



Women in IT: closing the gender gap

A Cebr report

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Introduction and Executive Summary

This report aims to quantify the boost to economic output that would result from more women working in IT.

In support of this research, Opinium undertook a survey of 527 IT decision makers to assess the benefits that women bring to their organisations and investigate the beliefs they hold regarding women in IT roles.

The gender imbalances in IT/STEM subjects at school and at higher education level are examined.

We analyse the impact on output of a scenario where the gender gap in IT narrows.

- There are currently 139,000 women employed in IT-related roles in 2013, which is 19.1% of total employment in IT-related roles.
- The economic contribution of these women to the UK economy is estimated to be £6.25 billion, significantly less than their male counterparts who are estimated to contribute £33.5 billion, reflecting the higher number of men employed in the sector.
- Scenarios where the education gap narrows could deliver gains for the whole economy of £59 million or £103 million. The higher figure could be reached by raising the proportion of women staying in IT out of those who do IT-related degrees.
- A scenario where the gender gap disappears and extra women fill the skills shortage in IT would provide an estimated extra £6.8 billion in economic output in the IT sector and an extra 124,000 IT workers. The net economic benefit for the whole economy is estimated to stand at £2.6 billion.
- If the gender gap in IT continues on its current trend, the gap will widen slightly over the coming years.

The gender gap in IT is worrying for the UK economy

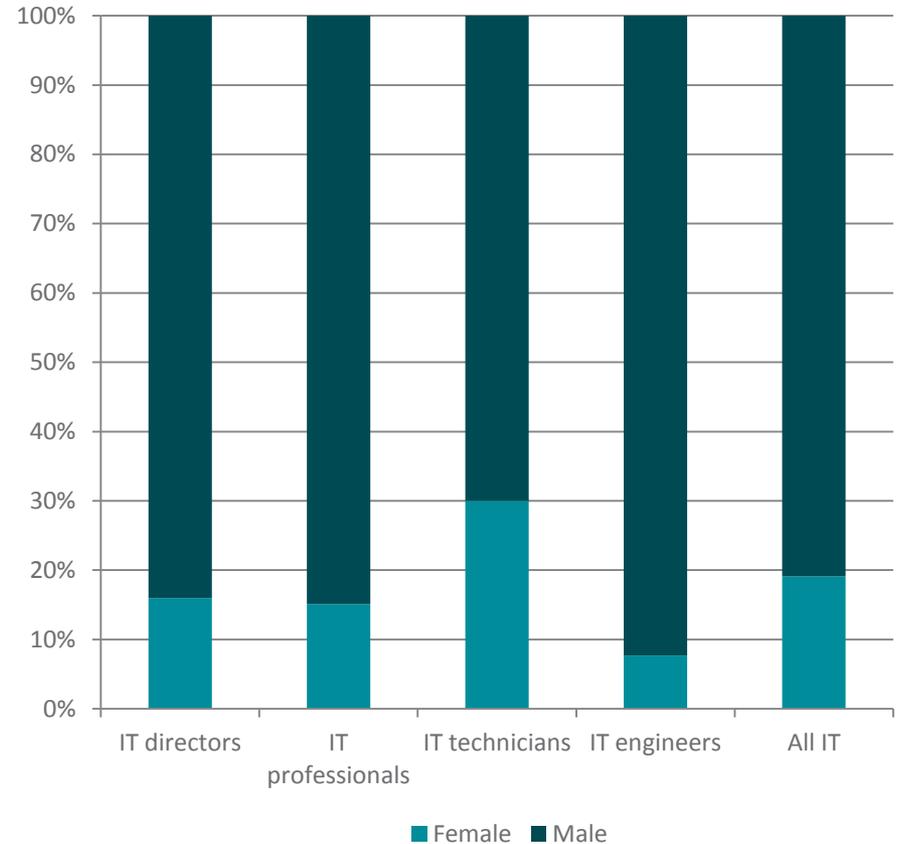
- The gender gap in IT has negative implications for the UK economy as potential skills and innovation in technology are missed by not recruiting as many talented women into the IT profession as men.
- According to a survey of 527 IT decision makers, only 26% of applications received for IT roles are from female applicants.
- The survey also showed that 53% of those IT decision makers agree that women generally find working in IT roles less attractive than men. Possible reasons for this include:
 - IT is perceived to be a male-dominated profession
 - IT is not generally promoted as a viable career option for girls in school/college
 - Negative media perceptions (e.g. IT is uncool/nerdy)
- The unattractiveness of pursuing a career in IT means that girls are less likely than boys to take IT/STEM (Science, Technology, Engineering and Mathematics) subjects at school and those girls who do are less likely to continue studying the subject further.
- A separate survey by the Confederation of British Industry (CBI) shows that nearly two-fifths (39%) of firms are struggling to recruit workers with the required advanced technical STEM qualifications. This skills shortage in IT could be improved if there were more females taking IT-related subjects at school and university.
- By deterring women from gaining the appropriate qualifications and then applying for roles in the IT profession, the economy is forgoing skills from potentially productive females.
- IT development and skills are crucial for the economy's future growth prospects and competitiveness.

IT women in the workplace

Women made up only 19% of the IT workforce in 2013

- Just under half (49%) of total employees across the economy were women in 2013, whereas only 19.1% of total IT employees were women.
- Clearly, all roles within IT are heavily dominated by men.
- The gender imbalance is most prevalent for IT engineers: only 7.7% of IT engineers were women.

