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*Gender differences
across scientific fields*

2. Gender differences across scientific fields

The value of looking more closely at different scientific disciplines

Educational choices are made in a gendered environment under the influence of factors such as peer pressure and teacher preference. These choices impact on the career possibilities of women and men. Probably the most highlighted difference is the lack of women in engineering professions. It is therefore important for analysts and policy makers to have a clear idea of how well research is capitalising upon knowledge intensity in certain fields. The indicators presented in this Chapter refer to horizontal segregation, in this case, the dissimilarity in the distributions of the sexes across scientific fields.

Studies on segregation in the European labour market have found that existing overall segregation is mostly due to high levels of horizontal segregation (Blackburn et al., 2002). This means that the different distributions of men and women in employment are due to differences across fields of employment, rather than in seniority. This may or may not be the case for research – the data currently available do not lend themselves easily to such an analysis. Nevertheless, we can start to get an understanding of the significance of horizontal dissimilarities¹ by looking at differences in given parts of the R&D system. Furthermore, the diversity in the percentage of women in each sector and country and the small numbers involved for some countries² must be kept in mind when drawing conclusions at national or European level.

Common patterns between education and research for many countries

The results presented here reveal that not only are gender differences evident, especially among Member States from several perspectives, but that they follow the stereotypical patterns that can be witnessed in the labour market at large. Alongside the lack of women in engineering, there are high concentrations of women in Health and Medical fields, in Humanities and in the Social Sciences in many countries. This is the case for both higher education and research. In many countries the share of women is also high in Agricultural and Natural Sciences. Some countries, for example Bulgaria and Latvia, stand out as having quite individual gender profiles.

There are data gaps for the Member States in GOV that hinder the possibility of making a fuller analysis and of calculating any EU estimates, but women appear more likely to be undertaking S&E³ research in GOV than in the HES in the Associated Countries. However, the GOV sector is smaller than the HES and the BES and not always as well resourced in many of these

¹ It should be borne in mind, however, that a uniform distribution of the sexes across scientific fields is not necessarily realistic or beneficial to women

² Especially Luxembourg, Cyprus, Estonia and Malta.

³ Here the term 'S&E' refers to the combination of the two fields of science NS and ET

countries. Romania is the only country where women are more likely than men to be undertaking S&E research – and this is only true in the HES sector. Interestingly, in the BES, where men are in a sharp majority, the distributions of women and men across economic activities are remarkably homogenous.

Is there change afoot?

It is only possible from the available data to make a crude analysis for three Member States and ten Associated Countries where the data broken down by field of science were available for either 1999 or 2000 and then for either 2000 or 2001 in the HES. In Denmark, Germany and Estonia in both Natural Sciences and Engineering, there was change of less than 1% in the percentages of women. This was also the case for Natural sciences alone in Bulgaria, Cyprus, Iceland and Israel. In Czech Republic, Lithuania, Norway and Slovenia, the percentage of women increased by more than 1% in S&E, and in Engineering by 3.1%, 4.1% and 5% in Cyprus, Lithuania and the United Kingdom respectively. There was a small decline in the proportion of women S&E researchers in Slovakia.

For the remaining fields of science, there were minor increases in the order of one or two percent in almost every case, with more significant increases in the Humanities for Czech Republic, Lithuania and Slovenia. The proportion of women researchers in Agricultural sciences in Israel also increased

from 10% to 14%. In the other fields of science, the only exceptions to this positive trend are to be found in Medical sciences in the United Kingdom, Czech Republic and Slovakia. Also, in Lithuania, the proportion of women researchers in Agricultural Sciences declined from 50% to 39%. So, the gradual increase in the proportion of women researchers seems to be evident across most fields of science for the Czech Republic, Lithuania and Slovenia between 1999 and 2000/2001 but is otherwise barely discernible for most countries.



Table 2.1.a

Percentage of ISCED 6 graduates who are women by broad field of study in EU Member States, 2001⁽¹⁾

Percentage Women	EDUCATION	HUMANITIES AND ARTS	SCIENCE, MATHEMATICS AND COMPUTING	AGRICULTURE & VETERINARY	HEALTH AND SOCIAL SERVICES	ENGINEERING, MANUFACTURING & CONSTRUCTION	SOCIAL SCIENCES, BUSINESS AND LAW
Belgium	54,5	31,1	33,6	31,2	39,6	15,4	35,0
Denmark ⁽²⁾	X	50,6	32,6	46,6	47,5	23,7	41,7
Germany	41,7	45,2	26,8	52,5	45,5	11,8	32,1
Greece	:	:	:	:	:	:	:
Spain	54,3	45,4	44,6	33,3	48,7	23,2	44,0
France	50,0	56,5	39,3	56,5	57,0	26,8	42,4
Ireland	50,0	54,3	42,7	36,8	60,3	22,2	49,1
Italy	:	57,9	47,7	56,0	66,3	34,4	46,0
Luxembourg	-	-	-	-	-	-	-
Netherlands	:	31,5	25,5	32,8	41,8	13,8	37,2
Austria	62,1	51,4	35,6	51,1	71,9	13,0	39,4
Portugal	66,4	64,2	49,8	56,1	64,9	39,1	46,1
Finland	72,2	45,6	37,4	39,2	62,9	21,2	50,9
Sweden	65,6	44,0	33,0	48,4	52,7	24,1	41,1
United Kingdom	55,2	46,4	38,9	39,6	51,6	18,8	40,2
EU-15 ⁽³⁾	55,4	48,9	35,7	46,5	49,0	20,6	39,3

