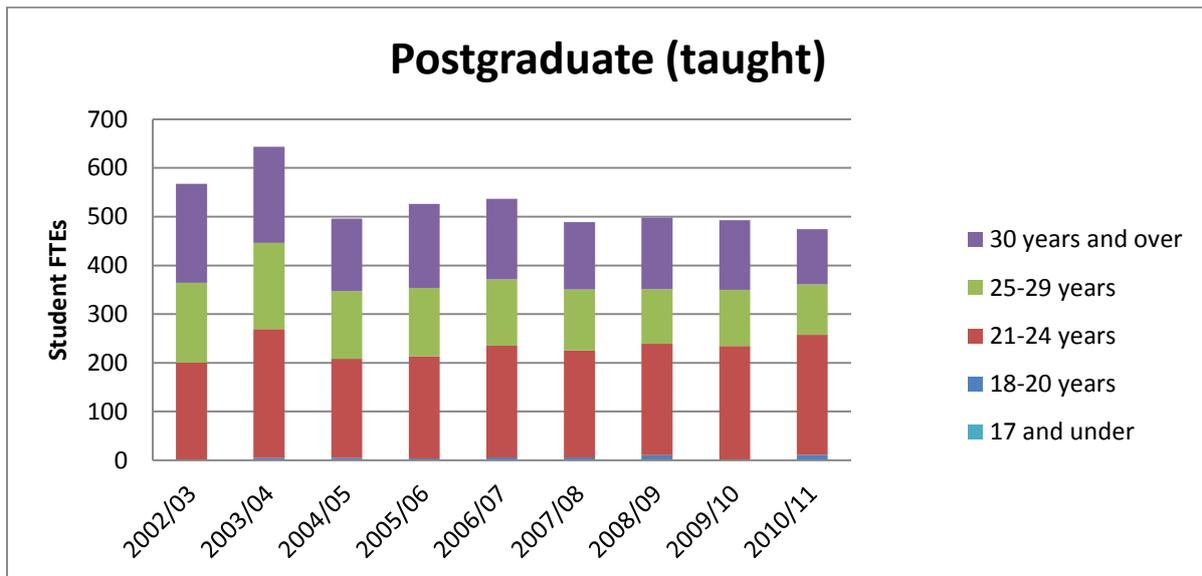


Figure 25. Numbers of postgraduate (taught) student FTEs in Statistics, by age group, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Taught postgraduate students (Figure 25) are, unsurprisingly, older than undergraduates on average. For taught postgraduates, the older students are no longer concentrated in just a few universities but are spread fairly evenly across all providers. Proportions in the different age groups have not changed much over the period (though, to a small extent, this student population has got younger over time on average).

The distribution of research student FTEs across the age groups (Figure 26) is roughly similar to that for taught postgraduates, though there has been more change over time. The proportion in the younger age groups (24 and under) has gradually reduced from between 35% and 37% between 2002/03 and 2005/06 to 31% in 2010/11. The modal group is age 25-29, again unsurprisingly. In 2010/11, 40% of the FTEs were in this group.

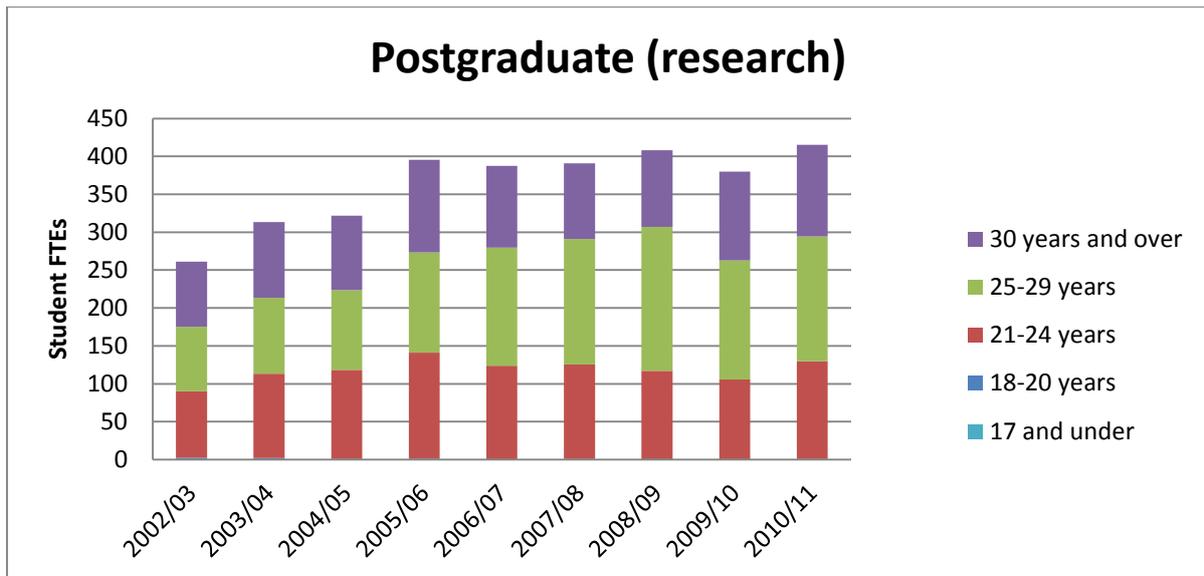


Figure 26. Numbers of postgraduate (research) student FTEs in Statistics, by age group, UK universities, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Figure 27 presents an attempt to summarise changes in age, by level of study. A very crude estimate of mean age³² was calculated for each year and study level. This indicates very little change in age for research students, possibly a small decline in age over time for taught postgraduates (whose age, on average, is very close to that of research students). Undergraduate average age increased and then declined again, reflecting the changing balance between older and younger students as numbers going into undergraduate study very soon after the A-level stage declined and then increased.

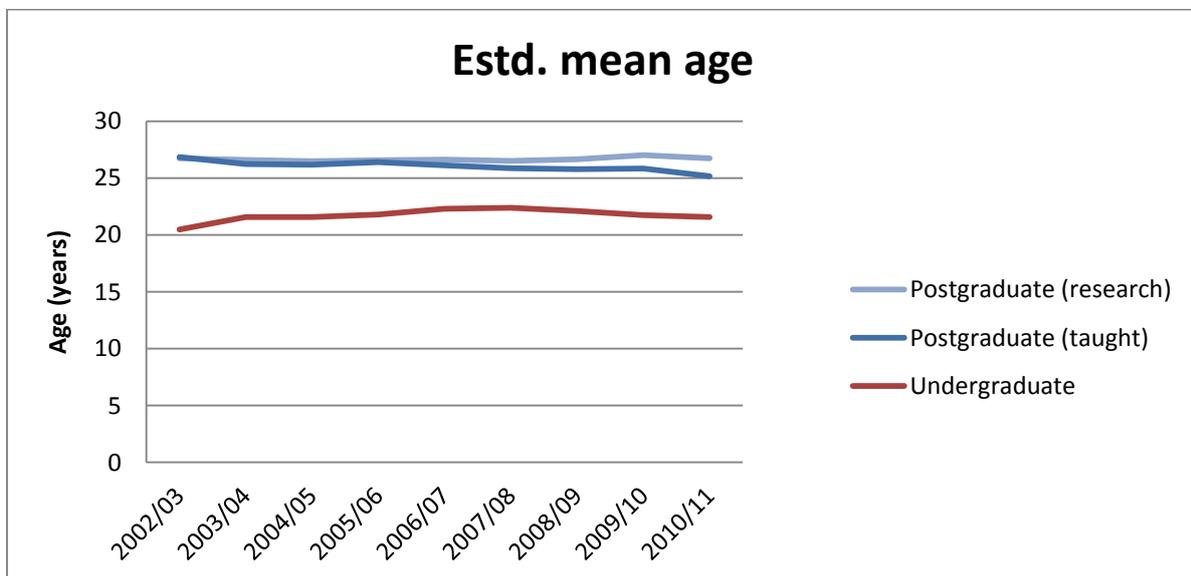


Figure 27. Crudely estimated mean age of student FTEs in Statistics in UK universities, by level of study, 2002/03 to 2010/11. Source: Based on HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

³² The estimate was calculated by assuming that all those in each age group had the same age. For the age groups under 18, 18-20, 21-24, 25-29 and 30+ the assumed ages were respectively 17, 19, 21.5, 27, 32. The resulting estimated means are likely to be underestimates because of the likely skew age distribution of those in the oldest group.

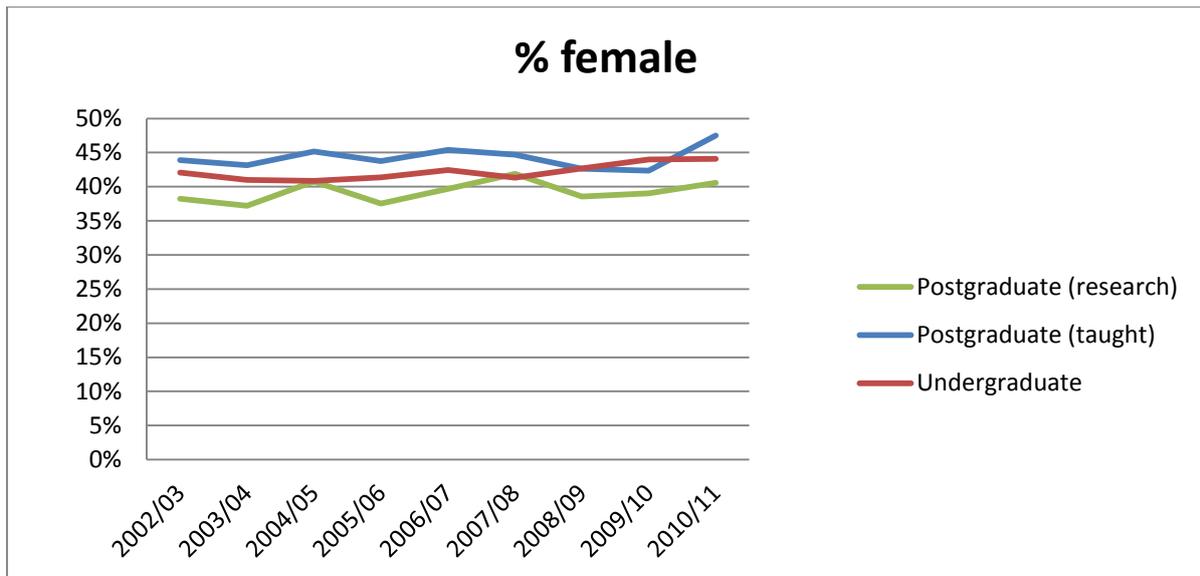


Figure 28. Percentage of student FTEs in Statistics that are female, UK universities, by level of study, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Finally (for this subsection), Figure 28 shows the percentage of students (FTE) that are female, by level of study. Changes over time have not been great. As in many subjects, the proportion of women amongst research students is somewhat lower than the proportions for taught postgraduates and undergraduates. The proportion of female undergraduates has increased slightly over the period studied.

