Transparency in the processes leading to setting pay and promotion is essential. There is considerable gain in moving from complex career structures, which may generate or be an indicator of gender segmentation within the workforce, to a smaller number of job families. Addressing these issues takes time, requires commitment from the top and must be undertaken in an open manner jointly with employees and their representatives. It is important to review progress through further gender pay audits.

**More evidence required - ASSET 2006**

We are at the early stages of our research. In the coming year, we plan to consider factors other than grade and age which determine pay, to look in more detail at the factors leading to promotion and to draw lessons on what makes a supportive environment which encourage female success. This work will provide important insights into what makes a successful scientific career. It is only possible to undertake it because of the rich source of data provided by the ASSET surveys.

The third Athena Survey of Science Engineering and Technology, ASSET 2006*, will run in the autumn. We hope that it will reach as wide an audience as possible in the scientific community, and in particular that it will provide much needed information about medical careers and scientists working in the private sector. ASSET 2006 will be launched at the University of East Anglia on 5 September 2006 and will be open for six weeks. The survey questions focus on the areas identified by Athena as key to the differences between men’s and women’s progression through and enjoyment of a career in science, medicine and engineering.

Jan Anderson is the Research Manager, at the Survey Office, ISD, University of East Anglia

Sara Connolly is a Senior Lecturer, at the School of Economics, University of East Anglia

Appendix

**PROGRESSION GLASS CEILING INDEX**

PCGI = \( \frac{\text{Proportion of staff in grade X-1}}{\text{Proportion of staff in grade X}} \)

**THROUGH FLOW INDEX**

\( TPFI = \frac{\text{Number of men in grade X}}{\text{Number of men in grade X-1}} \) / \( \frac{\text{Number of women in grade X}}{\text{Number of women in grade X-1}} \)

This briefing paper has been produced for the 2006 BA Festival of Science held at the University of East Anglia in Norwich on 5 September 2006 where the issues facing women in science today “Women in Science: Fulfilment or Frustration?” will be debated by a panel of leading scientists and policy makers.

The Athena Project was launched in 1999 with the aim of advancing the position of women in science, it works with UK universities, research organisations and professional bodies in Science, Engineering and Technology, for further details see the Athena website www.athenaproject.org.uk.

*ESRC grant number RES-000-22-1724.

*ASSET – Athena Survey of Science, Engineering and Technology.


*The published figures refer to permanent academic staff in England.

*The figures here relate to the UK and so are slightly different to those in the HEFCE (2006) report.

*This compares with 37% in the social sciences, 43% in law, 49% in languages and 57% in education.


*“Women and Science – a review of benchmarks and indicators”, Dutch Women’s Studies Association, (2004), this work was undertaken within the Framework of the EQUAL Project 'Breaking through the Gender Divide at Universities’. A similar approach is taken by the EU Commission, SHE-Figures 2006 – Women and Science Statistics and Indicators.


*Further information on ASSET 2006 will be available from August on the Athena website www.athenaproject.org.uk, or for more information email athena@royalsoc.ac.uk There will be a direct link through to the survey questionnaire from www.athenaproject.org.uk.

Further copies of this research briefing are available from

www.setwomenresource.org.uk

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www.setwomenresource.org.uk
Equal Measures: Investigating University Science Pay And Opportunities For Success

Jan Anderson and Sara Connolly

- Women are employed in increasing numbers in universities, but still only represent 29% of permanent academic staff in the sciences
- Measures of discrimination applied for the first time to UK science show that men have greater likelihood of progressing in their careers
- Where the glass ceiling is ‘thickest’ for scientists depends on their employment sector
- Seniority, age and employer type do not explain all of the pay differentials between male and female scientists working in Higher Education
- Despite their qualifications and commitment to career, female scientists in Higher Education experience an “unexplained” pay gap of over £1,500 pa.
- This research was conducted using data collected by the Athena Survey of Science and Technology (ASSET) 2004
- ASSET 2006 will be launched at the BA Festival of Science at the University of East Anglia on 5 September 2006. Further details inside.
### Setting the Scales

Statistics, recent research and anecdotal evidence all point the same way - women remain under-represented in the more senior levels of science, are paid less and face more barriers to career progression.

Until now there has been a lack of data to provide a firm basis from which to understand and address the barriers to women’s progression in scientific careers. But in 2003/4 the Athena Project ran two large scale surveys of scientists working in selected UK universities and Science Council-funded Research Institutes, plus a pilot industry survey. Over 7,000 men and women responded, providing information on their career paths, experiences, aspirations and expectations.

General results from these two surveys have been presented widely in the UK, Europe and the US and are being used by the Athena Project and their partners to inform science policy, debate and action.