Source: Eurostat, Education

Notes: ⁽¹⁾Exceptions to the reference year: DK, FR, IT, FI: 2000

⁽²⁾Humanities and arts includes education

⁽³⁾EU-15: estimate excludes EL, LU. Above exceptions to reference year apply

Although women outnumber men only in the field of Education for the EU-15 average, they enjoy more or less equal numbers of ISCED 6 graduates as men in Humanities & Arts, Health & Social Services and Agriculture & Veterinary Sciences. An estimated 41.4% of university graduates in Science, Mathematics or Computing subjects in 2000 were women, so the average of 35.7% is less than we would have expected. Furthermore, the numbers of these graduates appear to have fallen from 105 000 in 2000 to 90 000 in 2001.

Among engineering graduates the percentage of women was 20.8% in 2001 and 20.2% in 2000 – a close match for the EU-15 average of 20.6%. However, there was in real terms a decrease in head count from 1 800 (in 2000) to an estimated 1 200 (in 2001) women graduating in Engineering at ISCED 6 level.

In some countries there are signs that this “hard science bottleneck” between ISCED 5 and ISCED 6 graduates might be disappearing. In Science, Mathematics and Computing in Denmark, Spain, Austria and Portugal there are higher proportions of women graduates at ISCED 6 than at ISCED 5. For Engineering, this can also be witnessed in France, Ireland, Italy, the Netherlands, Portugal and the UK.

Table 2.1.b

Percentage of ISCED 6 graduates who are women by broad field of study in Associated Countries, 2001⁽¹⁾

Percentage Women	EDUCATION	HUMANITIES AND ARTS	SCIENCE, MATHEMATICS AND COMPUTING	AGRICULTURE & VETERINARY	HEALTH AND SOCIAL SERVICES	ENGINEERING, MANUFACTURING & CONSTRUCTION	SOCIAL SCIENCES, BUSINESS AND LAW
Bulgaria	43,8	43,9	45,6	51,9	51,9	27,6	40,3
Cyprus	50,0	100	66,7	-	-	-	100
Czech Republic	63,0	50,0	24,4	31,3	50,9	27,1	42,0
Estonia	-	35,7	31,8	50,0	64,8	0	50,0
Hungary	60,7	41,9	26,1	30,9	38,2	24,0	42,6
Iceland	:	:	:	:	66,7	:	100
Israel	75,6	42,3	44,2	48,1	63,3	28,6	58,6
Latvia	66,7	50,0	44,4	100	-	28,6	66,7
Lithuania	:	60,0	45,2	100	43,8	30,0	70,5
Malta	:	0	:	0	:	0	:
Norway	54,5	46,8	9,1	36,9	40,7	13,9	39,6
Poland	-	48,5	44,6	43,9	47,0	19,6	44,4
Slovakia	44,8	36,7	45,0	38,5	54,2	28,6	46,7
Slovenia	81,3	51,1	43,4	69,2	57,5	22,8	63,3