4.6. Institution

Data were available classified by institution, and remarks about particular universities have been made throughout the previous discussion. However, it is inadvisable to read too much into the data for individual universities, given the various data problems that have already been described. But some analysis may be helpful. One particular issue that will be investigated is the question of whether student numbers are becoming increasingly concentrated in a relatively small number of universities. It is often stated (for example, prominently, in IRMS 2010) that this concentration is happening, particularly for research students, that the increasing concentration is driven by funding mechanisms, and that this works to the disadvantage of smaller groups of statistical academics and researchers.

In all, 85 different institutions³³ appear somewhere on the HESA record as having had student FTEs in statistics in at least one academic year between 2002/03 and 2010/11. But it is certainly not the case that every university had students at every level in every year. Figure 29 shows the counts of institutions that had a nonzero FTE count, by academic year and level of study.

³³ This count treats the (previous) University of Manchester, UMIST, and the (current post-merger) University of Manchester as three separate institutions.

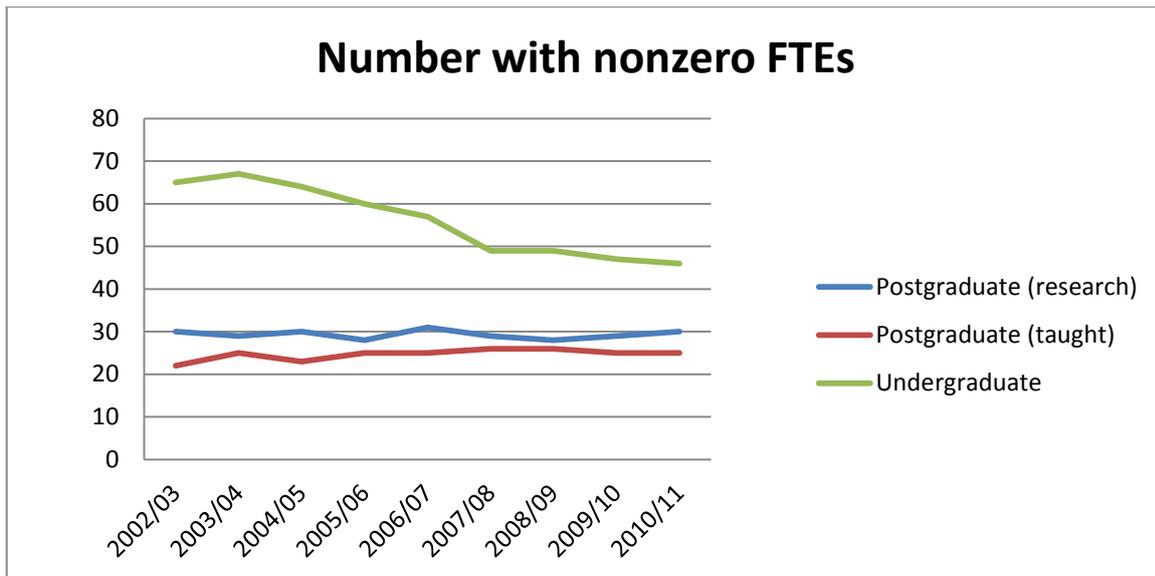


Figure 29. Number of institutions with a nonzero count of FTEs in statistics, by level of study, 2002/03 to 2010/11. Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

It shows a quite large decline for undergraduate provision (from 67 institutions at the peak in 2003/04 to 46 in 2010/11). Meanwhile the numbers for both kinds of postgraduate provision have remained fairly constant. The number of recorded providers of taught postgraduate study in statistics has remained between 22 and 26, and for postgraduate research the number has remained between 28 and 31. These data provide no evidence of major change in availability of postgraduate study. However, it is important not to read too much into this. In all cases there is a fairly long tail of institutions that have very small FTE counts. Also, though the overall numbers of providers may not have changed much, the details of which institutions are on the list in any year do change.

It is also important to note that the decrease in listed undergraduate providers may not entirely reflect reality either. Recall that most undergraduate students studying statistics will also be studying something else concurrently, so that their time has to be allocated between different subjects, and that the rules for doing this in HESA returns are somewhat flexible and subjective (and have changed over time). Thus it is probably the case that some universities, which on the HESA record were teaching some undergraduate statistics in 2002/03 and have since stopped, are actually still teaching it, possibly even at the same intensity, but are recording the resulting FTEs under a different subject. There is no quick way to judge the extent of this, though, and all that can be said is that the data are not inconsistent with a decline in the number of undergraduate providers.

As an indication of the most recently recorded position, Table 5 to Table 8 give the recorded student FTEs (for the larger providers), in total (Table 5) and for the three levels of study separately³⁴.

³⁴ The institution names used are those on the HESA record. The cut-off figures below which I have chosen to give only totals are, of course, entirely arbitrary.

Table 5. Numbers of FTEs (all levels of study) in statistics, 2010/11, by institution (decreasing order of FTEs). Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Institution	FTEs 2010/11
The Open University	308.0
London School of Economics and Political Science	277.9
The University of Warwick	233.2
The University of Manchester	229.0
University College London	215.3
Heriot-Watt University	211.7
The University of Oxford	151.3
Birkbeck College	141.7
The University of Glasgow	119.4
The University of Sheffield	74.9
The University of Reading	71.7
The University of Strathclyde	70.7
The University of Lancaster	60.7
Queen Mary and Westfield College	60.7
39 other institutions with fewer than 60 FTEs each	907.5
Total	3133.6

Table 5 shows that the overall distribution of FTEs is skew, with a small number of providers dominating (in student numbers) a very long tail. The biggest provider in FTE terms is the Open University (and recall that these are FTEs, so that, since almost all OU students are part-time, a table of student headcounts would show the OU further ahead).

It is noteworthy that the top 7 providers include all the 4 remaining universities with a free-standing statistics department (LSE, UCL and Warwick and Oxford). (Heriot-Watt, at sixth, has a department of Actuarial Mathematics and Statistics; not a single-subject statistics department, but arguably closer to one than many departments in the mathematical sciences elsewhere.)

There may be a confounding issue here – in some universities, the allocation of student numbers to subjects for HESA returns may involve the department, and it may be the case that a free-standing statistics department is more likely to allocate a share of students to Statistics in the return than would a differently administered grouping. This is just one reason why we cannot conclude from these data that free-standing departments tend to have higher student numbers, or indeed that higher student numbers are more likely to preserve the status of a free-standing department.

Table 6. Numbers of undergraduate FTEs in statistics, 2010/11, by institution (decreasing order of FTEs). Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Institution	FTEs 2010/11
The Open University	302.2
London School of Economics and Political Science	207.2
The University of Warwick	182.7
University College London	175.9
The University of Manchester	164.4
Heriot-Watt University	162.9
The University of Glasgow	96.6
Birkbeck College	74.5
The University of Reading	63.9
The University of Strathclyde	58.3
Aston University	56.4
Imperial College of Science, Technology and Medicine	56.4
Queen Mary and Westfield College	55.7
The University of Oxford	54.7
32 other institutions with fewer than 50 FTEs each	531.7
Total	2243.6

Because, for universities with substantial provision in statistics at undergraduate level, the undergraduate student numbers are generally considerably larger than postgraduate, it is not surprising that the overall order in Table 6 is similar to that in Table 5. The undergraduate data are very skew. However, because these data particularly depend on universities' decision on how to allocate partial FTEs to students studying more than one subject, it is important not to overinterpret them. The Open University has been the biggest recorded provider since its recorded FTEs became correct in 2006/07; the following ten or so universities in Table 6 have occupied similar places in the rank order in previous years, though their exact relative order has changed.

Table 7. Numbers of postgraduate (taught) FTEs in statistics, 2010/11, by institution (decreasing order of FTEs). Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Institution	FTEs 2010/11
Birkbeck College	66.7
London School of Economics and Political Science	53.4
Heriot-Watt University	40.8
The University of Sheffield	39.2
The University of Oxford	32.7
The University of Manchester	26.3
The University of Lancaster	25.3
The University of Leicester	23.1
The University of Warwick	22.2
The University of St Andrews	20.3
University College London	18.3
The University of Southampton	18.2
13 other institutions with fewer than 15 FTEs each	88.1
Total	474.5

As with the Open University in the undergraduate numbers, FTE counts for taught postgraduates (Table 7) are dominated by one provider of part-time education, this time Birkbeck College. In 2010/11, Birkbeck had 14% of the total FTEs at this study level (higher than the 13% of the undergraduate FTEs accounted for by the OU). Birkbeck has held the top rank only since 2008/09, having recorded steadily and fairly substantially increasing student FTE numbers throughout the period of these data apart from the final year considered. Some other universities (Southampton and Sheffield Hallam) have recorded fairly major declines in student numbers over the period. Excluding Birkbeck, the rest of the distribution is considerably less skew than the undergraduate numbers.

Table 8. Numbers of postgraduate (research) FTEs in statistics, 2010/11, by institution (decreasing order of FTEs). Source: HESA Student Record 2010/11. Copyright Higher Education Statistics Agency Limited, 2012.