Male and female divide in IT-related roles in 2013

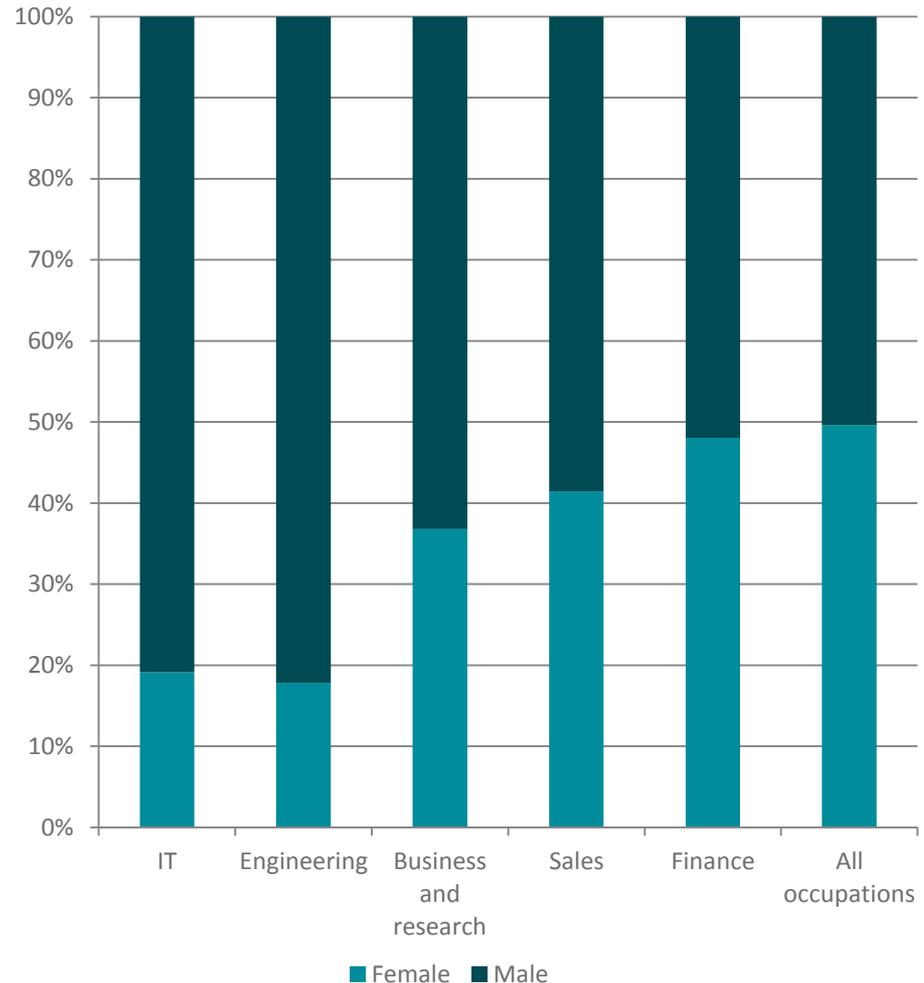


Source: Office for National Statistics, Cebr analysis

Gender imbalance is evident in IT-related roles

- Only 19% of employees working in IT-related roles are women, one of the lowest when looking at a range of occupations.
- Occupations such as Business & Research, Sales, and Finance have a much larger proportion of women in the workplace but there is still not complete gender equality.
- Engineering roles have a low proportion of female employees, which is similar to that of IT. This is not surprising as engineering has also historically been a male-dominated occupation.
- This gender imbalance in IT has been evident for more than a decade, with the proportion of women in IT-related roles staying fairly constant at around 20%, suggesting little or no improvement in encouraging women into IT roles over the past few years.
- In general, across all occupations in the UK economy there is an imbalance between the genders, with women making up just under half of total employees.

Male and female divide across occupations, 2013

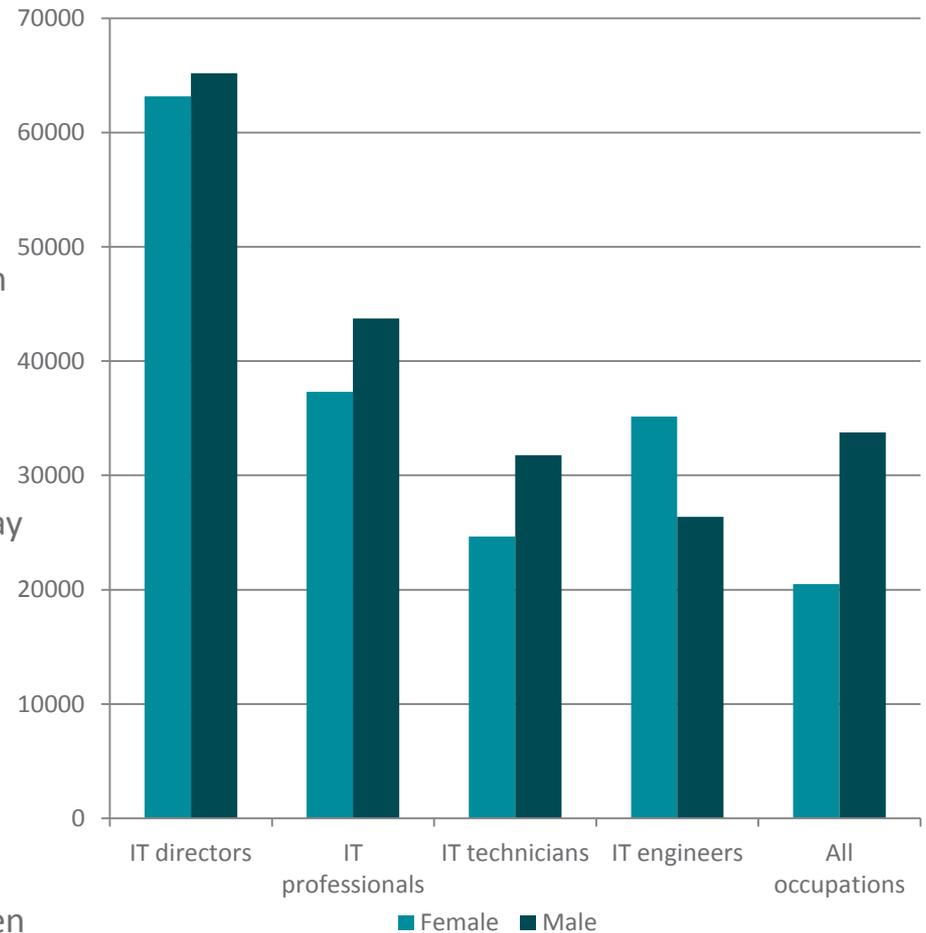


Source: Office for National Statistics, Cebr analysis

On average, men earn more than women in IT roles

- On average, men earned 21% more than women in 2013 across all IT occupations.
- The average salary of women in IT was approximately £32,581, which is just over 50% higher than the average for women across all occupations, which stood at £20,487 in 2013.
- Interestingly, female IT engineers earn a higher salary than males even though this is the role which the currently employs the lowest proportion of women.
- A survey of 527 IT decision makers found that women on average are likely to stay in an IT role for four years, whereas men on average are likely to stay in IT roles for five years.
- This implies women are less likely to benefit from promotion through experience, which could be a contributory factor to the gender pay gap across IT as a whole.
- A research paper by June O’Neill found that gender pay gaps in general are based on experience as women are less likely to work continuously than men due to factors such as childcare responsibilities.

