



Gender and the STFC-funded PhD Experience

Key Findings

- Male and female students have similar motivations for undertaking a PhD.
- Similar low proportions of female and male STFC-funded students rate their supervision and overall training as less than satisfactory/adequate.
- Women are less likely to rate their supervision and overall training, respectively, as good/excellent or good.
- Unlike female chemistry PhD students, female STFC-funded PhD students are at least as likely as men to wish to pursue careers in academia at the end of their period of study. In addition, the proportion of STFC-funded students, both male and female, wishing to remain in academia is higher than for chemistry.

Introduction

The Science and Technology Facilities Council undertakes an annual survey of funded PhD students. The survey provides a check on the quality of the training offered by departments and information on students' motivations for undertaking a PhD and career intentions post-graduation. This paper gives a summary of data collected in surveys from 2002 to 2009, in particular looking at whether there were any differences in the perceptions of men and women in the key areas of supervision, overall training experience and career intentions.

The best available data for comparison with other disciplines are drawn from three reports published by the Royal Society of Chemistry and the Biochemical Society. These reports presented the findings of studies investigating the experience of female and male PhD students during their PhD and how it influenced their career intentions.

Student sample

Table 1 shows the number, gender split and field of study of respondents each year. The response rates were typically around 95%. The percentage of female students holding STFC studentships during this period has ranged from 20% in 2002 to 26% female in 2009.

Table 2 shows how the percentage of women varied between the main fields of study for the years available i.e. 2003 to 2009. Solar system science had the highest percentage of women with 44% in 2009, having increased from 19% in 2002. Both experimental and theoretical particle physics also showed increases in the percentage of women: from 18% to 25% and 4% to 11% respectively. In astronomy, the percentage of women remained roughly constant at between 24% and 28%. (Nuclear physics studentships are not included here as only two years of data are available.)

Table 1 Number, gender and field of respondents to studentship questionnaires (N/A = Not available)

	2002	2003	2004	2005	2006	2007	2008	2009
Number of responses	532	541	544	573	574	592	722	743
% female responses	21%	22%	24%	25%	23%	22%	24%	26%
% Astronomy	N/A	62%	56%	56%	55%	46%	45%	43%
% Particle physics experimental	N/A	20%	22%	23%	23%	25%	25%	26%
% Particle physics theory	N/A	12%	14%	14%	14%	18%	19%	17%
% Solar system science	N/A	5%	7%	8%	7%	11%	10%	10%
% Nuclear physics	Not applicable						2%	3%

Table 2 Percentage female postgraduate researchers (N/A = not available)

% female	2002	2003	2004	2005	2006	2007	2008	2009
Astronomy	N/A	27%	28%	28%	24%	24%	26%	28%
Particle physics experimental	N/A	18%	21%	21%	20%	23%	24%	25%
Particle physics theory	N/A	4%	10%	13%	17%	10%	12%	11%
Solar system science	N/A	19%	26%	35%	39%	31%	39%	44%

Motivation for undertaking a PhD

Figure 1 and Figure 2 show the factors selected by female and male students as important in choosing to undertake a PhD. For both men and women enthusiasm for the subject is the most commonly cited important factor and the proportion of respondents selecting this

has remained relatively constant over the period covered by the surveys. Both women and men have placed increasing importance on believing that a PhD would enhance their career prospects and wanting to work in a first rate research group.