Institution	FTEs 2009-10
The University of Oxford	63.9
The University of Manchester	38.4
The University of Cambridge	35.1
The University of Lancaster	30.4
The University of Warwick	28.3
The University of Glasgow	22.8
The University of Edinburgh	22.2
University College London	21.1
London School of Economics and Political Science	17.3
The University of Salford	14.9
The University of Sheffield	12.6
The University of Bath	12.5
The University of Strathclyde	12.4
The University of Kent	12.2
16 other institutions with fewer than 10 FTEs each	71.6
Total	415.5

FTE numbers of postgraduate research students (Table 8) by institution show, again, less skew than the undergraduate numbers. Oxford has been the biggest recorded provider in every year of the period considered (2002/03 to 2010/11), though its size in comparison to the others has varied considerably over time in line with the data anomaly noted above. The University of Manchester has also occupied a high rank (second, or sometimes third) for many years.

Another inexplicable data anomaly has affected a university that used to be high in the rank order. The University of Southampton was second or third on the list each year from 2003/04 to 2007/08 inclusive. However, it has no recorded FTEs in statistics for research students from 2008/09 to 2010/11. I think it extremely unlikely that there were actually no such students; unless an error has occurred, they must have been recorded under some other subject.

As mentioned above, the FTE counts for the three different levels of study differ in their skewness. To investigate how this skewness has changed over time, and in particular to look for evidence as to whether numbers of postgraduate students have become more concentrated in fewer universities,

Gini coefficients were calculated from the FTE counts for each academic year and each study type. They are presented in Figure 30³⁵.

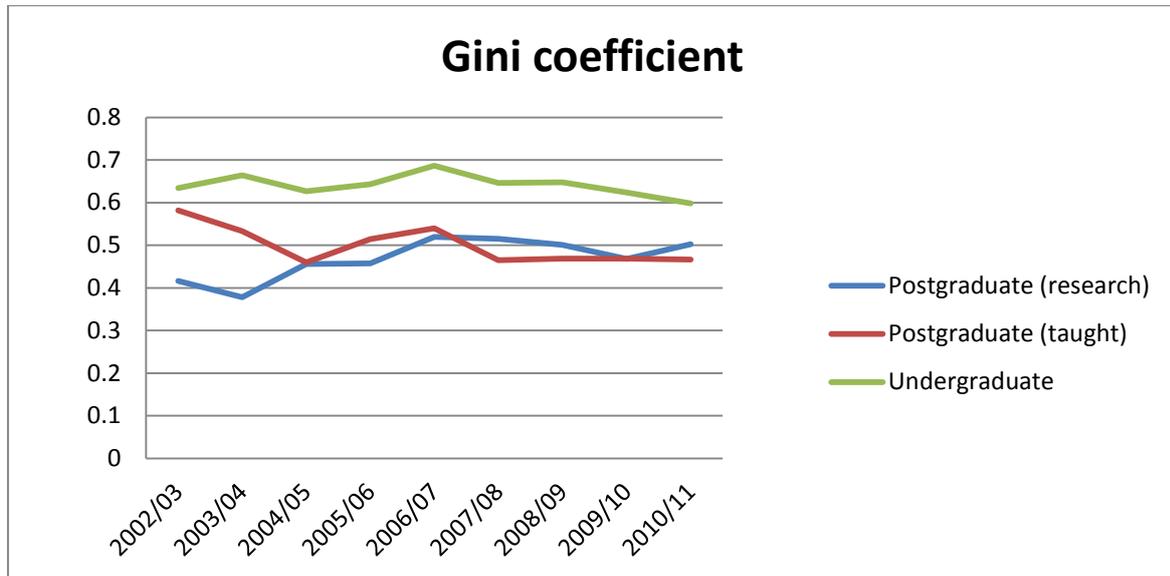


Figure 30. Gini coefficients for FTEs in statistics across institutions, 2004/03 to 2010/11, by level of study. Source: calculated from data from HESA Student Record 2010/11.

At undergraduate level, there is no clear time trend in the Gini coefficients. The reduction in numbers of institutions with nonzero undergraduate FTEs (Figure 29) does indicate that some concentration has taken place, however. Overall, though, the Gini coefficients for undergraduates are considerably higher than those for the two postgraduate groups, indicating greater inequality between institutions in student numbers at undergraduate than at postgraduate level. But again, the data here depend heavily on individual institutions' decisions on how to allocate students studying more than one subject.

For taught postgraduates, there is if anything a slight downward trend (towards greater equality of student numbers) over time. In the last few years covered, the Gini coefficients for the two types of postgraduate provision are similar (as indeed are the numbers of institutions involved in each). For research students, the Gini coefficients increased over time (increasing inequality) for the first half of the period covered, but since then have remained fairly steady with a slight downward trend. They thus provide no support for the contention that research students have become more concentrated in relatively few universities in recent years.

4.7. Conclusions

The data from HESA need to be treated with a considerable amount of caution, because of inconsistencies of several kinds in the way that student numbers are allocated to subjects.

However, certain broad patterns seem to be secure. At undergraduate level, though there is perhaps an indication that the number of universities seriously involved in teaching statistics has decreased

³⁵ In each case the Gini coefficient was calculated only from the data for institutions that had greater than zero FTEs for the appropriate year and level. As recorded above (Figure 29), the number of such institutions varied very little for the two postgraduate levels over the period, but it decreased considerably over time at the undergraduate level. This complicates the interpretation of the Gini coefficients for undergraduates.

(though it remains considerably larger than at postgraduate level), student numbers have been increasing in recent years. At postgraduate level, both on taught courses and for research students, the recent picture has been fairly static in most respects, and there is no firm and reliable evidence from the HESA data of overall reductions in student numbers or of increasing concentration of postgraduate study in fewer universities. There is, however, evidence of a decline in the number of UK-domiciled taught postgraduate students, over a considerable period of years. Part-time study plays an important role in both undergraduate and postgraduate teaching, though it occurs on a substantial scale in a very limited number of institutions.

5. Survey of taught masters courses in statistics

5.1. Introduction: the central role of the MSc

The MSc degree, and similar taught postgraduate qualifications, have always played a more prominent role in the UK academic statistics community than is the case with masters degrees in many other subjects. There are several reasons for this prominence. As described above, although many students would study some statistics as part of their first degree in the mathematical sciences or in another related discipline, single honours first degrees in statistics are (and always have been) relatively uncommon. Thus, for a relatively large proportion of students, their first qualification that would prepare them for employment in statistics, or for research, would be a masters degree. Thus it has always been the case that new PhD students in statistics would be relatively likely to take a masters degree in the subject first. But in recent years it has increasingly become the norm in most subjects that PhD study is preceded by some form of taught postgraduate provision, and indeed the research studentship funding models for several UK research councils assume that such study will take place.

That said, it is not the case that every university, in which substantial amounts of statistical research are carried out, has its own taught masters course in statistics. Several respected institutions manage without one. Currently these include (among others) Queen Mary University of London, the Universities of Bath, Cambridge, Newcastle and Durham, and the Open University. Some of these have had their own masters degree in the past, and some have a broad masters degree in the mathematical sciences within which students can concentrate to a considerable extent on statistics. However, it remains the case that, despite the important reasons for masters level study in statistics just described, it seems not to be an *essential* requirement for a prominent academic statistics group to run its own statistics MSc.

Nevertheless, masters degrees in statistics are generally considered important in the academic community, and concern on two specific aspects of their provision has emerged.

In its evidence to IRMS 2010³⁶ (p. 40 of Part 3), the RSS wrote:

“In particular, statistics has continued to suffer from non-integrated local decisions by individual vice-chancellors to cut or reduce statistics teaching at their universities. Two very recent examples of this are the termination of the Masters courses at Sheffield Hallam University and Edinburgh Napier

³⁶ Available at

<http://www.epsrc.ac.uk/SiteCollectionDocuments/other/MathsIR2010EvidenceDocumentsParts1-3.pdf>.

University. There is a very real danger that such uncoordinated local decisions will leave the UK with insufficient ability to produce skilled personnel in an area that is increasingly important to the UK national economy and competitiveness. Some kind of integrated national strategy is needed.”

It is true that the two masters courses mentioned were terminated fairly rapidly, and on the basis of local decisions. Indeed (as will be reported below) these are not the only recent cases of locally decided closures of courses, against the will of the statisticians at the universities concerned. However, the HESA data reported in the previous section did not show any clear recent signs of significant reduction in taught postgraduate student numbers. Since there is not (yet) any kind of integrated national strategy on this point, it is far from obvious what the overall position actually is.

The second specific area of concern is funding, in the form of studentships or bursaries, for students to study masters courses. This point has already been mentioned in the section on research funding (Section 2). Until reasonably recently, it was relatively easy compared to many other subjects) for a university to make such funding available, from public or other sources. This is no longer the case. However, the overall position on student funding for taught postgraduate study is not clear, and it seems to be even less clear to what extent the changes in funding have affected recruitment.

In order to investigate the current position, in the hope of throwing more light on these concerns and other aspects, I carried out a data collection exercise addressed to all UK institutions of higher education that currently provide at least one masters degree in statistics (on its own, or in combination) or closely related subjects.

5.2. Data collection method

There is no central register of masters courses in statistics in the UK. (This position contrasts with first degree courses, where the admissions service UCAS has a public database that covers almost all full-time courses.) The RSS provides a list of courses that it accredits³⁷, but makes it clear that this is in no way a comprehensive list of all courses that exist. The Committee of Professors of Statistics (COPS) used to publish each year a booklet listing postgraduate opportunities (taught and research) in statistics and related subjects, and though the booklet no longer appears, there is a list on the COPS website³⁸. But it rapidly became clear that the current version of this list is far from comprehensive.

I therefore began, in April 2011, by producing a list of masters courses, obtaining information from a list of different sources, given in Table 9. Many of these sources are Internet portals, from various providers (almost all commercial), in which one can carry out keyword searches in various ways. These portals clearly attempt to fill the gap arising from a lack of “official” lists of masters courses in most subjects in the UK.

³⁷ [www.rss.org.uk/uploadedfiles/userfiles/files/Accreditation - list of courses 19.pdf](http://www.rss.org.uk/uploadedfiles/userfiles/files/Accreditation_-_list_of_courses_19.pdf)

³⁸ www.copstat.ac.uk/pg_courses.html

Table 9. Information sources used to produce list of masters courses.