Annual Salary by type of IT role 2013, £

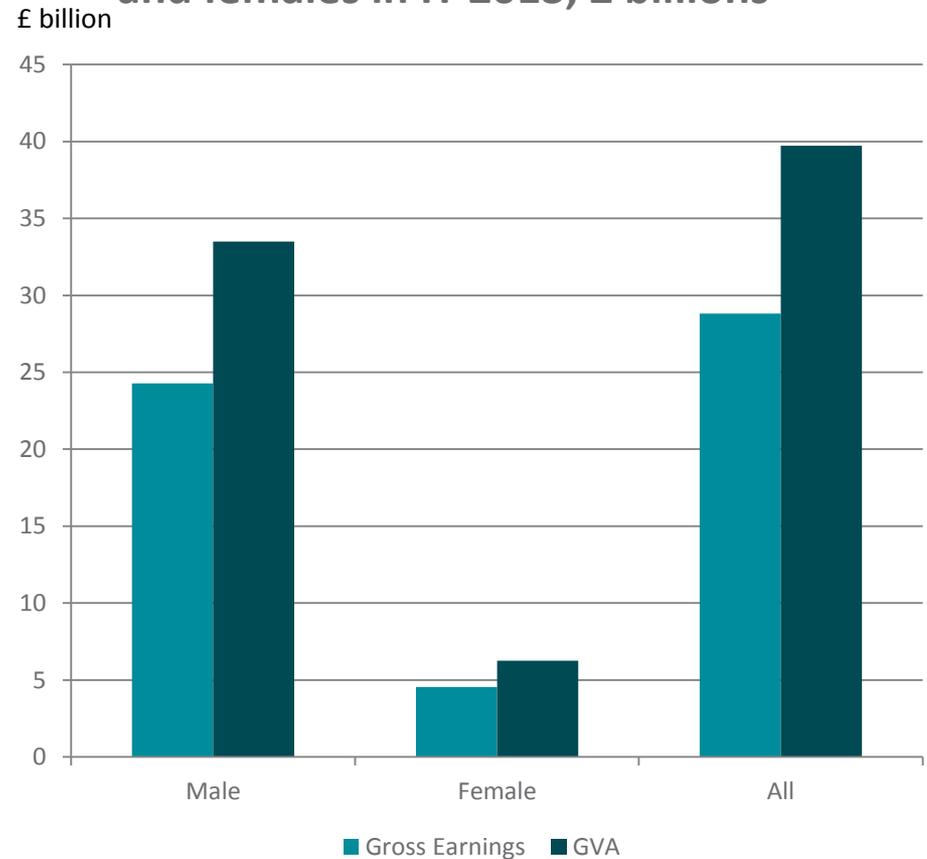


Source: Office for National Statistics, Cebr analysis

Women in IT are estimated to contribute over £6 billion to the UK economy

- The gross earnings of the 139,000 women in IT-related roles was estimated to be £4.5 billion in 2013.
- In comparison, the gross earnings of men in IT was estimated to be 5.4 times higher, at £24.3 billion.
- In order to measure the economic contribution to the UK economy, the gross earnings can be converted into gross value added (GVA) terms by adding in the tax contributions and business profits.
- Taking this into account and converting to GVA terms results in an estimated £6.25 billion economic contribution of women in IT-related roles to the UK economy .
- Males in IT-related roles are estimated to contribute a much larger value of £33.5 billion to the UK economy.

Gross earnings and GVA of males and females in IT 2013, £ billions



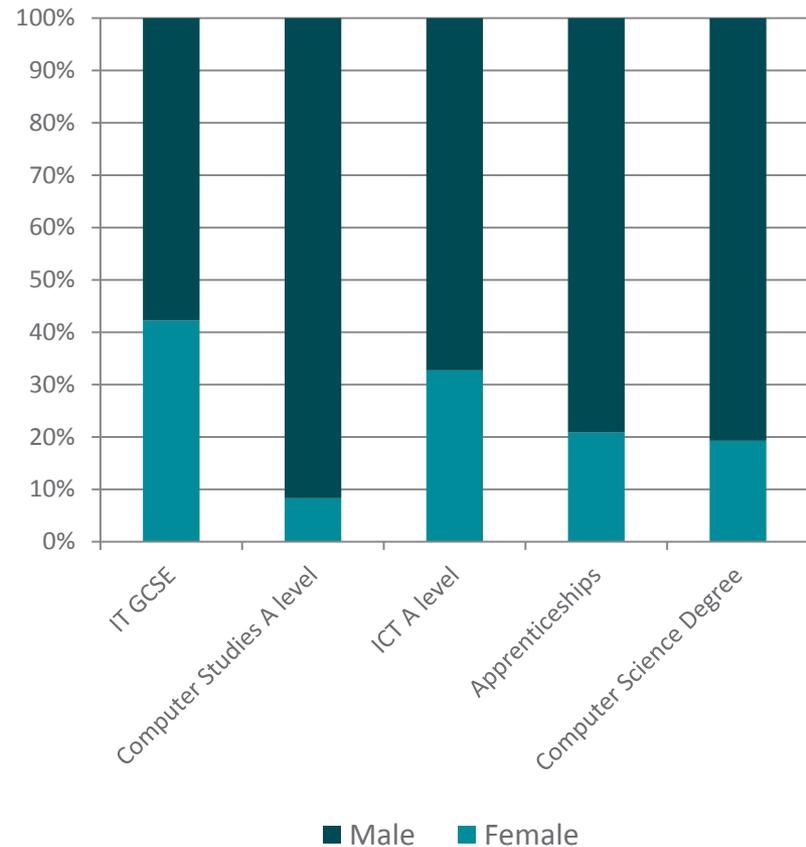
Source: Office for National Statistics, Cebr analysis