Dr Sara Connolly at the University of East Anglia has recently received funding from the Economic and Social Research Council to conduct an in-depth analysis of this ASSET survey data, looking in particular at the factors influencing pay and career success.

Early investigations show that, despite improvements in recruiting practices and greater awareness by managers of diversity and equality, inequalities in pay and opportunities for success remain. A description of measures of discrimination and their implications is presented here.

### Gender equality gap in HE narrows

A recent report published by HEFCE highlights a narrowing of the gender gap in higher education. The figures, which cover the ten year period 1995-2005, show that the level of employment in higher education has risen and that this has been accompanied by an increasing proportion of employment amongst women (rising 9 percentage points to 35% of total employment) and those from a non-white ethnic background (rising 2 percentage points to 8% of total employment). The closing of the gender gap in overall employment is to be welcomed, but significant gender gaps persist, especially in the sciences.

### Less equality in the Sciences - Women in the majority as students, but only 1 in 3 of academic staff

The gender breakdown of students and staff within the sciences is shown in Chart 1. Women account for only 29% of staff (significantly lower than the overall average), but make up more than half the student body. In the traditional scientific disciplines we see that the female share of employment varies between 9% and 35% of total employment. In the sciences the gender pay differential is higher and women are much less likely to be high earners.

### Pay differentials exist and are higher in academic science

Gender inequality is not only restricted to employment. Female academics are also paid less than their male colleagues. Across all subjects women are on average paid £4,953 less than men (just over 13% of average female pay) women are also less likely to be amongst the high earners (earning more than £50,000 pa). In the sciences the gender pay differential is higher and women are much less likely to be high earners.

### Survey data sheds new light on the extent of discrimination

These figures – collected by HESA – provide a valuable overview of trends in employment, but they only cover those in permanent academic jobs. Women are much more likely than men to be employed in temporary jobs, on short-term contracts or in post-doctoral positions – an important stage in careers in science. If we are to assess accurately the position of women in the sciences, we need data that covers all types of employment (across all grades), and that provides details on careers, roles, responsibilities and achievements. Fortunately, this information was collected in the ASSET surveys.

Using this data, we find that women account for a much higher share of employment once we include all types of contracts and grades. Looking at six major areas, we find that in three – medicine and dentistry, biological sciences and subjects allied to medicine – employment is female-dominated, whereas employment is male-dominated in the other subject areas - physical sciences, mathematics and computing sciences, and engineering.

Women are under-represented in the more senior positions and over-represented lower down the scale. This is shown in Chart 4. Women account for only 16% of all professors in the sciences. Though the proportion of female professors is higher (almost a third) in the female-dominated subjects, it is significantly lower in the subject areas which are dominated by men. Interestingly, women account for more than half of those in post-doctoral positions in most subjects. The data suggests that women are

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**Chart 1 - Percentages of female science students and staff in UK universities**

<table>
<thead>
<tr>
<th>Subject Area</th>
<th>Female (%)</th>
<th>Male (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjects allied to medicine</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Medicine &amp; medical</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Biological sciences</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Veterinary science</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Engineering &amp; technology</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Mathematical sciences</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Computer science</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Agriculture &amp; related subjects</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Geography &amp; earth sciences</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>29%</td>
<td>71%</td>
</tr>
<tr>
<td>All science</td>
<td>29%</td>
<td>71%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Staff/Students</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: HESA subject statistics 2004/5 and HEFCE, “Trends in Academe”, Table UK13

**Chart 3 - Employment by gender, ASSET data**

<table>
<thead>
<tr>
<th>Subjects Allied to Medicine</th>
<th>Female (%)</th>
<th>Male (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine and dentistry</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>Biological sciences</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>Physical sciences</td>
<td>16%</td>
<td>84%</td>
</tr>
<tr>
<td>Engineering</td>
<td>3%</td>
<td>97%</td>
</tr>
</tbody>
</table>

**Chart 2 - Percentages of high earners in HE, 2004/05**

- **Computer sciences**: Women 10%, Men 40%
- **Veterinary sciences**: Women 12%, Men 32%
- **Engineering**: Women 7%, Men 62%
- **ALL SUBJECTS**: Women 10%, Men 40%

Source: Author’s own calculations using ASSET 2004

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entering the profession in larger numbers, but because they are young and occupy more junior positions they are likely to be paid less.

There are therefore two dimensions of inequality to explore. Vertical inequality arises if women face barriers – a glass ceiling – progression up the hierarchy. Horizontal inequality occurs if women are treated differently within grades - that they face some kind of pay discrimination.