Type of source	Sources used
Lists held by statistical organisations	RSS accreditation, COPS listing, PSI (Statisticians in the Pharmaceutical Industry) ³⁹
Web portals	www.findamasters.com , www.postgraduatesearch.com , www.postgrad.com , www.whatuni.com , www.hotcourses.com , www.targetcourses.co.uk , www.newscientiststudy.com , www.mastersportal.eu , www.educaedu.co.uk , www.masterscompare.co.uk , www.ukpass.ac.uk
Broader searches	Archives of allstat mailing list (from January 2010 on). Generic Google search for “MSc Statistics” and “MSc Statistical”.
University websites	While checking the details of courses discovered from the sources above, I searched for other relevant masters courses.

I included any course that appeared to me to contain a substantial amount of statistics. “Joint” courses in two subjects including statistics were included. To some extent, of course, the decision on what to include or exclude was subjective (and made by me). However, I did take an overall decision to *exclude* courses in the following areas (which are to various extents statistical):

- Bioinformatics and health informatics
- Epidemiology, public health, and similar, except in a small number of cases that looked specifically statistical
- (General) social science methods
- Actuarial science (on its own or with second subjects that are not statistical)
- Finance

The resulting list included 60 different courses from 31 different institutions (and in some cases from more than one department in the same institution), all listed on their institution’s website in early April 2011 as available from autumn 2011. The list is given in Appendix A. A further list of 14 courses, which are not primarily “in” statistics but reasonably closely related, was also produced, and it appears in Appendix B. The list in Appendix A is intended to be comprehensive in coverage at the time the list was compiled. The Appendix B list is less so, and was put together partly to allow investigation of potential differences between these more “marginal” courses (in statistical terms) and the more “mainstream” courses in Appendix A.

A further check was made, in February 2013, of the availability of statistics masters courses for 2013 entry. Of the ‘mainstream’ masters courses in Appendix A, only one is no longer available. (Another has been replaced by a broadly similar course with a different designation, and a third has had a name change.) Of the ‘marginal’ courses in Appendix B, two are no longer available (and one has had a slight name change). However, five new courses of the Appendix A type have become available since 2011, and are listed in Appendix C. Three of these are renamed specialist versions of courses that existed in 2011, but two (from Imperial College and the University of York) seem to be entirely new. Thus the current list of ‘mainstream’ masters degrees would include 64 different courses from 32 institutions.

³⁹ www.psiweb.org/newcareers/index.php?p=UNIVERSITY%20INFO

5.2.1. Questionnaire

A brief questionnaire was produced and sent (in late June 2011) to an appropriate contact in the relevant institution (identified from the institution's web pages), for each of the courses in Appendices A and B. The questionnaire is reproduced in Appendix D.

After, in some cases, redirection of my original enquiries to a more appropriate person, and in some cases reminders, at least an informative partial reply was obtained from all the courses in Appendix A and all but two of those in Appendix B. No successful contact was made with anyone concerned with the two missing courses from Appendix B (MSc in Financial Modelling at Glasgow and MSc in Mathematical Sciences at Liverpool). (In fact, on further examination of public information, it appears that neither of these can actually contain a substantial proportion of statistics, so arguably they should never have been included anyway. This is the reason that I did not chase up further for a response about them.)

In most, but not all, cases where more than one masters course is offered by the same department, it turned out that the same person was responsible for all the courses in a department, and in most but not all such cases, a single response covering all the masters courses from that department was received. (Respondents were given the choice between sending one response for all courses, or separate responses.) Sufficient details were generally given to allow me to sort out the position on separate masters courses from one another in such cases, where that was appropriate, but overall the unit of analysis for the analyses I report below is the response, rather than the named masters course.

Between the production of the list of masters courses in April, and the return of the questionnaires in late June and July (mostly), one of the courses (MSc in OR and Statistics at the University of Salford) was cancelled by the university (though it has since become available again), another (MSc in Statistics and Management Science at the University of the West of England) was in the process of being closed by the university (and is indeed no longer available in 2013), though it was recruiting for one last year, and a third (MSc in Economics and Statistical Analysis at Glasgow Caledonian) had had its initial year postponed from 2011 to 2012. In addition, the MSc in Applied Population and Statistical Mapping at the University of Glasgow (Geography Department), from the Appendix B list, had had its 2011 presentation cancelled because of staffing issues. (The Department told me that it hoped to bring it back in the future, but it is not available in 2013). Taken alone, these cancellations reinforce the picture painted in the RSS evidence to IRMS 2010, quoted above, that statistics masters courses are particularly prone to arbitrary closure. However, against this must be set the large number of new courses that started in 2010 and 2011 (see below, Subsection 5.3.1) and the facts that the vast majority of courses available in 2011 were still there in 2013, and that there have been some significant additions to the list since 2011; the overall balance seems to be one of increase rather than decrease.

5.3. Results

5.3.1. Age and availability of courses

Of the mainstream courses (Appendix A), 6 were first offered in the 1960s (or earlier), 3 in the 1970s, 3 in the 1980s, 6 in the 1990s, 8 between 2000 and 2004 inclusive, 13 between 2005 and 2009 inclusive, 6 in 2010, and 9 were available for the first time in 2011 (plus the one that was deferred from 2011 to 2012).

Of the more marginal (Appendix B) courses, 2 began in the 1990s (none is older), 2 between 2000 and 2004, 7 between 2005 and 2009, 1 in 2010, and 1 was new for 2011.

Beyond the cases mentioned above where masters courses were withdrawn after my list had been drawn up, no attempt was made to count the number of courses that have disappeared in recent years. But overall, the impression given is one of an overall considerable net increase in the number, and perhaps variety, of courses available, in recent years. Some long-established courses do continue (and, judging by student numbers, some prosper, others perhaps not). However, a considerable number of universities have decided to offer new masters courses in recent years, including some in which (to my knowledge) no masters courses in statistics had run before. Further some universities which have run one or perhaps two masters courses have in the past few years introduced additional named masters involving statistics. Some departments or schools are now offering four or five different courses, which generally have a common core of study but differ in the details and options.

The overall position is not easy to interpret. Superficially, the availability of so many new courses in the past few years would seem to indicate a buoyant market that is growing. On the other hand, though their deficiencies must not be forgotten, the HESA data described in the last section show fairly static student numbers in taught postgraduate statistics, and also fairly static numbers of institutions recording postgraduate taught students in their HESA returns. Perhaps universities are having to tune their offers more closely to what students appear to want, and perhaps they are having to work harder to compete over what amounts to a fairly constant number of students.

It also became clear that different universities are using different criteria to decide on the future of masters courses in statistics. Student numbers that some universities consider so small that a course must be closed can be higher than projected numbers that allow other universities to offer an entirely new course. While the resulting (potential) lack of stability within individual universities is hard for academics (in statistics groups or elsewhere) to deal with, I have found no evidence that the position in statistics is radically different from that in many other subjects.

In particular, it certainly does not seem to be the case that a well-qualified candidate for a masters degree in statistics would have difficulty in finding an interesting and appropriate course on offer.

5.3.2. Recruitment

The main information specifically asked about in the questionnaire in relation to recruitment was on expected student numbers for the 2011 intake. However, some more general information on trends was also obtained.

Entry requirements

The questionnaire did not ask about entry requirement or on numbers of applicants. (In hindsight, these omissions were an error.)

However, entry requirements, in terms of UK first degrees, were recorded and analysed from university websites for applicants. (I could not find this information for two courses. In almost every other case, the websites mention that there are several other possible ways to meet the entry requirements, beyond having a UK first degree of the type described.) A few responses to the questionnaire did mention numbers of applicants, remarking that their applicant numbers were

sometimes very large compared to the number of places available, but that many applicants were rejected on the basis of inadequate previous study. I have no idea how general this experience is.

In terms of UK first degrees, then, for the mainstream courses in Appendix A, every course but one said that it required an honours degree with at least second class honours. About two-thirds went further and specifically required a 2i, with two courses specifying a first class degree. The position is roughly similar on the Appendix B courses.

There was, however, much more variability in what different courses require in terms of the *subjects* of study at first degree level. Almost all explicitly required prior study of a subject with some mathematical or statistical content (and I suspect that the few that did not make this explicit, which were mostly in social statistics and allow entry through social science degrees, would expect some quantitative component in that study). However, they differed in the nature of that study, and in terms of whether it needed to contain prior study of statistics. Some required a degree in the mathematical sciences (or very near offer); for others, a degree in a wide range of science and engineering (and similar) subjects would do as well. Very broadly speaking, it appeared that masters degrees involving another subject alongside statistics were less likely to be strict on the overall subject of the previous degree, but there were several exceptions to this overall pattern. The position was even more complicated in terms of the requirement to have studied statistics previously. Most masters courses in statistics did not specifically make this requirement. A substantial minority did, and in most cases make this very explicit and clear on their web pages for applicants.

What I do not know (because I did not ask) is whether in practice it is widespread for students across all these masters degrees to begin them with very limited, or no, knowledge of statistics. It does seem noteworthy that there can be courses of very comparable content (as far as can be told from the websites), at universities with similar reputations in statistics, but which differ in their admission criteria apparently quite radically in terms of the requirement for previous statistical knowledge.

Nevertheless it would seem that a well-qualified candidate who had studied a substantial amount of mathematics at university, and who had no funding requirement, would not have much difficulty in finding a statistics masters for which he or she met the stated entry requirements, even if he or she had previously studied little or no statistics.

Perhaps unsurprisingly, but perhaps also unfortunately, the position would be different in most cases for someone who had studied a subject further from the mathematical sciences. There were a few possibilities. Birkbeck College and the University of Sheffield both run postgraduate courses below masters level, which can be studied by those with different backgrounds, and which equip those who take them to continue on the relevant masters course. Lancaster University offers some modules on its MSc in Statistics for those converting from another discipline, and its MSc in Quantitative methods for Science, Social Science and Medicine will admit students with no university-level mathematics background who are sufficiently numerate (say, mathematics to A level). There may be other similar provision elsewhere that I failed to find. But the number of ways in for candidates in this position is limited.

This fits with concerns expressed elsewhere. In its evidence to IRMS 2010⁴⁰, the RSS specifically brought up the lack of funding for masters level conversion courses, on which people with backgrounds in other subjects study statistics (part 3, p. 200): because of the fact that statisticians need knowledge of areas of application, this route is particularly valuable, but “Financial support for these crucial master courses has tended to fall between the two stools of undergraduate teaching and research.” The RSS attributes (partially) to this lack of funding the scarcity of such courses.