Gender imbalance in IT qualifications

Significantly more males gain IT-related qualifications than females

- An important factor that leads to a low proportion of women working in IT is the gender imbalance across IT related qualifications.
- Among those who studied IT at GCSE level in 2013, 42% were girls according to Ofsted. IT is compulsory for all pupils aged 9-16.
- At school education levels where the student chooses their own subjects, the gender imbalance becomes more prevalent.
- The proportion of students opting to study IT related subjects at A level that are female is lower than the number who studied IT at GCSE, only 8% of students that took computer studies were girls.
- The gender imbalance is more evident for students continuing to study IT related courses onto a higher level.
- Female participation in IT apprenticeship programmes and Computer Science degrees is only 21% and 19% respectively.

Male and female divide in IT-related subjects by level of education 2013

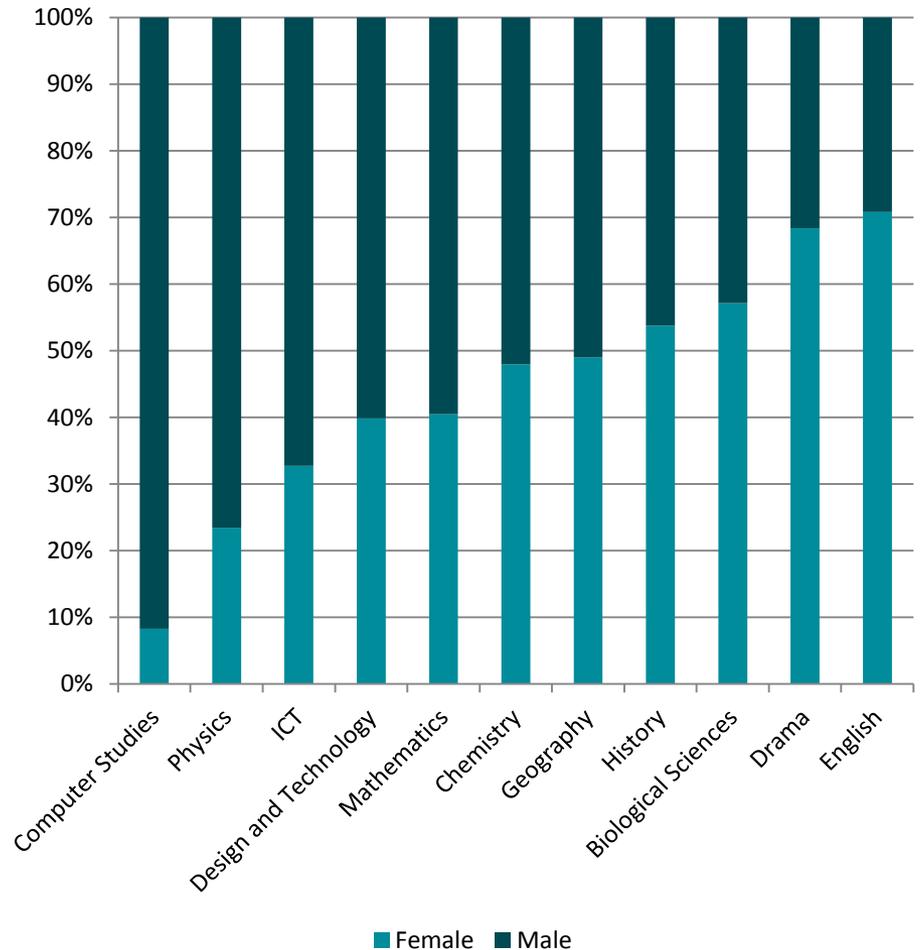


Source: Higher Education Statistics Authority, Skills Funding Agency, Cebr analysis

IT-related A-level courses are among the lowest for female participation

- Girls are less likely to participate in IT related courses at 'A' level: a third of students who took ICT were girls and only 8% who took computer studies were girls.
- Across this range of subjects, computer studies has the lowest proportion of female students.
- The gender divide is also evident in other STEM subjects, in particular in physics, where only 23% of students taking the subject are female.
- Girls are more likely to take subjects such as English and Drama, where both subjects in fact have a higher proportion of female students than male students.
- This lack of qualifications in IT/STEM courses makes it less likely that females will apply for IT roles, resulting in the gender imbalance observed across IT employees.