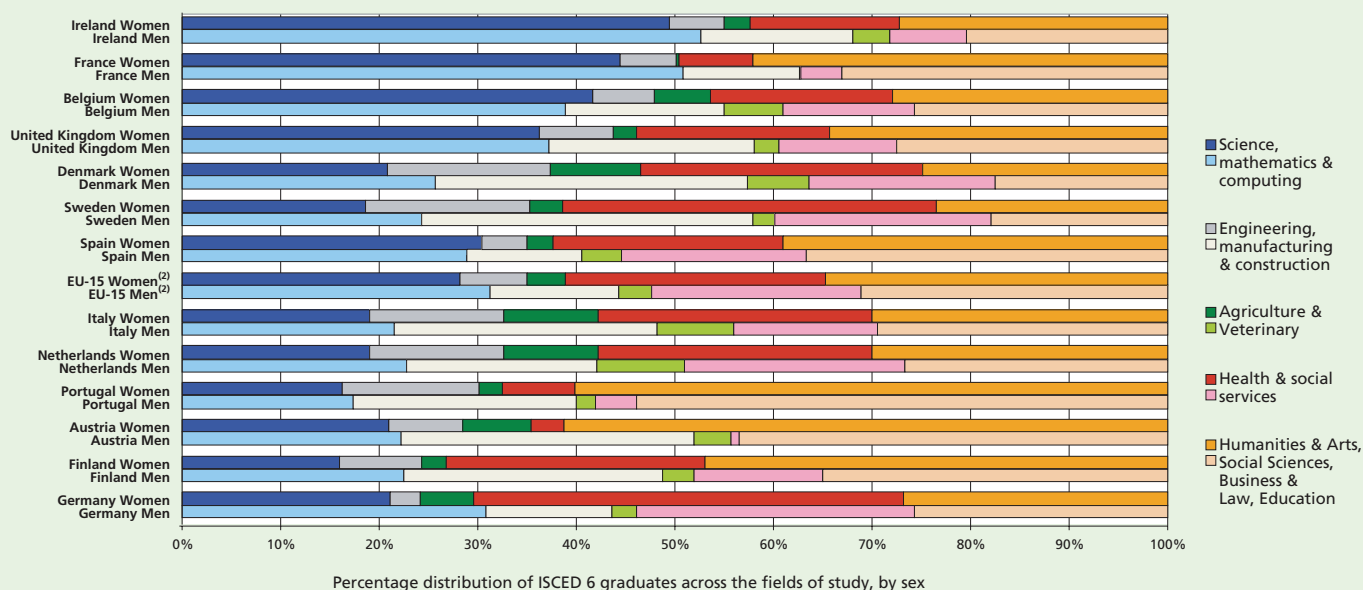
Source: Eurostat, Education; Israel Central Bureau of Statistics & Council for Higher Education
 Notes: ⁽¹⁾Exceptions to the reference year: IL: 1999; CY: 2000

In Bulgaria, Latvia, Lithuania and Romania a majority of graduates from higher education (ISCED 5+6) programmes in Science, Mathematics or Computing are women. This is reflected in the composition of PhD graduates in the same subject. Bulgaria also had the highest proportion of women engineering graduates in 2000 (39.7%) and in 2001 (35.5%), and in Estonia, Lithuania and Poland about a third of engineering graduates from ISCED 5 programmes were women. The overall pattern for ISCED 6 graduates visible in Member States remains discernible here, whereby there are higher proportions of women graduates in Humanities & Arts, Health & Social Services and Agriculture & Veterinary Sciences. Women remain a minority among successful engineering PhDs in all countries.

In Norway, where 60% of all university graduates are women, only in the field of Education are there more than 50% women graduates from ISCED 6. The proportion of women graduates in Science, Mathematics & Computing was 30.8% in 2000 and 29.7% in 2001 for ISCED 5 and ISCED 6 combined. It therefore appears from this table that Norwegian women are dropping out of studying in these fields in the national system at ISCED 6 level more sharply than men.

Figure 2.1.a

Distribution of ISCED 6 graduates across the broad fields of study by sex in EU Member States, 2001⁽¹⁾



Source: Eurostat, Education

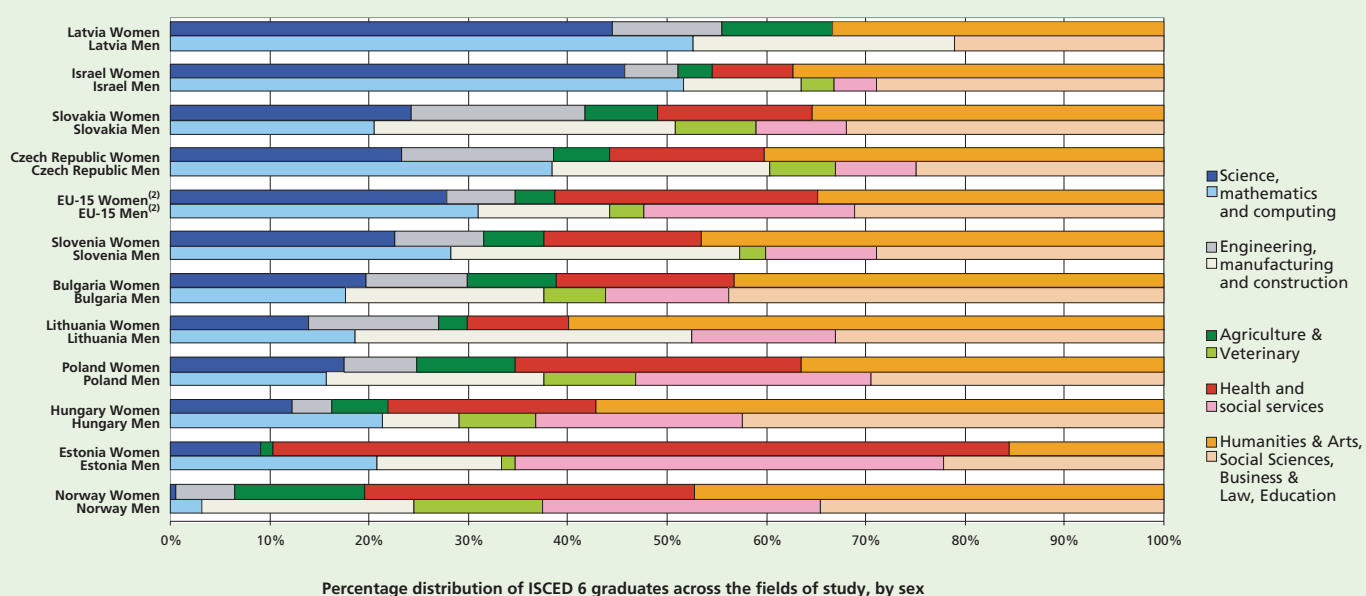
Notes: ⁽¹⁾Exceptions to the reference year: DK, FR, IT, FI: 2000