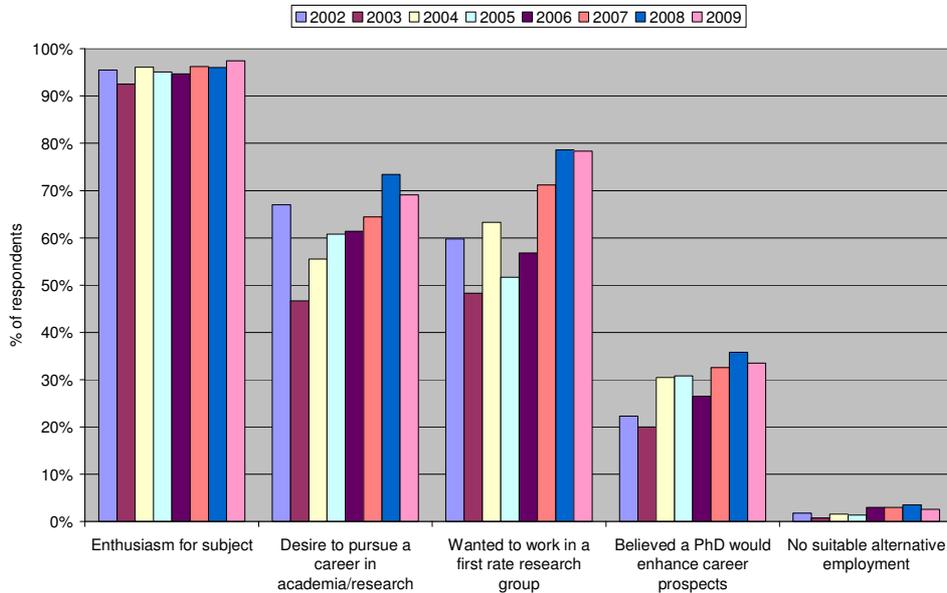


Figure 1 Motivation for undertaking a PhD for women



Figure 2 Motivation for undertaking a PhD for men

Supervision

Figure 3 shows the distribution of responses regarding the usefulness of the supervision received split by gender. Overall, around 80% of students have rated their supervision as good or excellent.

There were no significant differences between the female and male respondents in the proportions rating their supervision as poor or unsatisfactory: 5% and 6% respectively over the whole period. This compares favourably with the findings of the 2009 *Postgraduate Research Experience Survey (PRES)* which reported that, across all subjects, 20% of students rated the supervision experience as having failed to meet their expectations. (PRES is an online survey tool designed by the Higher Education Academy to collect feedback from current postgraduate research students).

However, the difference in proportions of female and male respondents rating their supervision as good or excellent was significant at the 1% level. For example, in 2009, 77% of female students rated their supervision as good or excellent, compared with 85% of men. PRES 2007

also found that male students rated their supervision more highly than female students did.

Overall Training

Figure 4 shows the overall rating of the training received. Satisfaction with the overall training rose over the period. In 2002, half of respondents rated the training as good compared with 80% in 2009.

In 2009, less than 2% of students rated their overall training as inadequate and there was no significant difference between women and men. Again, this compared favourably with PRES 2009, which reported that 16% of students rated their overall research degree experience as not having met their expectations.

However, the difference in proportions of female and male respondents rating their overall experience as good was significant at the 5% level. In 2009, 73% of female students rated their overall training as good compared with 80% of men.