Male and female divide by subject 2013

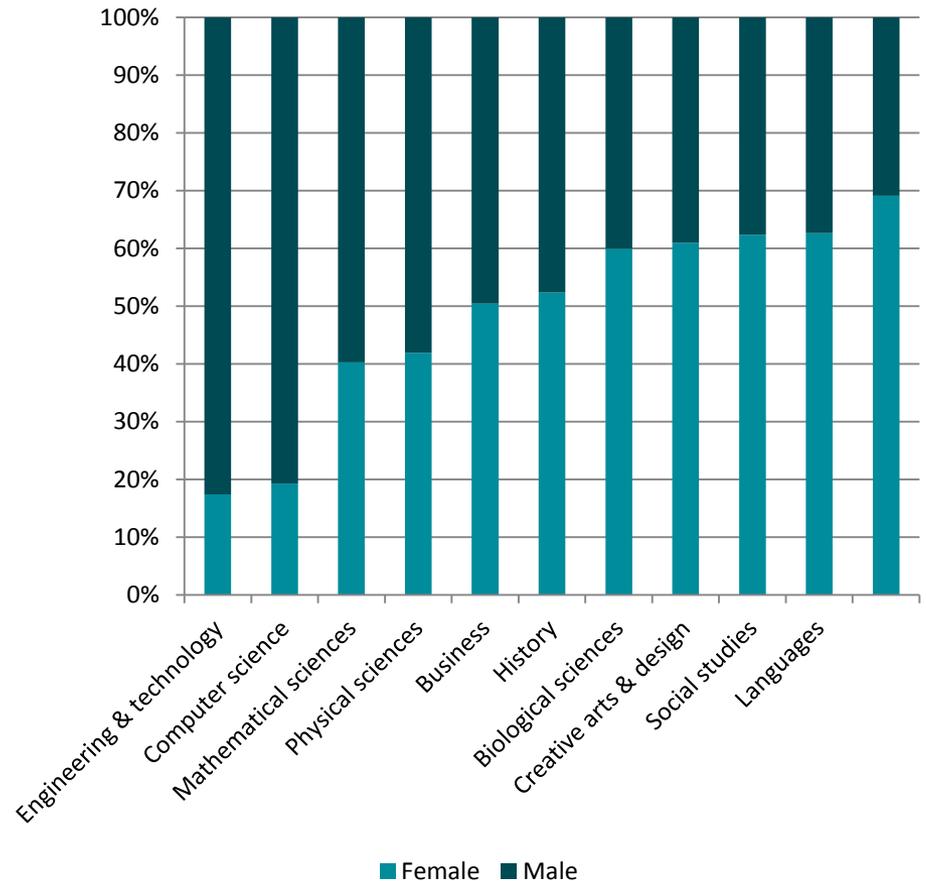


Source: Department for Education, Cebr analysis

Less than 20% of students on Computer Science and Engineering degree courses are women

- Engineering & technology and computer science have the lowest female participation among this range of subjects. The proportions of female students taking those subjects (out of all students taking each subject) are only 17% and 19% respectively.
- The gender imbalance is not as large for other STEM subjects, such as the sciences and mathematics.
- Females dominate subjects such as languages, but to a lesser extent than the male domination observed in engineering & technology degrees.

Male and female divide by degree subject 2013

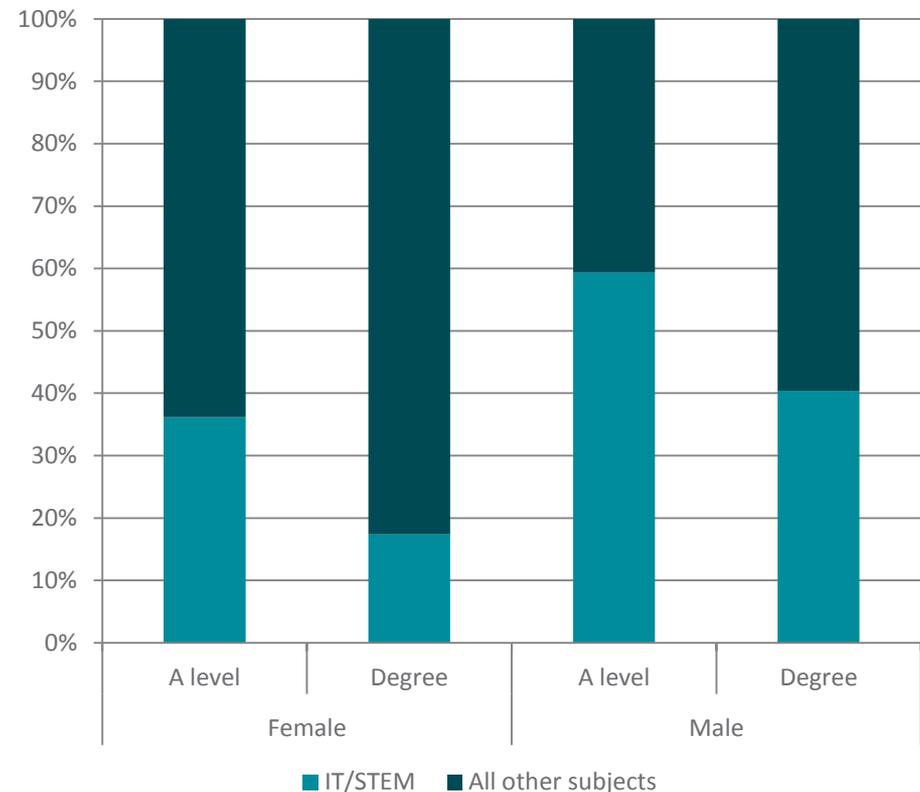


Source: Higher Education Statistical Authority

Females are less likely to study IT/STEM subjects at 'A' level and degree level

- The proportion of males and females studying IT/STEM subjects is lower at degree level than at 'A' level.
- The proportion of IT/STEM 'A' levels taken by girls is only 36%, while over half (59%) of 'A' levels chosen by boys are IT/STEM subjects.
- Therefore, it is more likely that girls will choose other subjects and boys will choose IT/STEM subjects.
- At degree level, the proportion of females studying IT/STEM subjects falls by around a half to 17% and the proportion of males falls to 40%.
- This suggests that a female who studies IT/STEM subjects at 'A' level is less likely to study an IT/STEM subject at degree level than her male counterparts.

Proportion of males and females studying IT/STEM subjects at 'A' level and degree level 2013



Encouraging women to study IT

- Of 527 companies surveyed, 59% agree that their IT team would benefit from having a gender-balanced workforce; it is therefore important that women are encouraged into studying IT subjects to enable them to pursue a career in an IT profession.
- The core of the gender imbalance problem in IT is that girls are less likely to take IT-related subjects in school than boys and those that do are then less likely to study such subjects further, which in turn leads to women being less likely to apply and thus be hired in IT professions.
- The unattractiveness of IT roles to women appears to be a major factor and 40% of the companies in the survey said they are not currently doing anything to encourage women into IT.
- The survey found some popular measures that could be adopted in order to encourage women into IT, which some companies are currently practising.
- However, only 23% of the companies in the survey said they are promoting IT roles specifically for women.
- The popular ways to encourage women into taking IT-related subjects include:
 - The company visiting schools/universities
 - Holding open days for school girls
 - Sponsoring degrees of women taking technical subjects
 - Increasing the number of apprenticeships specifically for young women

Productivity and output gains

Scenarios for future gains

We consider three scenarios.