⁽²⁾EU-15 estimate excludes EL, LU. Exceptions to reference year apply as above

Putting the results from Table 2.1.a into perspective, where ISCED 6 graduates in some fields of study tend to be dominated by one or the other sex, we can now see that the distributions of men and women graduates across the possible fields are also gendered. Only Agriculture & Veterinary Sciences appear immune from this effect. Men graduates are consistently more likely than women graduates to be graduating from Engineering programmes and, with the only exceptions of Belgium and Spain, from Science, Mathematics & Computing programmes. Conversely, women graduates are consistently more likely than men graduates to be graduating from Humanities & Arts and Health & Social Services programmes.

Figure 2.1.b

Distribution of ISCED 6 graduates across the broad fields of study by sex in Associated Countries, 2001⁽¹⁾



Source: Eurostat, Education; Israel Central Bureau of Statistics & Council for Higher Education

Notes: ⁽¹⁾Exceptions to the reference year: IL: 1999

⁽²⁾EU-15 estimate excludes EL, LU. Exceptions to reference year apply as per Figure 2.1.a

In line with the relatively high proportion of women graduates from Science, Maths & Computing in Bulgaria, Poland and Slovakia, we can see that women graduates are more likely than men graduates in these countries to be graduating in this field. However, the proportion of men graduating from ISCED 6 engineering programmes in all the Associated Countries is at least twice that of women, for most countries. Equally, with the only exceptions of Bulgaria and Estonia the proportion of women graduating from Humanities & Arts and Health & Social Services programmes, is higher than that of men.

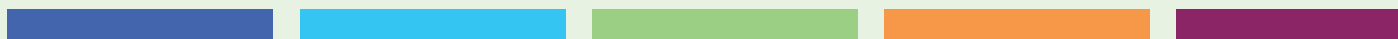


Table 2.2.a

Percentage of researchers who are women by field of science in HES in EU Member States, HC, 1999⁽¹⁾

Percentage Women	NATURAL SCIENCES	ENGINEERING AND TECHNOLOGIES	MEDICAL SCIENCES	AGRICULTURAL SCIENCES	SOCIAL SCIENCES	HUMANITIES
Belgium ⁽²⁾	29,5	20,0	30,1	25,1	32,4	35,9
Denmark ⁽⁵⁾	22,9	12,2	35,6	44,7	26,8	37,1
Germany	18,1	11,3	34,1	31,5	23,5	35,2
Greece	:	:	:	:	:	:
Spain	:	:	:	:	:	:
France ⁽³⁾	29,4	15,2	32,4	:	39,8	X
Ireland	:	:	:	:	:	:
Italy	31,0	13,4	22,9	24,3	26,7	41,5
Luxembourg	50,0	-	50,0	-	37,5	66,7
Netherlands ⁽⁴⁾	19,7	13,7	37,0	25,7	29,2	31,2
Austria	18,2	8,9	31,9	30,6	29,9	37,2
Portugal ⁽³⁾	48,6	28,7	49,7	44,0	48,7	X
Finland	34,4	22,4	52,0	36,2	47,0	50,6
Sweden	30,5	19,0	51,2	40,9	43,3	43,7
United Kingdom	30,6	13,2	48,1	35,5	42,8	40,3

Source: Eurostat, S&T statistics; DG Research, WiS database

Notes: ⁽¹⁾Exceptions to the reference year: DK, DE, FR, UK: 2000; AT: 1998

⁽²⁾Data not official. Estimates made from BE-FL for 2001 and BE-FR for 2000

⁽³⁾SS includes H

⁽⁴⁾FTE as exception to HC

⁽⁵⁾Definition of HES coverage differs slightly from Annex Table 1.2.a

In Chapter 1 it was clear that women are already under-represented in all sectors of research. Here we can see that the low percentages of women researchers are reflected in some of the main fields of science in the Higher Education sector. These low proportions of women are found in engineering for every single country and corroborate the low proportions of women engineers among ISCED 6 graduates. In fact, there is only a majority of women researchers in the HES Finland and Sweden in Medical Sciences and Humanities, which are generally the most feminised fields. The percentages of women in Social Sciences seem to be very similar to the overall percentage of women researchers in many countries.