2011-12

Respondents were asked how many students they anticipated recruiting for the next entry on their course or courses (which, in all but one case, would be in autumn 2011). In total, for 2011 entry, respondents expected about 680 students⁴¹ on the mainstream (Appendix A) courses, and about another 270 on the Appendix B courses. (These totals are approximate because precise answers were not always given, and in any case, estimates given in June or July of the number of students who will actually start in September or October will be subject in some cases to considerable error.) Average student numbers per course were higher on Appendix B courses because of the presence there of several Business School masters; these generally have higher student numbers than a ‘typical’ Statistics masters. (One respondent pointed out the difficulties that can arise because of this difference, when a group of statisticians or operational researchers is located in a business school which expects larger numbers of masters students than would be usual on a statistics masters.)

On the mainstream masters, anticipated student numbers per department or group ranged from 1 to almost 70. The largest anticipated numbers (around 70, including new part-time students, at the University of Sheffield, around 55 at Birkbeck (all part time), around 50 at Cardiff) were all in departments that run more than one MSc course, and many of these students (I cannot be precise about how many) would be studying statistics alongside some other related subject. Below that the distribution was very skew, with most below 25. (The median was 15.)

Trends

Respondents were asked for information about recent trends in student numbers. It is difficult to summarise the overall pattern for several reasons. First, as previously stated, many of the courses were new, or had begun very recently. Second, as might be expected on courses with relatively low student numbers, recruitment varies considerably from one year to the next, and insufficient respondents gave detailed information on past student numbers to give a clear indication of how the overall total had changed from year to year.

Overall, though, most departments or groups reported student numbers that were either fairly stable or increasing over the past few years. There seems to have been a slight tendency for recruitment to be more likely to increase on courses that have more students anyway, though perhaps I am over-interpreting the data on this point. Some of the universities whose masters courses have been running for some time reported that there had been a dip in numbers in the mid-decade, so some time around 2005-6. These patterns do not entirely match the HESA data

⁴⁰ Available at

<http://www.epsrc.ac.uk/SiteCollectionDocuments/other/MathsIR2010EvidenceDocumentsParts1-3.pdf>.

⁴¹ This number may appear optimistic in comparison with the HESA student data for recent years described above (Subsection 4.2). However, the HESA data were for full-time equivalents, and the counts here are counts of students, some of whom are part-time and some of whom will be studying other subjects alongside statistics. So the two sets of data are not strictly comparable,

previously considered, which showed taught postgraduate number reasonably stable but with a slight bulge rather than dip in mid-decade, but it must be noted that the questionnaire data do not include information on masters courses that closed before the sampling frame was drawn up. Generally, though, the pattern is one of broad stability in student numbers, according to both sources.

Of those groups of courses or courses (mainstream) that gave student numbers for both 2010 and 2011 entry, 19 were expecting an increase from 2010 to 2011, 7 anticipated no change, 9 anticipated a decrease. Most of the anticipated changes were small, though a few of the expected increases were more substantial. I have not investigated whether these anticipations were actually realised; several respondents pointed out explicitly that it can be difficult to predict student numbers until the student actually arrive (or not). However, on the face of it, amongst these universities (and hence excluding universities who closed courses before my sampling frame was produced), the position on 2011 recruitment looked broadly positive. (On the more marginal courses in Appendix B, the position was more balanced, with 3 expecting an increase, 3 no change, and 3 expecting a decrease.)

5.3.3. Domicile of students

Respondents were asked about the domicile (UK, rest of EU, outside the EU) of their students and specifically were asked about numbers for 2010–11. Many did not give precise numbers. Overall, roughly half the students reported on had their domicile outside the UK, which is in accord with the HESA data on this point. However, the position varied greatly from one course to the next. Some drew almost all their students from the UK, others had very predominantly overseas students, and again these overseas students were predominantly from the EU in some cases and predominantly outside the EU in others.

It is not possible to say why these differences exist; potentially relevant factors include the actual content of the course, the marketing activity of the department and/or university, and potentially the status or reputation of the course, department and university (which may differ from one part of the world to another).

One point that may be relevant or may well be an over-interpretation is that, on almost all the more marginal courses (Appendix B), students came very predominantly from outside the UK. One interpretation might be that these masters courses (which tend to be broader, often with stronger links to business and management than the Appendix A courses) have stronger appeal to overseas students than do the more mainstream courses. If this is indeed the case, there may be a message here for UK statisticians on what is required to recruit large numbers of overseas students. However, the number of courses here is not large, they are diverse in nature, and there is a possible artefact in that they were included because they came up in various Internet searches for courses in statistics, and that may simply be because they are more broadly marketed than other similar courses that were not included in Appendix B. Thus, to have a better idea of what the position really is would require more data and considerably more analysis.

5.3.4. Funding for students

As has already been pointed out more than once in this report, funding for students on masters courses is a matter of concern in the UK academic statistics community. Thus the questionnaire included questions on funding sources and trends in availability of funding.

Sources

The quantitative data on funding from different sources can be summarised as follows. (The unit of analysis here is the individual response; as mentioned above, several universities or departments, where there is more than one MSc course, reported on them as a whole. There were in all 40 responses on the mainstream (Appendix A) courses and 11 on more marginal (Appendix B) courses.)

EPSRC: Because of the way EPSRC funding is allocated, generally in money terms rather than as a given number of studentships or stipends, it is a little difficult to summarise. Overall, 13 departments or groups reported that they had EPSRC funding for students. This amounted in all to 18 fees-only studentships, 20 studentships that were explicitly fees plus stipend, or where it was not stated what the studentship covered, and £210,000 expressed only in money terms (in addition to the numbers listed by studentships). All of these were for mainstream (Appendix A) courses.

Other research councils: Respondents reported 9 MRC-funded studentships (at two different mainstream departments). ESRC funding is a little more prevalent. Some was reported to be currently available at 4 departments on the mainstream list, and another two on the Appendix B list. In all this amounted to 6 studentships for mainstream departments, another 4 at one Appendix B department, plus unspecified numbers of studentships for '1+3' study (masters followed by doctorate) at two mainstream and two Appendix B departments.

NIHR: Respondents reported 16 studentships in five departments (all mainstream).

University's own resources: Here the position was again rather complicated. In some cases, students on statistics masters courses compete with students from other disciplines for funding from the institutions own resources, so numbers of studentships are not known in advance. In other cases, there is a competition between departments but it takes place in advance, so that studentships can specifically be offered to applicants. Some level of funding from this source was reasonably prevalent, and existed at 13 of the mainstream departments or groups of courses (so roughly one third), and four of the Appendix B departments or groups of courses (again roughly one third). At most universities, the amount of funding was quite limited, perhaps to one or two studentships, to pay for fees only, or even to some relatively small bursaries. However, two departments reported 5 and 6 studentships (respectively) from their own university's resources. (The respondents did not give the actual value of these studentships – they could possibly be relatively small – but in both cases enough of them were available for a substantial minority of all the students on the course(s).)

Business or industry: Funding from these sources was fairly limited. Around 10 studentships were available on mainstream courses, at seven different universities. In addition there was fees-only support from industry sources at a few more departments, and there was the special case of the MSc in Official Statistics at Southampton, where most of the students doing the full qualification had been funded by the Office for National Statistics as their employer. Some funding from business sources was reported by 4 universities on the Appendix B list.

Other: Five mainstream courses (or course groups), and two from Appendix B, reported funding in the form of scholarships or fee waivers from some other source. The funding sources involved are very diverse, including public bodies, charities, and alumni. In most cases the numbers of students affected was small (one or two students).

However, the University of St Andrews reported that it had 8 fees-only studentships available (to Scottish and EU students only) from the Student Awards Agency for Scotland (SAAS) under its Postgraduate Students' Allowances Scheme, for the MSc in Applied Statistics and Datamining, and according to the SAAS website⁴², such awards were (and indeed still are) also available to some students on the MSc in Statistics and Operational Research at Edinburgh. (The respondent from Glasgow Caledonian University hoped that such funding would be available for their MSc in Economics and Statistical Analysis when it opened in 2012, but this hope seems not to have been fulfilled.) This funding source, which supports certain courses deemed to be vocational, is available only to Scottish institutions.

Under the "Other" heading, several institutions reported that some overseas students on their courses are funded by their home governments.

Summary: Student funding is clearly in limited supply for statistics masters courses (as for masters courses in most subjects). Of the 40 mainstream courses or groups of courses for which a separate response was sent, about a quarter (11) reported no funding availability at all for students. (That is also the position on 3 of the 11 Appendix B courses or groups.) Of those where funding is available, there were very few where the proportion of students who will be funded is half or over. (The median proportion of students who can be funded was around 15%, over all courses or groups of courses including those where no funding is available, though several crude approximations were used in arriving at this figure.) It was very clearly the case that most students studying masters courses in statistics in the UK did not have access to funding arranged through the university or department where they are studying.

Trends

Respondents were asked about recent trends on the availability of funding for students.

The resulting picture was very mixed, though overall many more universities reported decreasing funding rather than increasing. Almost every conceivable response appears somewhere. Many respondents reported decreases, sometimes considerable, in research council funding, from all three research councils involved (EPSRC, ESRC, MRC). However, in a few cases EPSRC funding had increased or been introduced on new courses (despite the fact that one respondent remarked that it is impossible to get research council funding for new courses). NIHR funding is a relatively new development, and in some of the universities where it had become available, it seems in part at least to have taken the place of funding from other public sources that had diminished. Several respondents also reported a decrease in the availability of funding from industry, due to the current financial climate and/or changes in the structure of UK-based pharmaceutical research. (In the past, funding was available at several universities from several pharmaceutical companies. However, only one such company, GSK, was reported as funding any studentships currently, and was doing so on a reportedly much reduced scale (at some universities) compared to past years.)

Thus the overall picture was one of reducing levels of funding for students. Some respondents commented that this decline in funding is one of the most crucial issues facing the statistics profession, in that, without MSc funding, there will in the future simply be too few trained statisticians to meet the country's needs. One response raised the possibility that, when higher

⁴² www.saas.gov.uk

undergraduate fees for (some) UK students come into operation, UK students will not be willing and/or be financially able to commit to a self-funded postgraduate year. (My own crystal ball remains cloudy on this specific issue, and in any case the position will depend on university decisions on future taught postgraduate fee levels, which are still not all clear yet.)