- Scenario 1) We look at the number of women qualifying in computer science and assume the number increases to the same number as it is for men. We assume the proportion of IT-qualified women going into IT-related roles stays the same as at present.
- Scenario 2) We then calculate the added value if the proportion of IT-qualified women working in IT-related roles rises to the same proportion of men who do so, and the number studying IT-related subjects increases too, as per scenario 1)
- Scenario 3) We imagine a very ambitious scenario, which may not be attainable for some time, where the gender split in the IT sector moves to become even.

We then find yearly gains under the three scenarios.

- Scenario 1) finds a gain for the IT sector of **£66 million** per year. But because these women are not doing whatever other career they may otherwise have done, we also calculate a net figure for the whole economy. The whole-economy figure needs augmentation to account for the increased productivity of IT graduates (whether or not they work in the IT sector), ending up at **£59 million** per year.
- Scenario 2) finds the IT sector gains **£228 million** yearly, which comes down to **£103 million** when we look at the whole economy – other sectors lose talent.
- Scenario 3) finds a gross figure of **£6.8 billion** per year if the IT sector were to grow and assume an even gender split. The net economic benefit for the whole economy – accounting for other sectors losing talent - is estimated to stand at **£2.6 billion**.

1) Addressing the education gap: what if as many women as men take degrees in IT and computer science?

- In the UK, 22,800 men and 5,455 women obtained degrees in computer science in 2012/13
- Closing this gap would mean an extra 17,425 women would be able to work in IT-related careers. We do not suggest this is a trivial aim: however, it illustrates the potential gains available.
- Clearly, closing the gap in education does not mean that all the new graduates would go into IT-related fields. At present, just 9% of women studying IT-related fields work in IT-related fields.
- If the proportion stays at 9%, raising the number of women studying computer science to the level for men would mean an extra 1,605 women working in IT.
- Based on a starting salary of £30,000 and adding in tax contributions and contributions to employer profits, the gross value added of IT workers comes to £41,400 per year. This would be the same for women as for men, as a starting salary.
- Therefore the IT sector would gain **£66 million** overall.
- There are then effects on other parts of the economy.
- A consequence of attracting women into IT is to deprive other sectors of this talent.
- However, a consequence of more people studying computer science degrees is that they are on average more productive and earn higher salaries than people studying different degrees. (Admittedly, part of the difference is due to ability – not the subject they did.)
- Overall, after making adjustments to account for these effects, the whole economy gains **£59 million**.

2) Addressing the education gap: what if more women qualify in IT and as many IT-qualified women as men go into careers in IT?

- As well as a gender gap in *entering* degrees in IT and computer science, there is also a gap between women and men *leaving* university degrees in IT and computer science, in terms of staying within the field.
- Research finds that while 26% of men who studied ICT-related fields work in these fields, only 9% of women do.
- We imagine now a more ambitious scenario – what if the number of women qualifying in IT rises to the same levels as men **and** the proportion of IT-qualified women who work in IT rises to equal the proportion of IT-qualified men who do so? In other words, the differing figures below would equalise:

	Women	Men	Difference
Number qualifying in IT	5,455	22,880	17,425
Proportion staying on in IT	9%	26%	17%

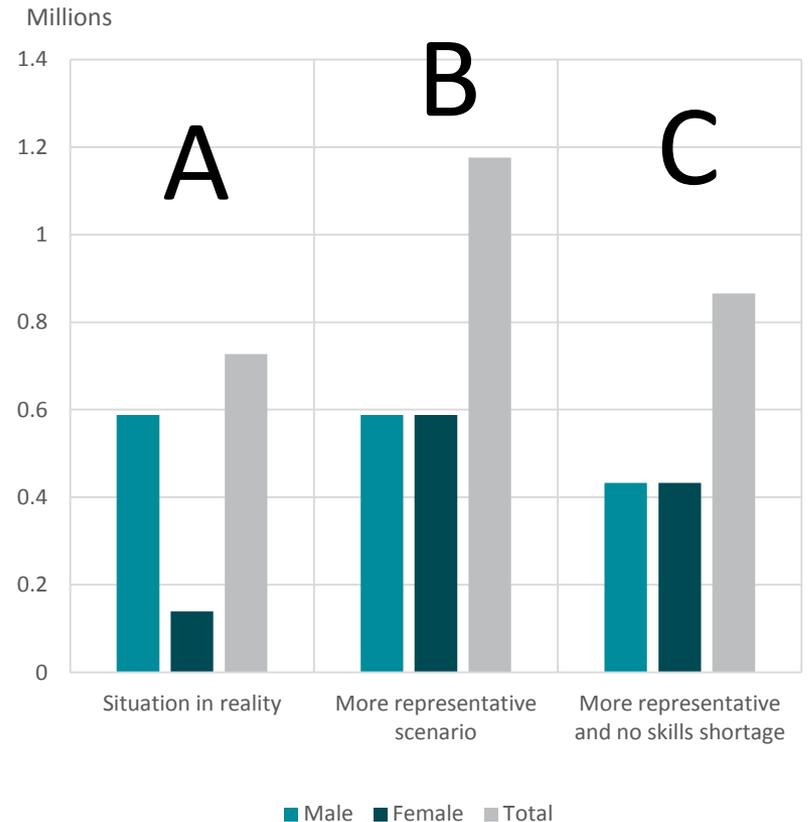
- The gain for the IT industry in that case would be **£228 million** in GVA terms: **£190 million** from extra workers from among the additional women now studying IT, and **£39 million** from women who already would have studied IT, but would not have continued within an IT-related career, choosing to do so.
- We have to reduce the overall figure when we look at the wider economic effects. If more women enter IT careers under this scenario, they will not be working elsewhere. This goes both for those who would never have even taken the computer science degree, and for those who would have taken it but chosen a different career.
- As before, we have to account for the higher productivity of IT graduates, whatever they choose to do, raising the value of the overall economic effect.
- The overall net benefit for the economy of the two changes outlined under this scenario would be **£103 million** per year.

3) What could the IT sector look like with a more equal gender composition?