Table 2.2.b

Percentage of researchers who are women by field of science in HES in Associated Countries, FTE, 2000⁽¹⁾

Percentage Women	NATURAL SCIENCES	ENGINEERING AND TECHNOLOGIES	MEDICAL SCIENCES	AGRICULTURAL SCIENCES	SOCIAL SCIENCES	HUMANITIES
Bulgaria	45,3	15,8	47,2	0	41,4	47,7
Cyprus	16,3	16,7	0	0	33,7	40,9
Czech Republic	34,3	26,9	34,8	36,3	39,3	38,7
Estonia	33,3	23,8	55,7	45,7	51,6	59,2
Hungary	:	:	:	:	:	:
Iceland	17,5	41,0	41,1	46,7	43,6	36,2
Israel	11,8	12,1	38,1	13,6	30,3	35,6
Latvia	35,2	34,9	78,4	59,0	41,9	79,3
Lithuania	37,9	24,5	55,2	39,3	57,1	66,5
Malta	:	:	:	:	:	:
Norway ⁽²⁾	23,5	17,4	44,7	34,0	39,4	40,4
Poland	33,8	15,8	43,3	33,1	37,9	33,0
Romania	36,4	34,3	51,5	24,5	22,8	27,3
Slovakia	33,2	33,9	50,8	:	50,5	49,9
Slovenia	30,6	18,8	51,7	51,4	41,4	48,9

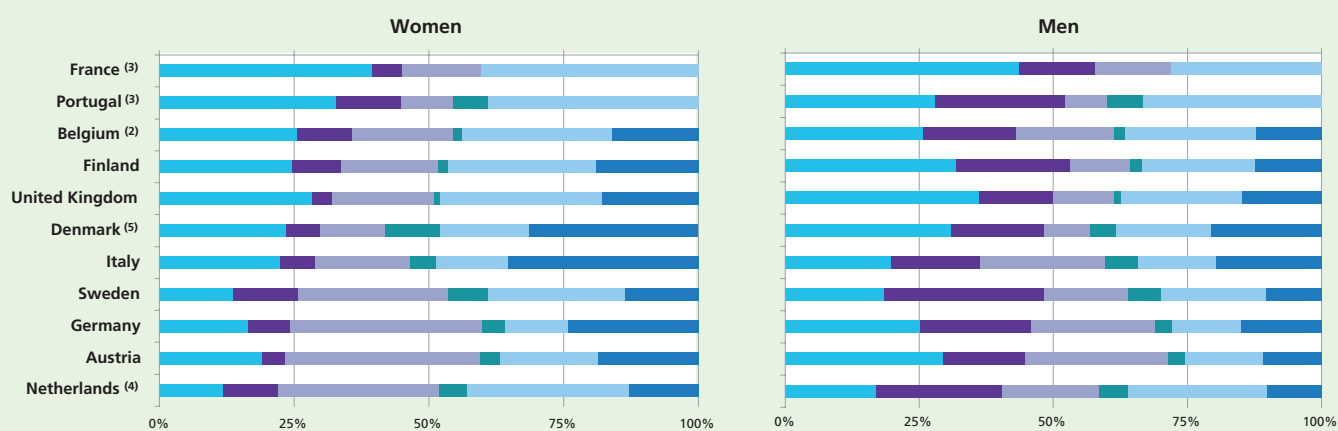
Source: Eurostat, S&T statistics; DG Research, WiS database

Notes: ⁽¹⁾Exceptions to the reference year: IL, LT, NO, PL: 2001; IS, LV: 1999
⁽²⁾HC as exception to FTE

For six countries (Bulgaria, Cyprus, Israel, Latvia, Lithuania and Slovakia), it can be seen that the average percentage of researchers that are women in the HES presented in Figure 1.6.b is hiding marked differences between fields of science. In fact, the average percentage of women from Figure 1.6.b is at least five points away from any of the percentages for the fields of science here. This variation is less evident in the Member States.

Figure 2.2.a

Distribution of researchers across the fields of science in HES by sex in EU Member States, HC, 1999⁽¹⁾



Source: Eurostat, S&T statistics; DG Research, WiS database

Notes: ⁽¹⁾Exceptions to the reference year: DK, DE, FR, UK: 2000; AT: 1998

⁽²⁾Data not official. Estimates made from BE-FL for 2001 and BE-FR for 2000

⁽³⁾SS includes H

⁽⁴⁾FTE as exception to HC

⁽⁵⁾Definition of HES coverage differs slightly from Annex Table 1.2.a

- Natural sciences
- Engineering and technologies
- Medical sciences
- Agricultural sciences
- Social sciences
- Humanities

In the HES sector in EU Member States, the proportion of men performing research in the Engineering & Technology field is twice as high as that of women in all countries for which data are available. On the other hand, there is a lower proportion of women researchers in Medical Sciences compared to the proportion of women graduating from Health science programmes at ISCED 6 in a number of countries. Without further study it is not possible to say whether these women are in another sector or professional field or whether they are working in technical as opposed to research occupations.