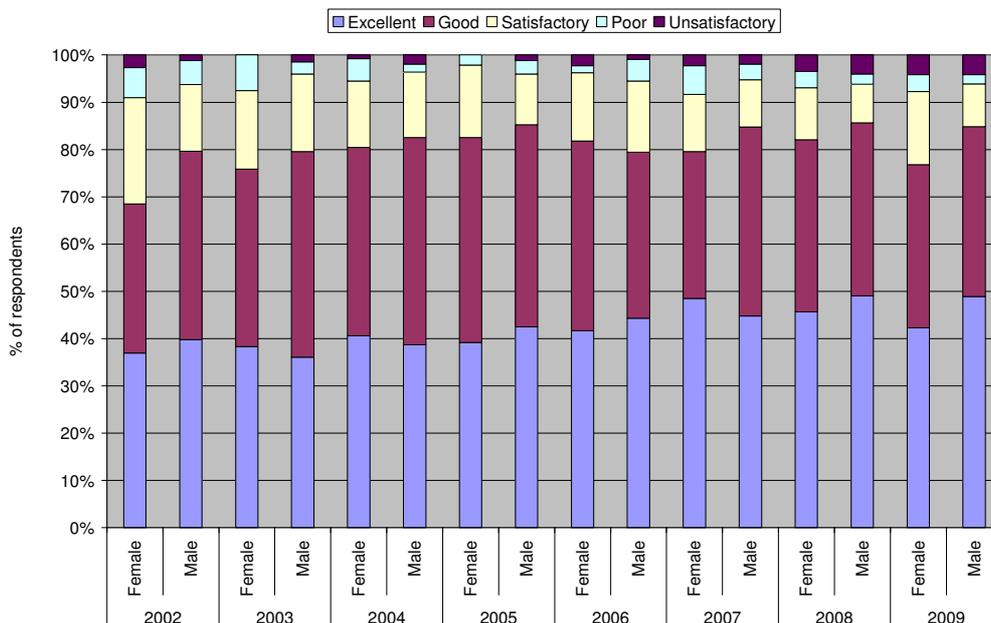


Figure 3 Usefulness of supervision

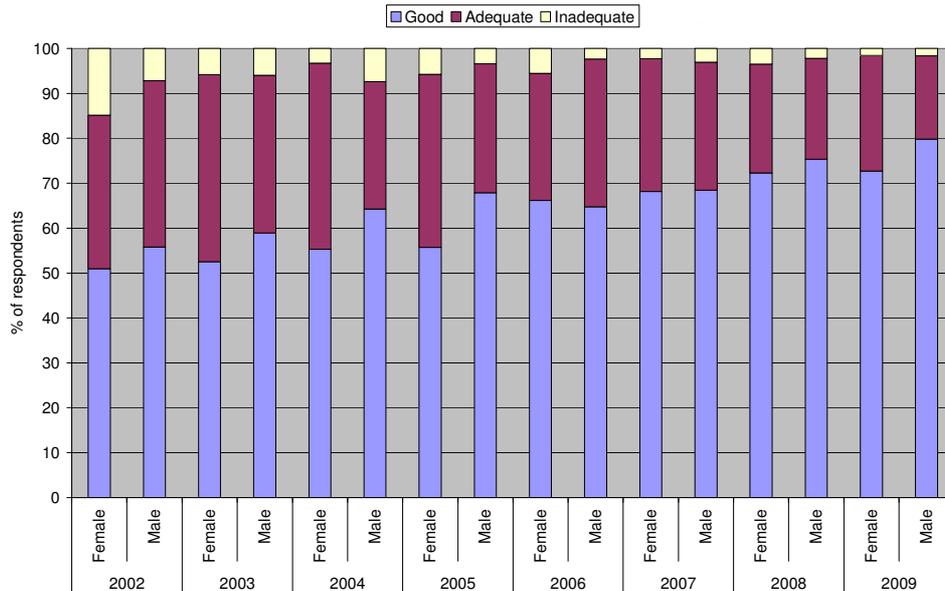


Figure 4 Overall rating of training

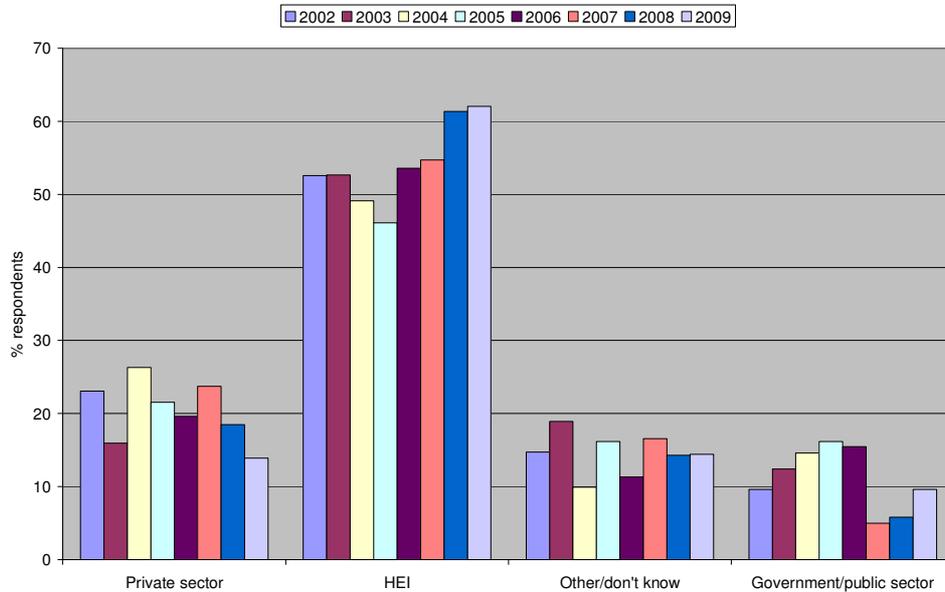


Figure 5 Preferred sectors career destinations of final year students

Career Intentions

Figure 5 shows the sectors in which students in year three wish to pursue careers. The most common career intention for both men and women is to work in a higher education institution, with 50% to 60% giving this as their intention.

Figure 6 shows that the intention of women and men to work in higher education has increased over the period more for women than for men. In the 2009 survey, women in their third year were significantly more likely (at the 5%

level) than men to want to pursue a career in higher education.