However, reduced studentship numbers were not the case in every university. A few had been successful in increasing the number of funded places, and as previously mentioned, some new courses had obtained some funded places.

5.3.5. Destinations

The information collected on student destinations after MSc study was not always very specific, largely because the question I asked was not very specific, but also partly because for some courses, information on destinations is either confidential or not available. So this section will be somewhat impressionistic.

Many respondents mentioned first that they have numbers of students who go on to PhD study afterwards. As one might expect, this was predominant on courses that are specifically linked to research and/or where ESRC 1+3 funding or CDT status were available; however, some others where such links are less obvious also reported considerable numbers moving on to PhD study. In several cases this is the most common destination.

Other areas that were commonly mentioned were employment in the pharmaceutical industry, in financial services, in consultancy, in government, and in junior research posts in universities. Some respondents mentioned that, because of changes in the UK pharmaceutical industry, fewer students were moving on in that direction. Interestingly, a few respondents reported an increase in the proportion (or indeed the number) moving on to funded posts on university research projects.

5.3.6. Other comments

Respondents were given an opportunity to add further comments. The question pointed them to explain, where appropriate, special features of their course. In some cases respondents therefore gave details which, while they certainly helped my understanding, are not appropriate to report in detail here. But several more general points were made, including the following.

- Several respondents reported, in different ways, that strong links to industry or relevant employers are very important to the success of their courses. This was given as one of the reasons for the very strong recruitment on the then new MScs in OR and Applied Statistics, and in OR, Applied Statistics and Risk, at Cardiff.
- The fact that the Cardiff courses link OR and statistics was also reported as important, based on student feedback, though the existence of similar link at Salford did not unfortunately save the course there from being cancelled by the university (though it has since been reinstated). Some other respondents pointed to interdisciplinary links to other subjects and other departments as a strength of their courses.
- One respondent, writing about an interdisciplinary course (that is broadly half statistics) from the point of view of the other discipline (computer science) made interesting points about the nature of statistics as a subject, and surmised that we statisticians do not get across adequately to undergraduates, who might otherwise contemplate postgraduate study in our subject, what the excitement of the subject is, what its research aims are, and

how its concerns differ from those of “axiomatic” mathematics. While these comments come from a single individual with, perhaps, a rather idiosyncratic view, they do coincide (anecdotally) with views I have heard expressed by more than one academic statistician, and if there is something in them, they have implications for the fact that existing masters courses concentrate very heavily on recruiting students with heavily mathematical backgrounds at undergraduate level. Do enough of those we are trying to recruit understand what our discipline is actually about? Are we, and those who market our courses, explaining things accurately?

5.4. Conclusions

Despite often repeated concerns about the availability of taught postgraduate courses in statistics, and about recruitment on these courses, the data collected in this exercise, like the HESA data, do not give immediate cause for concern at aggregate level. The overall position is roughly static, with (if anything) some indications of increase in both courses and student numbers.

This overall picture does hide two broad areas that have been causing concern. One is that, for several reasons, the position on individual courses in individual universities is not necessarily so rosy. We have seen that it continues to be possible for university level decisions to remove masters courses, including well-respected ones, at short notice. To a greater extent than in many other disciplines, some statistics departments and groups of staff are particularly reliant for their health (and income) on their masters courses, yet the fact that in most cases student numbers are not huge, so that in overall university terms the courses may not seem to be of great importance, makes such groups vulnerable. In my opinion, this possibility that a university might pull the rug from under the feet of a group of statisticians by removing a major aspect of their teaching is a greater threat to the health of academic statistics than is the possibility that, overall, insufficient academics will be trained because of an overall lack of masters degree places. But it is important not to exaggerate the importance of this threat. In the case of most universities, it seems to be potential rather than immediate.

The second area of concern is about future funding and course availability, in the light of the radical changes in finance (particularly for undergraduate study) that have just been introduced in English universities. At this stage it is extremely difficult to predict what the effect on any postgraduate courses might be, and perhaps this is particularly true for statistics masters with relatively small student numbers, in a context where some universities have still not completely thought through how they might make decisions on such courses in the new world that faces us. The problem is that this is a cause for concern that it is very difficult to do anything about at present — except that we should remain vigilant and accept that some sort of rapid action may be required at some point.

What remains particularly unclear, though, is the overall effect of changes in the availability of direct funding for masters students on recruitment. Despite recent reductions in postgraduate student financial support, the evidence from the HESA data and from this data collection exercise is that student numbers are roughly static. More anecdotally, the questionnaire response from one lucky masters course shows a considerable increase in the number of funded places over the past few years, but student numbers have remained static there. So there is no clear evidence that changing the availability of student funding has an immediate marked effect on recruitment.

Perhaps a more precise view of the situation is not that universities are unable to fill places on statistics masters courses without funded places. Several of the big providers have little or no funding available for their students – this was true of the biggest provider, Birkbeck College, though that is a special case because of its part-time provision (and the same goes for the part-time distance learning routes through the masters degrees at Sheffield), but it was also true of some other more conventional substantially sized courses (e.g. the statistics masters at Leeds, LSE and Oxford). Perhaps the main issue is that to some extent courses are failing to recruit some of the most ‘desirable’ students, in that well-qualified undergraduates, who express some interest in postgraduate study in statistics, are going elsewhere (typically into the workplace) because no funding is available, whereas in the past, when studentships were available more commonly, they might have been more likely to do a statistics MSc (and, in some cases, continue through a PhD to a UK academic career).

If this is indeed the case, then it is not clear that the feared lack of statisticians in the future will actually occur. People, based in the UK or elsewhere (in roughly equal numbers), *are* taking statistics masters courses, despite what appear (compared to some other disciplines) to be fairly strict and specific entrance requirements. The evidence from the questionnaire on destinations, sparse as it is, indicates further that they are moving on in some numbers to PhD study. A hesitant interpretation of all this, and of the HESA student number data, is that we may not always be getting the new statisticians that academic colleagues would ideally like to have, but we *are* getting new statisticians. The future remains uncertain, and at present more so than usual because of the unpredictable effect of the changes of undergraduate funding in England.

To return briefly to the question (raised by the RSS in its evidence to IRMS 2010, see above) of conversion masters courses: is it really the case that lack of funding for students is the barrier here? For “non-conversion” masters courses, recruitment can be good despite a lack of studentships. I have not seen evidence that the same would not apply to conversion masters. There do exist non-financial barriers to such courses, such as the requirement of the Quality Assurance Agency (QAA) that they include sufficient study at postgraduate level, but some universities seem to have surmounted this barrier without too much difficulty (in statistics and in other disciplines). So is there some other reason that the courses and the students are (largely) not there at present?

6. Information from recruiters

The responses from university colleagues to the questionnaire in the last section, and general common sense, indicated that the state of the job market for graduates (with or without a masters degree) in statistics or related subjects is important to the future of UK academic statistics. To oversimplify, statistics is not a subject likely to attract a lot of candidates to study, if there were not reasonable numbers of jobs available to people with a qualification in the subject. More specifically, given the importance of taught masters degrees to UK academic statistics generally, given that it is increasingly important for PhD candidates to start with a masters degree, and given that overall most of those who obtain a masters degree do *not* go on to a PhD, the importance to UK academic statistics of a liquid jobs market for masters graduates in statistics can scarcely be exaggerated.

However, the plans for this project did not include specific provision for investigating the demand for the graduates from masters courses. (The resource for this was simply unavailable.)

But in view of its importance, I felt that obtaining some information, however anecdotal, was probably better than nothing.

In mid-August 2011, therefore, I drew up a list of recruiters from recruitment agencies who had advertised positions on the allstat electronic mailing list, between the start of June 2011 and the date the list was drawn up. There were 26 names on the list (in some cases, more than one from the same recruitment agency).

I emailed everyone on this list, asking them to address six questions about the job market within which they operate, and how it relates to the availability (and skills) of masters graduates. The email is reproduced in Appendix E.

No reminders could be sent out. In the event, six of the recruiters replied (so a 23% response rate). Most (but certainly not all) recruiters from agencies who advertise on allstat operate mainly in the pharmaceutical sector, and this was true of all but one of the recruiters who replied to me. I am under no illusions that the responses are truly representative of anything. But there is a considerable level of consistency between the replies. I will therefore briefly (and largely anecdotally) report what the respondents told me. This does not in any sense represent a thorough analysis of the relevant job markets, but in my view it is slightly better than nothing.

The comments on the current state of the jobs market for people just finishing a masters degree in statistics were somewhat negative, but this may well represent a sampling bias. Those respondents who recruit for the pharmaceutical sector all reported that it is easy to find jobs for those who have some relevant experience in addition to their studies, but that things are harder for people without experience. However, some pointed out that recruitment of those without experience would often be carried out directly by employers, so that most candidates for these jobs would not be placed with recruitment agencies, and hence respondents from such agencies may well not be seeing the overall position. The one respondent who did not specialise in pharmaceutical jobs was much more positive about the state of the market, saying that “a good MSc stats candidate should have no issues in securing work”. In terms of trends, some reported that the market in pharmaceutical jobs seems to be picking up somewhat after recent downturns, though this optimism was not universal.

Replies to the question on how easy it is to find the right candidate were more diverse. Generally the position seems to be that it all depends on the client requirements, which are themselves diverse. For clients with specific requirements for previous experience, and in some cases for less technical aspects such as good communication skills, appropriate candidates can sometimes be hard to find, and the same is true for more senior roles (though these are not so relevant to the situation for recent MSc graduates). But for more junior roles, the balance of replies indicated that, perhaps because of the current economic climate, candidates are reasonably easy to find.

Putting the answers to both these question together, the overall impression is that the current supply of qualified statistics graduates is neither excessive nor inadequate in relation to the demand. One should not rely too much on replies from just six recruiters, but there was nothing in those replies to indicate a major mismatch between supply and demand.