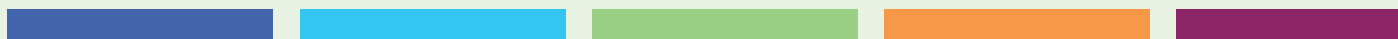
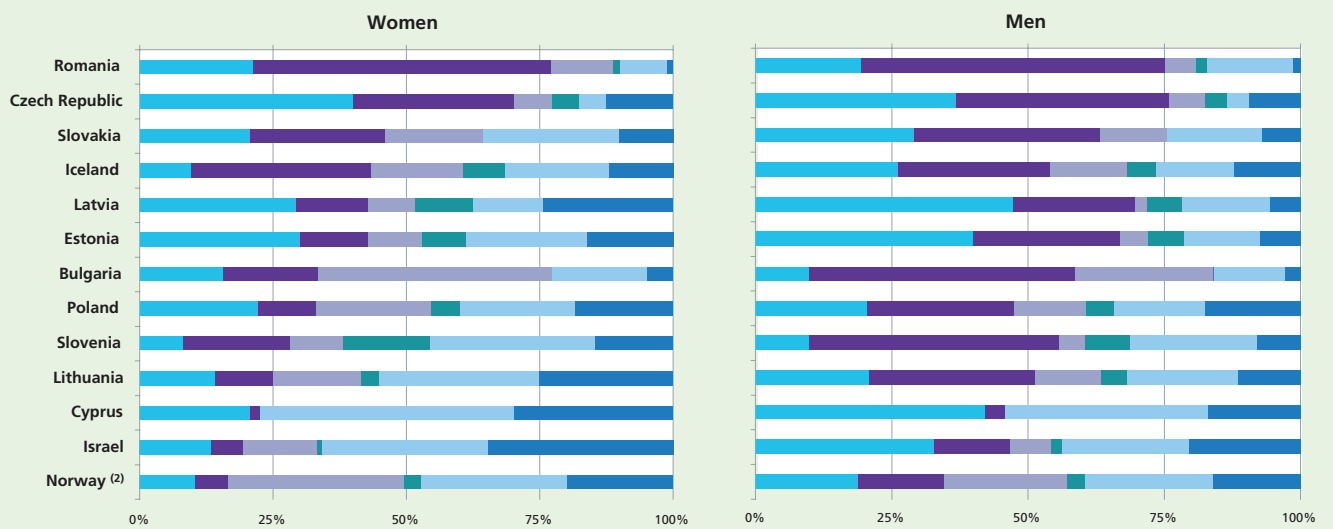


Figure 2.2.b

Distribution of researchers across the fields of science in HES by sex in Associated Countries, FTE, 2000⁽¹⁾



Source: Eurostat, S&T statistics; DG Research, WIS database
 Notes: ⁽¹⁾Exceptions to the reference year: IL, LT, NO, PL: 2001; IS, LV: 1999
⁽²⁾HC as exception to FTE

- Natural sciences
- Engineering and technologies
- Medical sciences
- Agricultural sciences
- Social sciences
- Humanities

Only in Romania is there a higher proportion of women researchers than men researchers working in S&E research. This is true for both Natural Sciences and Engineering, but it is an isolated case.



Table 2.3.a

Percentage of researchers who are women by field of science in GOV in EU Member States, FTE, 1999⁽¹⁾

Percentage Women	NATURAL SCIENCES	ENGINEERING AND TECHNOLOGIES	MEDICAL SCIENCES	AGRICULTURAL SCIENCES	SOCIAL SCIENCES	HUMANITIES
Belgium	:	:	:	:	:	:
Denmark ⁽³⁾	24,3	19,7	43,3	35,7	41,1	42,1
Germany	18,9	13,9	34,1	28,1	39,6	:
Greece	:	:	:	:	:	:
Spain ⁽²⁾	35,3	30,9	42,1	37,9	44,5	X
France	:	:	:	:	:	:
Ireland	34,8	28,0	71,8	14,9	33,3	0
Italy	:	:	:	:	:	:
Luxembourg	:	:	:	:	:	:
Netherlands	:	:	:	:	:	:
Austria	26,8	16,0	38,4	20,4	32,9	35,2
Portugal	:	:	:	:	:	:
Finland	:	:	:	:	:	:
Sweden	:	:	:	:	:	:
United Kingdom	:	:	:	:	:	:

Source: Eurostat, S&T statistics; DG Research, WiS database

Notes: ⁽¹⁾ Exceptions to the reference year: DK: 2000; AT: 1998; ES: 2001

⁽²⁾ SS includes H

⁽³⁾ Definition of GOV coverage differs slightly from Annex Table 1.3.a

As a general rule, the percentages of women researchers in Engineering are higher in the Associated Countries than in the EU Member States for both the HES and the GOV. However, the percentages of S&E women are higher in GOV for the three countries for which data are available for both sectors (Denmark, Germany and Austria). The same is also true for Medical and Social Sciences but Agricultural Sciences are more feminised in the HES. This may be a reflection of the organisation and dynamics of R&D in each the HES and the GOV in these countries.