Narrowing the gender gap should yield gains through both productivity per worker and overall numbers of workers

- At present, there are 588,000 men in IT versus just 139,000 women, a ratio of about 4:1 (split A – reality)
- We now imagine a more ambitious scenario still where the gender gap narrows so that the number of qualified women grows to equal to the number of qualified men (split B)
- That would leave the economy with far more IT workers than there currently are, and there may not be room for this many IT workers
- We address a scenario where the gender gap narrows, allowing more women to enter IT, but only up to the capacity of the industry to absorb that many workers (split C)
- And we compare a reinvigorated IT sector with an equal gender balance to the current situation in the sector: split A versus C

Number of IT workers by gender, in reality (A) and under two more representative splits (B and C)

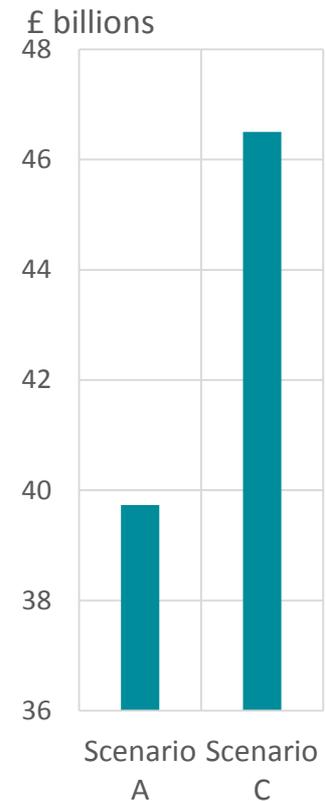


Source: Office for National Statistics, Cebr analysis

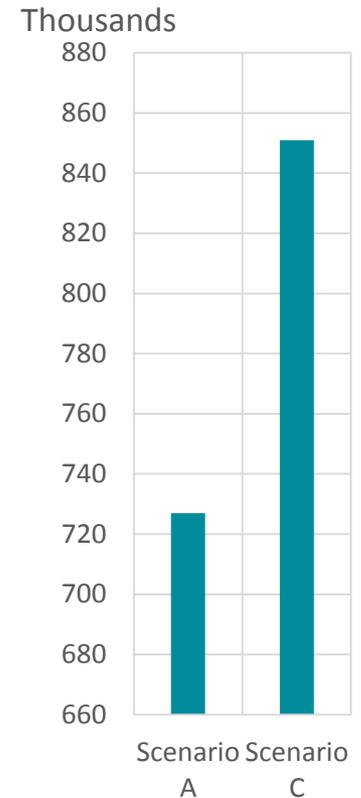
IT decision makers say that skills shortages make their companies 15% less productive than they could be

- Of 527 IT decision makers, 44% said that their company is negatively affected by a lack of suitably skilled staff in IT. The remainder said their company had no such shortage, or did not know.
- Respondents estimated that the average loss of productivity was 33%.
- Across all companies, this means that there is a 15% loss of output versus a scenario in which there are enough skilled staff.
- One explanation is that there are not enough skilled applicants.¹
- If women were not put off IT, there would be many more applicants. In fact, eliminating the gender gap would **more than cover** the shortfall.
- In such a scenario (split C) we would have an extra **£6.8bn** in economic output and **124,000 extra** IT workers.

Output, gross value added (2013), of all IT workers



Total number of IT workers (2013) under scenarios A and C



We argue this is the case. As survey respondents are “decision makers”, they should have the remit to expand the IT budget if there were sufficient good applicants.

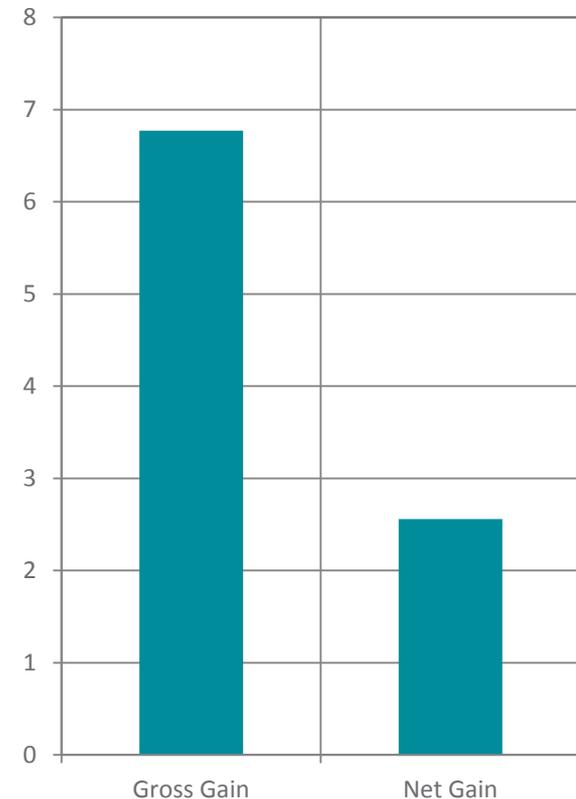
Source: Office for National Statistics, Cebr analysis

Eliminating the gender gap in IT is estimated to provide a net gain to the economy of £2.6bn

- We imagined a scenario where the gender gap narrows to make up the loss to productivity in the IT sector and then estimated a potential gain of £6.8bn to the UK economy if more women worked in IT.
- However, this does not account for the opportunity cost, in other words the salaries the 124,000 extra workers could have earned if they were employed elsewhere.
- By working in IT, these extra women forgo the opportunity to work in other occupations and so other sectors miss out on the productivity of these workers.
- To account for this loss, we have taken the average salary for women across all occupations and found the aggregate wages these 124,000 women could be earning if they were employed in 'the average job'.
- We then used the GVA for the total economy to scale up the total wages to include profits and tax contributions. Converting to GVA terms, the loss to other sectors is estimated to be **£4.2bn**.
- Therefore, taking into account the opportunity cost, the resulting net gain to the UK economy is estimated to be **£2.6bn**.