As to whether clients prefer particular degree titles, most respondents took the view that, as long as the degree is in the broad area of statistics or biostatistics or biometry, the exact title does not

matter. One reported that, from the spectrum of MORSE (mathematics, OR, statistics, economics) degrees, statistics is more valuable in the marketplace. In some cases, such as in recruiting for SAS programmers, though, the subject of the degree is irrelevant to clients as it is the specific experience and skills that matter. In terms of client preference for particular universities, two reported that some do have preferences, for “red-bricks” or Russell group institutions, though one respondent did describe such preferences as “snobbery”.

To the question on whether there are gaps in the skills possessed by new MSc graduates, the answers were again rather mixed. One respondent, the one who was most negative about the current state of the job market in earlier questions, felt that there were no serious gaps in skills, and that the problem is merely that there are currently more candidates than positions. But the others all listed various deficiencies. Most commonly mentioned were knowledge of software, principally SAS, understanding of the industry and context to which candidates are applying, communication and presentation skills, and interview technique. It is not surprising that software knowledge and industry understanding were commonly mentioned, because the question led respondents in these directions, and it will come as no surprise that SAS is the most mentioned software. However, my question did not specifically point at communication skills or interview technique. On interview technique, one respondent said that graduates might attend up to ten interviews before they realise what is required of them at interview. Mentions of deficiencies in communication skills came up in answers to several questions; several respondents pointed out in different ways that the days are past when statisticians could just sit in a back room getting on with their calculations and analyses; they need to interact effectively with a wide range of contacts.

All this, taken at face value at least, raises the question of whether masters degrees in statistics can and should cover the areas in which job candidates are reportedly deficient. Some masters degrees do have some coverage of business aspects and may (and indeed certainly will on some specialist masters) include something on the nature of the industry or business that is most relevant to the students. But this is not universal, and can be difficult or even inappropriate to provide in a masters course that is preparing its students for a wide range of different industries and for academic research work (as a PhD student or as a research assistant). I feel that most of those responsible for designing masters courses, while they might see interview techniques as important, would not see it as something that the masters level study should specifically cover (and most universities do have coverage of such matters through their careers service — maybe the appropriate action would simply be to point students more firmly in that direction). Some masters courses do already cover SAS programming, but again here an issue is that, while SAS continues to predominate in many pharmaceutical contexts (and in some other business sectors as well), it is not the norm everywhere, and concentrating on SAS in a general masters may well not be appropriate. Finally, the question of communication and presentation skills is perhaps trickier. Arguably, all statisticians should require such skills, wherever their destination after the MSc, but the detailed skills *do* to some extent depend on the context (so that, for many purposes, the skills developed and assessed in a typical masters dissertation might indeed be the most appropriate). One also has to ask the question of what other content might appropriately be removed from a statistics masters course to make room for more coverage of communication skills.

Recruiters mostly did not see the issue of funding for MSc study as very relevant to their role. The main concern expressed was whether the lack of funding would reduce the supply of masters

students and thus change the market, though respondents said they had as yet seen no sign of such a change. Some respondents brought up the fact that (currently) having a masters degree in this area does not generally lead to a higher salary, compared to what the holder of a first degree in a suitable subject would be paid (though it was pointed out that having a masters degree might lead to more rapid promotion later). While this position holds, the incentive for someone to spend their own money on masters study will clearly be reduced — though in statistics, because of its relative lack of prominence at first degree stage, many who want to work in statistics would have to take a masters degree simply to get their foot in the statistical door. (Incidentally, one respondent reported that people with a PhD are not favoured for most jobs in business and industry, because companies feel that “they have been in education too long and adapt badly to business environments and issues.”)

One respondent suggested that a partial way round the funding gap would be for more part-time research and/or teaching work to be made available within universities (as is more common in North America), so that many postgraduate students could pay their way through this route. This is an interesting point, though it is not easy to see how it might actually work on a greatly increased scale within UK university traditions, culture and funding arrangements.

Finally, for the question on how they saw the future of this market, most respondents were optimistic, some to a very marked degree. The consensus was that demand for statistical expertise would increase (and this is of course in line with much that has been said in the general and management media in recent years), and that people with these skills, particularly if they have “got their foot in the door” with some industry experience, have a bright employment future. Some notes of caution were sounded, however. The point was made that the jobs are not always based, geographically, where people would like to work — they may be in less popular parts of the UK, or increasingly not in the UK at all, with major growth being seen in other parts of the EU. Also, one respondent noted that there is increasing competition for these jobs from candidates from countries like China and India “who are equally strong in their analytical skills and are fast becoming very good with their English and overall communication skills.”

Overall, then, while being careful not to read too much into this very limited study, there seems no reason to fear for the future of the job market for graduates from statistics masters courses. Very few signs of contraction were reported, and there are some grounds for expecting expansion. But the respondents did raise several issues about the way in which current masters degrees prepare students for this job market. A more thorough investigation of these questions could be very valuable.

Indications from outside this limited study are that statistical skills generally are in increasing demand, though often the resulting jobs are for data scientists or others whose roles link statistical expertise with expertise in other fields, such as computing, business, or even graphic design. The area of ‘big data’ seems to be mentioned more and more as one of importance. Of course, it remains to be seen to what extent these predictions are realised. But in any case a risk for academic statistics is that the candidates for these new jobs come principally from the other relevant disciplines, and do not acquire the necessary statistical skills from statisticians. In this respect, the dynamic and changing nature of the supply of masters courses (commented on in the previous section) is helpful.

The evidence is that new, and potentially more relevant, masters courses *can* be brought in quickly. But all this does imply that academic statisticians need to be very adaptable and eternally vigilant.

7. Overall discussion and recommendations

7.1. Discussion

The overall general impression I take from all the data sources I have considered is one of an academic grouping in reasonably good shape. Funding is available for research from a number of different public and other sources, indeed a wider range than is the case in the mathematical sciences generally. Staffing demographics are not in a particularly bad state compared to the position generally in the UK academic community. Undergraduate student numbers seem to be rising (after an earlier decline). According to the somewhat unreliable HESA data, numbers of postgraduate students, both taught and research, are broadly steady, despite some reduction in the availability of studentships for masters degrees. Despite some recent casualties, the number of available taught postgraduate courses seems to be increasing, and there is no major evidence of increasing concentration of postgraduate teaching in fewer universities. Finally, according to the very weak evidence I have, the job market for masters graduate statisticians is in reasonable shape and improvements are predicted.

There are some negative points alongside all this. Public funding does not cover everything that UK academic statisticians would wish it to cover, and in particular not enough studentships are available on masters courses, in the view of many statisticians. This may or may not be linked to indications from the HESA data that numbers of UK-domiciled taught masters students in statistics are decreasing. In common with many other smaller disciplines, statisticians have moved into larger departmental groupings, often against their will. It is possible that the number of universities participating in reasonable volumes of undergraduate statistics teaching is decreasing. However, overall I personally would rate the balance as positive. There are many reasons for uncertainty, many things are changing, and major change is never popular, but there are reasons to be cheerful.

It concerns me, therefore, that there is a decided air of defensiveness and pessimism in many of the communications I have had with fellow academic statisticians, and indeed this is arguably present in many of the evidence statements from universities (and the RSS) submitted to IRMS 2010. We seem to be a profession lacking in confidence. We feel we cannot get people back into academic statistics once they have escaped into the world of business and industry. We cannot get people to study statistics as undergraduates on any major scale, so we have had to rely on persuading people to move into taught postgraduate study by offering funding for them, that would not be available if they instead chose to study almost any other subject. (Indeed some of my respondents predicted the death of the discipline as a consequence of the drying up of masters funding.)

I have no panacea for this pessimism; maybe it is not as widespread as I think, and there is some kind of availability or selection bias in the observations that has contributed to creating this impression.

One aspect that, in my view, should be considered is the apparent lack of understanding from undergraduate students and, indeed, from academics from other disciplines about the nature of statistics. We do not seem to be very good at letting these fellow inhabitants of universities know

what is good, fascinating and useful about our subject. The RSS set up its getstats initiative to inform and involve the public generally. Do we need a getstats for university colleagues? Do we need to blow our own trumpets more inside our own institutions?

Whether or not that happens, let us at least be as confident and optimistic about our position and future as the existing data allow.

Finally, let us not forget that many people in academia who do statistics, teach statistics, or do statistical research fall outside commonly recognised statistics groupings. Some of these people would describe themselves as statisticians (academic or otherwise); others definitely would not. The health of UK academic statistics depends on them as much as it depends on statisticians in mathematical sciences departments (and similar). The RSS's own charter concentrates on its roles in relation to statistics, not primarily in relation to statisticians, however they might be defined. It is in the very nature of our discipline that it has very fuzzy (and leaky) boundaries. We need, in my view, to involve those who are *not* typical academic statisticians to a much greater extent than is often the case. From the point of view of an academic statistician in a mathematical sciences department, I strongly feel that we need them, perhaps even more than they need us.

7.2.Recommendations

1. The RSS should consider extending the work reported here to cover:
 - a. further investigation of the demographics of UK statistics academics;
 - b. further investigation, if possible, on the actual reasons why it is difficult to appoint to senior academic statistics posts;
 - c. investigation of the extent to which PhD training in statistics continues to be concentrated in mathematical sciences groups;
 - d. further investigation of the reasons why there is so little provision of ‘conversion’ masters courses for people trained in other disciplines to move into statistics;
 - e. further investigation of the job market for those completing masters courses in statistics.
2. The RSS should continue to liaise regularly with other research councils that provide substantial funding for statistics (ESRC, MRC, BBSRC and NERC) as well as with EPSRC. Existing links with NIHR should be nurtured.
3. The RSS should support strongly Recommendation R-1 of IRMS 2010 on flexible research funding.
4. The RSS should work with Research Councils and NIHR (and possibly other funders) to see whether it is possible to establish a one-stop shop, at least for advice to academics on research funding.
5. The RSS should set up a continuing system of monitoring HESA data on numbers of statistics students. This will be particularly important in the near future as student funding arrangements change (most radically in England).
6. The RSS, or possibly COPS, should consider producing a website that integrates information on taught masters courses in statistics and related subjects. The current COPS website is not sufficiently comprehensive, and no other source is easy to use from the point of view of the prospective student.
7. Universities should be encouraged to make more appointments that are joint between the mathematical sciences department where statisticians are concentrated and departments where applied statistics is used.
8. The question of how undergraduate students, perhaps sixth formers at school, and also academic colleagues in other disciplines can be made aware of the positive side of studying statistics should be investigated further. The RSS is currently concentrating on its (broader) getstats project, but other learned societies seem to be more prominent in their attempts to involve those close to studying their subject than is the case with the RSS.