In 2009, a new question was included on the extent to which students intend to use their research and science background. Figure 7 gives a summary of the responses for all year three students that responded. This shows that 72% of women and 54% of men intended to pursue a career in research. For year three students intending to pursue a research career, 94% of women and 91% of men indicated that higher education was their intended destination.

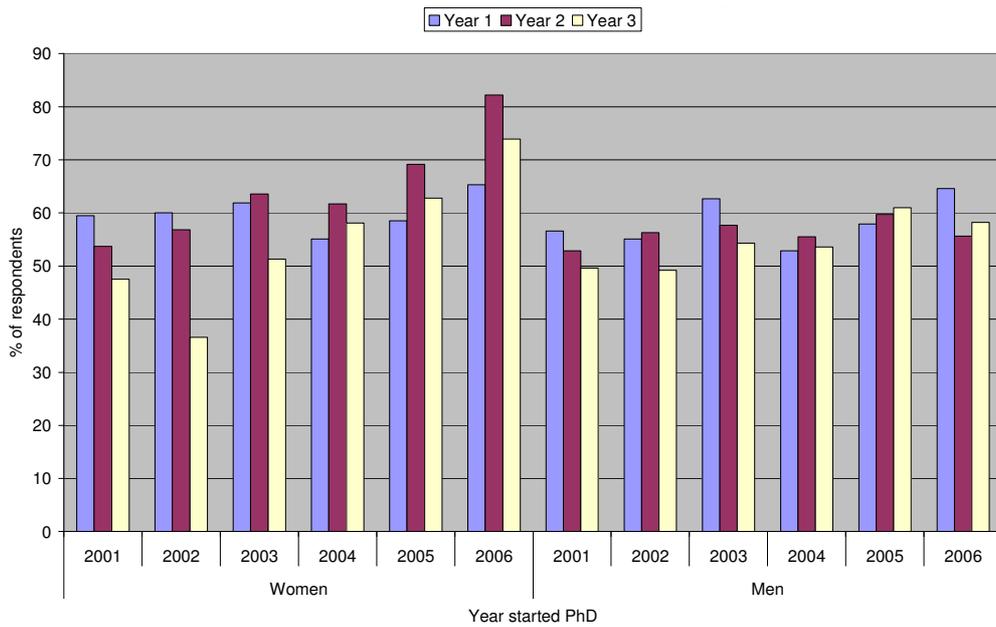


Figure 6 Percentage of students intending to pursue a career in higher education

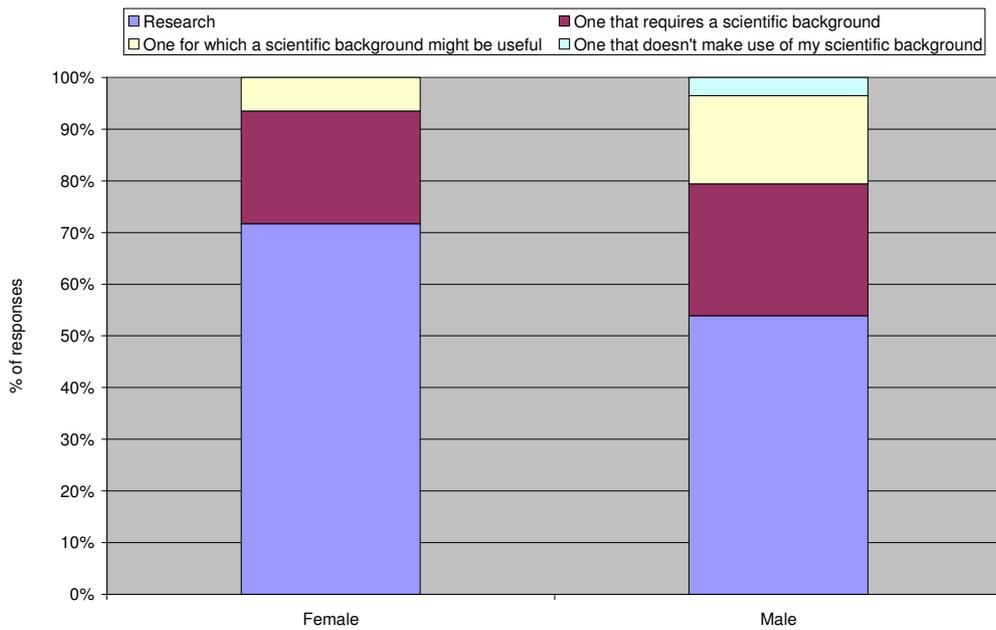


Figure 7 Extent to which intended career will make use of research and scientific background