Table 2.3.b

Percentage of researchers who are women by field of science in GOV in Associated Countries, FTE, 2000⁽¹⁾

Percentage Women	NATURAL SCIENCES	ENGINEERING AND TECHNOLOGIES	MEDICAL SCIENCES	AGRICULTURAL SCIENCES	SOCIAL SCIENCES	HUMANITIES
Bulgaria	52,0	34,1	53,2	50,1	53,5	58,2
Cyprus	56,0	15,9	36,8	24,8	28,4	63,0
Czech Republic	28,3	14,0	49,2	48,3	40,5	44,6
Estonia	29,6	34,0	72,0	45,3	61,1	75,0
Hungary	:	:	:	:	:	:
Iceland	24,4	43,3	47,3	18,3	38,1	41,7
Israel	:	:	:	:	:	:
Latvia	65,2	49,3	56,9	54,2	24,5	60,0
Lithuania	41,1	28,3	55,6	50,0	62,3	62,2
Malta	:	:	:	:	:	:
Norway ⁽²⁾	27,9	15,8	47,4	35,4	41,3	44,8
Poland	:	:	:	:	:	:
Romania	48,5	41,2	69,7	33,3	59,1	47,5
Slovakia	41,3	30,5	58,6	49,4	54,8	34,5
Slovenia	34,6	30,3	61,0	41,5	51,5	44,4

Source: Eurostat, S&T statistics; DG Research, WiS database

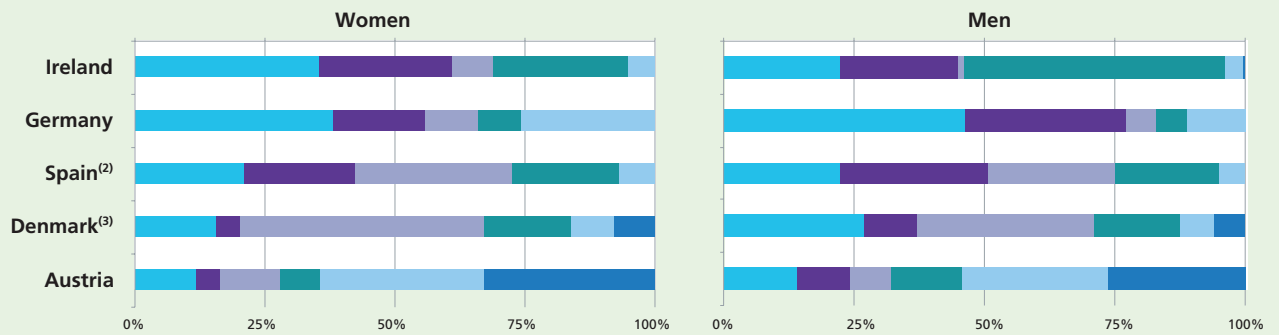
Notes: ⁽¹⁾ Exceptions to the reference year: LT, NO: 2001; IS, LV: 1999

⁽²⁾ HC as exception to FTE

Iceland and Norway fit well with the pattern visible among the Member States whereby all the fields in GOV except Agriculture have higher proportions of women than in the HES. For the other Associated Countries there is less definition to the pattern, although the percentages of women are higher for most countries and fields as we would have expected from Figure 1.6.b. It is important to recall that in many Associated Countries the GOV sector is relatively small in terms of performance. Furthermore, the GOV sector is undergoing economic restructuring in many countries and so performance is not always increasing as rapidly as in the HES and BES.

Figure 2.3.a

Distribution of researchers across the fields of science in GOV by sex in EU Member States, FTE, 1999⁽¹⁾