Acknowledgements

Thanks go to all those who provided information for me, including contacts in Research Councils and NIHR, respondents to my data requests on masters degrees, and the recruiters who respond to my requests for information. Particular thanks to Vivienne Blackstone of EPSRC for helping me to approach the other Research Councils, and to Professor Deborah Ashby for helping me understand NIHR and its role in relation to statistics. Any errors in information contained here are, of course, my responsibility. Final thanks to the Open University, the Statistical Laboratory at Cambridge, and the ABC Centre of the Max Planck Institute for Human Development in Berlin, for not complaining when I worked on this report instead of whatever I should really have been doing.

Kevin McConway

Milton Keynes, Cambridge, Berlin 2011/2013

Appendix A. List of ‘mainstream’ masters courses in statistics

<i>Institution</i>	<i>Course</i>
University of Bath	MSc in Mathematical Sciences
Birkbeck College	MSc in Applied Statistics
Birkbeck College	MSc in Applied Statistics and OR
Birkbeck College	MSc in Applied Statistics and Stochastic Modelling
Birkbeck College	MSc in Applied Statistics with Medical Applications
University of Birmingham	MPhil(B) in Statistics ⁴³
University of Birmingham	MSc in Mathematics, Operational research, Statistics and Econometrics (MORSE)
University of Bristol	MRes in Statistics
University of Cambridge	Master of Advanced Study
University of Cardiff	MSc in Operational Research and Applied Statistics
University of Cardiff	MSc in Operational Research, Applied Statistics and Risk
University of Dundee	MSc in Applied Health Statistics
University of Edinburgh	MSc in Statistics and OR
University of Essex	MSc in Statistics and Computer Science
University of Essex	MSc in Statistics and Data Analysis
University of Essex	MSc in Statistics and Econometrics
University of Essex	MSc in Statistics and Operational Research
University of Glasgow	MRes in Advanced Statistics
University of Glasgow	MSc in Biostatistics
University of Glasgow	MSc in Environmental Statistics
University of Glasgow	MSc in Social Statistics
University of Glasgow	MSc in Statistics
Glasgow Caledonian University	MSc in Economics and Statistical Analysis
University of Kent	MSc in Statistics
University of Kent	MSc in Statistics with Finance
University of Lancaster	MSc in Statistics
University of Lancaster	MSc/MRes in Quantitative Methods for Science, Social Science and Medicine
University of Leeds	MSc in Statistical Epidemiology ⁴⁴
University of Leeds	MSc in Statistics
University of Leeds	MSc in Statistics with Applications to Finance
University of Leicester	MSc in Medical Statistics
London School of Economics	MSc in Statistics
London School of Economics	MSc in Statistics (Research)
London School of Hygiene and Tropical Medicine	MSc in Medical Statistics
University of Manchester	MSc in Biostatistics
University of Manchester	MSc in Social Research Methods and Statistics
University of Manchester	MSc in Statistics

⁴³ No longer available in 2013, but the University of Birmingham now offers an MRes in Statistics which appears similar.

⁴⁴ Replaced by 2013 by a similar MSc in Epidemiology and Biostatistics.

University of Nottingham	MSc in Statistics
University of Nottingham	MSc in Statistics and Applied Probability
University of Nottingham	MSc in Statistics with Biomedical Applications
University of Oxford	MSc in Applied Statistics
Oxford Brookes University	MSc in Medical Statistics
Queen Mary, University of London	MSc in Mathematics
University of Reading	MSc in Biometry
University of Salford	MSc in Operational Research and Applied Statistics
University of Sheffield	MSc in Statistics
University of Sheffield	MSc in Statistics with Financial Mathematics
University of Sheffield	MSc in Statistics with Medical Applications
University of Southampton	MSc in Official Statistics
University of Southampton	MSc in Social Statistics: Research Methods Pathway
University of Southampton	MSc in Social Statistics: Statistics Pathway
University of Southampton	MSc in Statistics with Applications in Medicine
University of St Andrews	MSc in Applied Statistics and Datamining
University of St Andrews	MSc in Statistics
University College London	MSc in Computational Statistics and Machine Learning
University College London	MSc in Statistics
University of East Anglia	MSc in Statistics
University of the West of England, Bristol	MSc in Statistics and Management Science ⁴⁵
University of Warwick	MSc in Mathematics and Statistics (MASDOC)
University of Warwick	MSc in Statistics

Appendix B. List of “marginal” masters courses related to statistics

<i>Institution</i>	<i>Course</i>
De Montfort University	MSc in Business Intelligence Systems and Data Mining
University of Essex	MSc in Applied Economics and Data Analysis
University of Glasgow	MSc in Applied Population and Statistical Mapping ⁴⁵
University of Glasgow	MSc in Financial Modelling
University of Liverpool	MSc in Mathematical Sciences
London Metropolitan University	MSc in Data Mining ⁴⁵
London School of Economics	MSc in Risk and Stochastics
London School of Hygiene and Tropical Medicine	MSc in Clinical Trials
University of Manchester	MSc in Analytics: Operational Research and Risk Analysis ⁴⁶
University of Nottingham	MSc in Applied Epidemiology
University of Southampton	MSc in Marketing Analytics
University of East Anglia	MSc in Knowledge Discovery and Data Mining
University of Warwick	MSc in Business Analytics and Consulting
University of Warwick	MSc in Management Science and Operational Research

⁴⁵ No longer available in 2013.

⁴⁶ Renamed by 2013 as MSc in Business Analytics: Operational Research and Risk Analysis.

Appendix C. List of “mainstream” masters courses in statistics that became available between 2011 and 2013

<i>Institution</i>	<i>Course</i>
Imperial College	MSc in Statistics
London School of Economics	MSc in Statistics (Financial Statistics)
London School of Economics	MSc in Statistics (Financial Statistics) (Research)
University College London	MSc in Statistics (Medical Statistics)
University of York	MSc in Statistics and Computational Finance

Appendix D. Questionnaire sent to enquire about MSc courses

Royal Statistical Society Project: UK statistical masters degrees

Please complete and return **by 31 July 2011 if at all possible** to:

Professor Kevin McConway
Department of Mathematics and Statistics
The Open University
Walton Hall
Milton Keynes MK7 6AA

Email: k.j.mcconway@open.ac.uk

Course and respondent information

1 What is the title of the course(s) you are providing data for?

2 At which university is it/are they available?

3 Please give details of the person supplying the response.

Name:

Position:

Email address:

History and student numbers

4 In which year did this masters course (or these courses) first run?

5 How many students do you anticipate recruiting for the next entry on your course(s)?

6 Please describe briefly where your students come from (UK, other EU, outside EU).
(If possible, give a breakdown on the origins of the students for the 2010–11 academic year.)

7 Briefly describe recent trends in student numbers on the course(s).
(If possible, give student numbers on the course(s) for the past three years.)

Funding

8 How many funded studentships are available on your course(s) from each of the following sources?

EPSRC

Other UK research council (please specify which)

NIHR

My university's own resources

Business or industry

Other (please specify)

9 Do you have further comments about funding?
(If possible, describe how funding sources have changed over the past 3 years.)

Destinations

10 Please briefly describe the most common destinations (in terms of employment and/or further study) for students who complete your course(s).

Further comments

11 Please add any further comments (e.g. any that will help us understand any special features of your course(s)).

Thank you very much for your help!

Appendix E. Email sent to recruiters of statisticians

Dear <name>

Royal Statistical Society project on academic statistics in the UK

I've been asked by the Royal Statistical Society (RSS) to carry out a short project on the state of academic statistics in the UK.

This project is not looking at every possible aspect, but it does contain several strands. One of these covers the availability of taught masters courses in statistics and some related subjects. There has been some concern about the future availability of funding for these course, and hence their viability.

Obviously the viability is affected by the job market for graduates in statistics. I've been asking University departments about the destination of students who complete their masters degrees, but it is much more complicated to get information from people who might employ those graduates.

Within the timescale and resources of the project, I'm not in a position to do anything approaching a proper survey of recruiters and potential employers. But I thought it would be useful to try to get a qualitative picture of some sort (and the RSS may commission some further work in this area later). So I'm emailing people from agencies who have advertised statistical jobs on the allstat mailing list recently. That includes you.

I'd be very grateful indeed if you could find a few moments to give me your views on the state of the job market for people completing masters degrees in statistics, or closely related subjects, in UK universities. Anything you'd like to tell me would be very welcome, but the following questions particularly interest me. (Ignore any that you'd rather not answer, for whatever reason.)

Any information coming from these questions in my report to the RSS will be anonymous, so your name (and indeed the name of your agency or employer) will not be mentioned.

1. What is the current availability of jobs in statistics for people who have just finished a masters degree in statistics? What have been recent trends in the availability of such jobs?
2. From the point of view of a recruiter, how easy or difficult do you find it to get the right candidate for such jobs?
3. How much does it matter which MSc a candidate has? (Which exact subject? Which department?)
4. Are masters graduates in statistics coming out of their studies with appropriate skill sets for the available jobs? Are there important skills that universities are not providing (e.g. computing, consultancy skills, industry understanding, or indeed anything you think would help)?
5. Many universities are finding it increasingly difficult to get financial support for students on MSc courses in statistics, because less money is available from Government sources, and fewer places are being funded directly by industry because of the economic climate and the state of pharmaceutical research in the UK. On the other hand, total numbers of taught

postgraduate students in statistics in the UK have not changed much over the past few years. From a recruiter's point of view, is student funding for MSc study an important issue?

6. How do you see the future of this particular job market?

Thank you very much for any help you can give me. I need replies fairly soon, by **9 September 2011** if possible, if they are to affect what I put in my report.

Yours sincerely

Kevin McConway

Professor of Applied Statistics
Department of Mathematics and Statistics
The Open University
Walton Hall
Milton Keynes MK7 6AA
k.j.mcconway@open.ac.uk