Experience of women and men in chemistry and molecular bioscience

In 2008 the Royal Society of Chemistry published two reports: *Change of Heart - Career intentions and the chemistry PhD* and *The chemistry PhD: the impact on women's retention*. The former report detailed the findings of a 2006 survey of doctoral chemistry students' career intentions that related specifically to the issue of female attrition from chemistry at the end of the postgraduate stage.

Figure 8 shows the proportions of female and male chemistry postgraduate students wishing to pursue careers that differ in the extent to which their scientific or research experience would be used and, in the case of a research career, whether this would be in higher education. This shows that the proportion of women PhD students planning a career as a research chemist fell from 72% in the first year to 37% in the third year. Of those who indicated that they were planning a research career, 51% of women in their first year of doctoral study regarded staying on in academia as an option for them, but this fell to 33% for third year female students.

Looking at all respondents, only 21% of men and 12% of women were planning to remain in academia. Of the female PhD students who planned to leave research, many still intended to pursue a science-related career.

The second report from the Royal Society of Chemistry identified factors that deter a larger proportion of women than men from remaining in research beyond their PhD. This found that a larger proportion of female than male participants had:

- been deeply affect by supervision issues;
- encountered significant supervision issues, which they felt powerless to resolve;
- experienced a lack of integration with their research group, isolation and exclusion (and, more rarely, bullying);
- been uncomfortable with the culture of their research group;
- developed concerns about poor experimental success rates, apprehensive of what this may imply to others about their skills and competence;

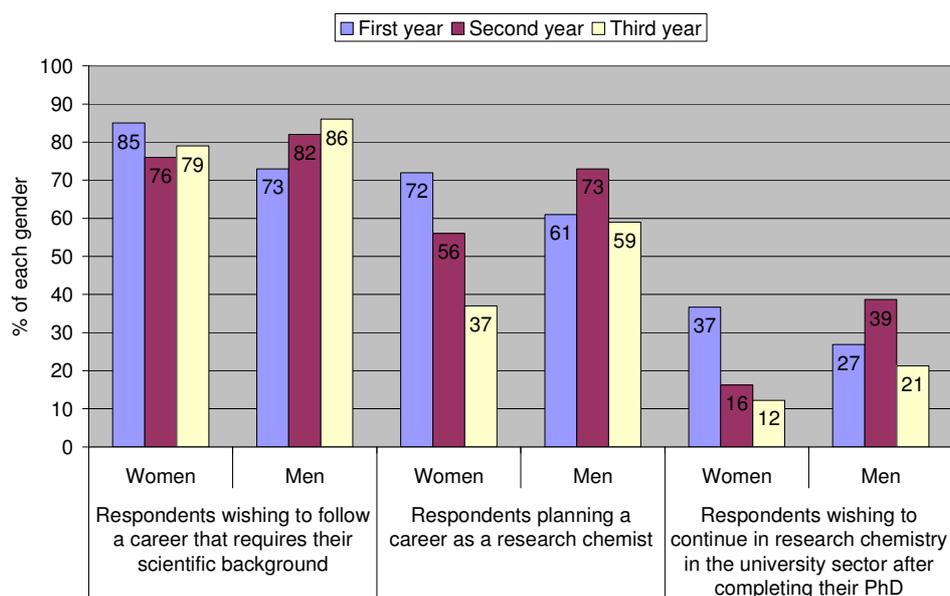


Figure 8 Proportions of chemistry PhD students wishing to pursue careers using their scientific or research experience and whether this would be in higher education

- formed the impression that the doctoral research process is an ordeal filled with frustration, pressure and stress, which a career in research would only prolong;
- come to view academic careers as too all-consuming, too solitary and not sufficiently collaborative;
- come to the conclusion that the short-term contract aspect of post-doctoral positions could not be reconciled with other aspects of their life, particularly relationships and family;
- come to believe the competition for a permanent post was too fierce for them to compete successfully;
- come to believe they would need to make sacrifices (for example, about parenthood) in order to succeed in academia;
- been advised, in negative terms, of the challenge they would face (by virtue of their gender).