How much more likely it is that men are promoted when compared to women? Building on work undertaken by Visser et al (2005) we identify two indices: the progression glass ceiling index (PGCI) which measures the relative chance of progressing to the next grade, if a group is under-represented it takes a value above 1. The through flow index (TFI) tells us, for a given grade, how much more likely it is that men progress to the next grade.

At all levels and across all subjects the values of the PGCI show that women are under-represented, evidence of a glass ceiling effect. The glass ceiling is “thickest” at the point of progression from senior lecturer or reader to professor but, surprisingly given that the female workforce is younger and increasingly accounts for a larger share of post-doctoral positions, it is “thinnest” at the progression from lecturer to senior lecturer. Thus, women face an early barrier: making the transition from post-doctoral to lecturerships positions.

The through flow index shows that in all cases men are more likely to move to the next stage in the hierarchy (by a factor of between 1.04 and 2.45 at the post-doctoral to lecturer level) and the increased likelihood is much larger at the top (by a factor of 1.38 to 6.04 at the senior lecturer/reader to professor level).

Work hard but get paid less

Not only are men better paid because they are employed in more senior positions, they are also more likely to earn more within each grade in whatever grade they are employed.

The next step is to identify how much of the overall pay gap is due to women being younger, more junior or employed in different types of institution or subject areas – this is known as the “explained” pay gap – and how much to men being better rewarded than women in the same circumstances – this is the “unexplained” gap and is a measure of discrimination (Table 1). Differences in characteristics account for just over 77% of the overall average gender pay gap: the fact that men are generally more senior accounts for 62% of the average pay gap, that men are older accounts for 16% and that they are more likely to be employed at Russell Group or Pre-92 Institutions accounts for 4% of the gap. Interestingly the subject mix causes women to be slightly better paid. Just under a quarter of the pay gap remains unexplained however. This can be attributed to differences in treatment i.e. “discrimination”.

How does this level of “discrimination” compare with the rest of the workforce? Most studies of gender discrimination cover men and women who are employed in very different occupations and with varying backgrounds in terms of education and employment experience. These differences would lead us to expect larger pay gaps and different treatment. Our study is distinguished by its focus on very highly educated men and women - they are at the very least all graduates and most have post-graduate qualifications – with almost identical career histories. They have been in continuous full-time employment and work in the same sector/occupation (higher education). Given the similarity of background, qualification and experience we would expect a more equal picture to emerge. Instead we find a higher than average pay gap and a similar level of discrimination to the workforce in general.

Table 1 - Gender Pay Gap disaggregated - measure of discrimination

<table>
<thead>
<tr>
<th>ALL FULL-TIME WORKERS</th>
<th>SCIENTISTS IN HIGHER EDUCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender pay gap</td>
<td>17%</td>
</tr>
<tr>
<td>Reason</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>6%</td>
</tr>
<tr>
<td>Years of full-time experience</td>
<td>16%</td>
</tr>
<tr>
<td>Years of part-time experience</td>
<td>12%</td>
</tr>
<tr>
<td>Interventions due to family care</td>
<td>15%</td>
</tr>
<tr>
<td>Occupational segmentation</td>
<td>1.3%</td>
</tr>
<tr>
<td>Discrimination</td>
<td>29%</td>
</tr>
</tbody>
</table>


Is it the same for all scientists?

Using data from the ASSET surveys we are able to compare the experience of research scientists in three different areas: HE, Research Institutes and the private sector. Using a general index of vertical equity we find that female researcher scientists in Higher Education face more barriers to progression and the gender pay gap is wider than for their female counterparts in Research Institutes and the private sector. However, when comparing the PGCI (Progression Glass Ceiling Index) some interesting patterns emerge. The barriers that female scientists face and when depends upon the sector in which they are employed:

- In Higher Education the thickest glass ceiling is in moving into the top grade – professorship
- For those working in Research Institutes it is in making the transition from a post-doctoral position to scientist
- In Industry it is progression in the middle grades.

Clearly, further study of how careers evolve for research scientists across these different employers will be valuable and informative.

Are employers ducking the issue?

The UK Resource Centre for Women in Science, Engineering and Technology held a workshop entitled “Equal Pay – Changes and Challenges” in June this year where three major employers discussed policies that they had implemented to tackle gender pay differentials. They each reported a significant reduction of the gender pay gap from levels that were already lower than those identified in Higher Education – from around 8% to below 3%.

In each case they stressed, in addition to the key concern of treating their employees fairly through equal treatment, that:

- There were important business reasons for addressing the differentials – that women are an increasingly important, skilled workforce who they want to attract and retain.
- Equal pay audits reveal where the largest inequalities lie and also identify means of addressing them.