Estimated Gross and Net Gain in GVA to the UK Economy

£Billions



Source: Office for National Statistics, Cebr analysis

More women in IT could significantly boost labour productivity

Evidence from other fields

- The UN Food and Agriculture Organisation (FAO) has reviewed evidence on productivity in farming, finding that narrowing the gender gap increased productivity.
- The Organisation of Economic Cooperation and Development (OECD) finds that “greater economic opportunities for women will help to increase labour productivity”. Further, although there are “no significant gender differences” in aptitude for science subjects, young women are much less likely than young men to choose STEM (Science, Technology, Engineering and Maths) subjects. Thirdly, this “deprives OECD economies of a source of talent and innovation”.
- In the UK, the National Skills Forum finds that “[t]he limited number of women entering science, engineering and technology (SET) exacerbates skills shortages in these sectors, reducing the productivity of SET organisations and making it harder for them to compete on the international stage.”

Evidence from survey data

- The OECD and FAO evidence agrees with the general assessment in the survey undertaken of 527 IT decision makers . Of those polled, 59% agreed that their IT team would benefit from having a more balanced workforce. Only 7% disagreed with the proposition.
- Of those who agreed, 41% believed a more even gender balance would raise productivity.
- Over half (52%) believed a better gender balance would improve communication skills; 48% believed it would improve staff morale. Some 46% were of the opinion that it would bring new ideas to their organisation.

Source: Office for National Statistics, Cebr analysis

Looking ahead to the future

Future trends: overall employment in the UK

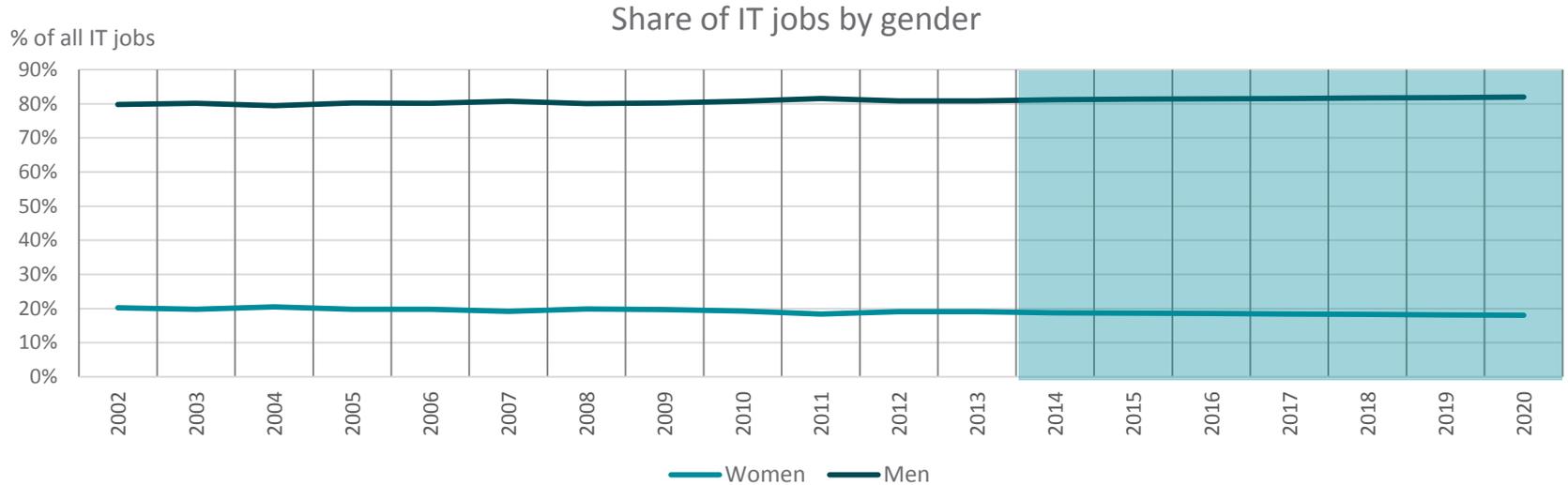
Employment rates by gender among those aged 16-64
% in employment



- Since 1971 the gender divide in total UK employment has been narrowing: in 1971, 92.1% of men aged 16-64 worked compared to 52.8% of women.
- More women have, since then, joined the workforce while men have been leaving it. The latter trend is due to the population ageing.
- Overall employment rates still vary significantly by gender: in November 2013, the respective rates were 77.3% for men versus 67.2% for women.

Source: Office for National Statistics, Cebr analysis

Future trends: the IT sector



- As with overall employment, one might expect the gender gap in IT to narrow as with in the workplace overall.
- However, the percentage of women in IT is actually falling slightly, and is currently 19% compared to 20% in 2002.
- We project the current trend forward to 2020. If it continues, the ratio will drop from 19% to 18%.
- The industry would suffer from the talent shortage mentioned and the lost opportunities this creates. Output per worker and the number of workers would both stay below their potential levels.

Source: Office for National Statistics, Cebr analysis

Method notes

Method notes

- The survey in support of this research, undertaken by Opinium, had a sample size of 527 IT decision makers between 21st March 2014 and 2nd April 2014.
- The analysis in this report was conducted largely using publications from the Office for National Statistics (ONS).
- The *Annual Survey of Hours and Earnings* gives earnings by sex and occupation.
- The *Department for Education* provides data on GCSE and A level entrants by subject and sex.
- The *Higher Education Statistics Agency* gives data on degree participation by subject and sex.
- The *Skills Funding Agency* provides Apprenticeship programmes by sector and sex.
- Using the *Supply and Use* tables in the National Accounts, we can scale up the total wages to find contributions to profits and taxes.
- The government's Shortage Occupation list includes IT and programming jobs.
- The FAO's *Women in agriculture: closing the gender gap in development* and the OECD's Report *Meeting of the OECD Council at Ministerial Level* provided evidence on the gender gap in other fields.
- *The Gender Gap in Wages* by June O'Neill found evidence that the gender gap is predominantly experience based.
- CBI/Pearson Education and Skills Survey 2013 provided evidence for the skills shortage in STEM subjects.
- European Commission DG COMMS, 2011, 'Women active in the ICT sector' provided estimates of women and men going into the ICT sector, of those who studied IT-related degrees.
- Average graduate starting salaries are provided by the Graduate Recruitment Bureau.



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