The Biochemical Society published a report, also in 2008, entitled *The Molecular Bioscience PhD and Women's Retention A survey and Comparison with Chemistry*. This described the findings of

a collaborative project involving the UK Resource Centre for Women in SET, the Biochemical Society and the Royal Society of Chemistry. The research comprised a survey of the doctoral study experiences and career intentions of molecular bioscience PhD students, which was carried out during Winter 2007/08, and a gendered analysis of these data. The findings were compared with those of the two reports published by the Royal Society of Chemistry.

Figure 9 compares the results of the two surveys regarding the intention of chemistry and molecular bioscience PhD students to pursue a career in research on completing their PhDs. Both studies found that, by the end of their PhDs, women were less likely than men to be planning to pursue research further. However, in contrast with the results for chemistry PhD students, there was no evidence that a significant proportion of women were deterred during their PhD from entering a research career in molecular bioscience.

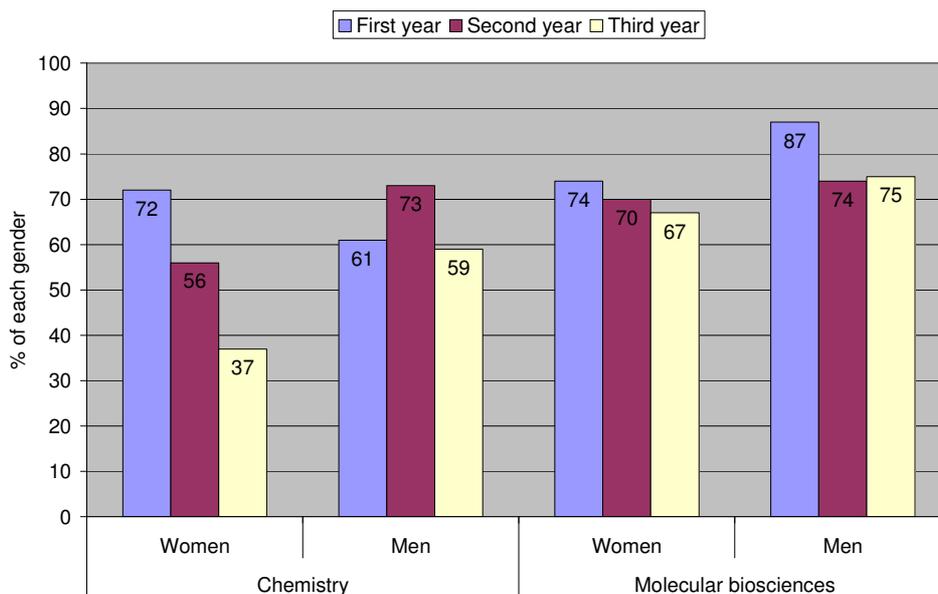


Figure 9 Intention of female and male chemistry and molecular biochemistry students to pursue a career in research



The most recent STFC studentship survey included a question regarding the extent to which respondents intend to use their research and science background in their future career. At 72%, the figure for third year STFC-funded female students wishing to pursue a career in research is similar to that for molecular biosciences but nearly double that for chemistry. At 54%, the figure for men is similar to that for chemistry but lower than that for molecular biosciences.

There are differences between chemistry and STFC-funded students in the choice of sector in which to pursue their research careers. Of the STFC-funded students intending to pursue a research career, 94% of women and 91% of men indicated that higher education was their intended destination. This compares with 33% and 36% for female and male chemistry students.

However, in addition to the influence of the postgraduate research experience, this difference may result from a perception that there are fewer jobs outside of academia in the STFC subject areas or, conversely, that there are fewer jobs in academia for chemists. Based on 2007/08 HESA data, the ratio of research staff to postgraduate research students is 0.46 for chemistry and 0.69 for physics, potentially indicating fewer opportunities to progress as a research chemist in higher education.

Although STFC students have rates of employment very close to 100%, jobs outside of higher education are often in non-scientific roles, which may not be attractive when enthusiasm for the subject is a key motivation for pursuing a PhD. For example, career path studies have shown that three quarters of STFC PhD graduates employed in the private sector work in financial or business services. The 2009 career path survey found that half of those employed in the public sector were in research

establishments. However, four fifths of these respondents were employed outside the UK. Therefore, it appears that there are relatively few opportunities to pursue UK-based scientific or research roles related to the STFC subject areas outside of higher education.

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