Source: Eurostat, S&T statistics; DG Research, WIS database

Notes: ⁽¹⁾Exceptions to the reference year: DK: 2000; AT: 1998; ES: 2001

⁽²⁾ES: SS includes H

⁽³⁾Definition of GOV coverage differs slightly from Annex Table 1.3.a

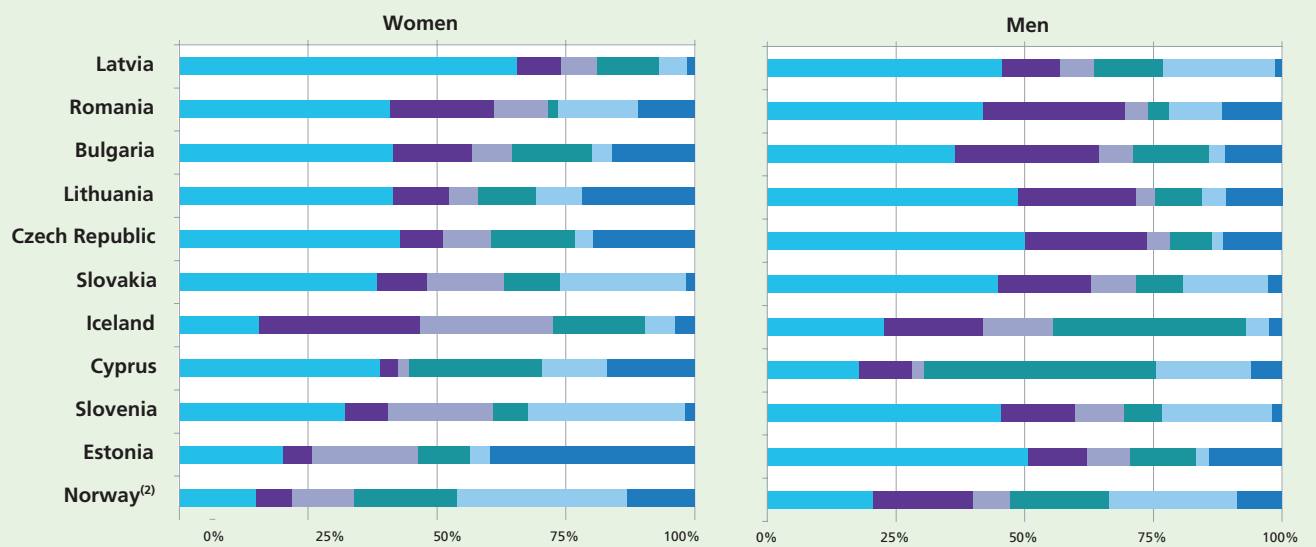
- Natural sciences
- Engineering and technologies
- Medical sciences
- Agricultural sciences
- Social sciences
- Humanities

It is clear that in Ireland and Germany, more than half of the women researchers in GOV are working in S&E fields. Furthermore, in Ireland women researchers appear more likely than men researchers to be working in either Natural or Engineering Sciences in the GOV sector. However, we also know from Table 2.3.a that they are still in a minority compared to men, particularly in Germany.



Figure 2.3.b

Distribution of researchers across the fields of science in GOV by sex in Associated Countries, FTE, 2000⁽¹⁾



Source: Eurostat, S&T statistics; DG Research, WiS database

Notes: ⁽¹⁾Exceptions to the reference year: LT, NO: 2001; IS, LV: 1999

⁽²⁾HC as exception to FTE

- Natural sciences
- Engineering and technologies
- Medical sciences
- Agricultural sciences
- Social sciences
- Humanities

In the GOV, Romanian women researchers are less likely than their male counterparts to be working in S&E fields, as they are in the HES, but those in Latvia, Iceland, and Norway are. At least 40% of women researchers in GOV in all these countries, except Estonia and Norway, are working in S&E.



Table 2.4.a

Percentage of researchers who are women by NACE category in BES in EU Member States, HC, 1999⁽¹⁾

Percentage Women	MANUFACTURING	REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	OTHERS
Belgium	:	:	:
Denmark ⁽³⁾	21,9	16,8	20,3
Germany ⁽²⁾	9,0	14,8	13,6
Greece	21,4	22,5	30,8
Spain	17,7	22,2	28,5
France	21,0	17,9	21,4
Ireland	:	:	:
Italy	15,3	26,7	23,1
Luxembourg	:	:	:
Netherlands	:	:	:
Austria	7,8	13,3	8,7
Portugal	20,8	27,1	28,5
Finland ⁽³⁾	21,8	20,8	20,4
Sweden	:	:	:
United Kingdom	:	:	:

Source: DG Research, WiS database

Notes: ⁽¹⁾Exceptions to the reference year: FR, IT, FI: 2000; AT: 1998

⁽²⁾FTE as exception to HC

⁽³⁾Definition of BES coverage differs from Annex Table 1.4.a

Table 2.4.b

Percentage of researchers who are women by NACE category in BES in Associated Countries, HC, 2001⁽¹⁾

Percentage Women	MANUFACTURING	REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	OTHERS
Bulgaria	58,2	31,8	42,4
Cyprus	18,9	29,7	15,2
Czech Republic	12,1	21,1	26,3
Estonia	40,1	25,6	33,7
Hungary	27,5	20,4	18,7
Iceland	13,5	31,4	14,9
Israel	:	:	:
Latvia	44,9	51,9	78,2
Lithuania	46,6	9,9	28,6
Malta	:	:	:
Norway	17,0	20,2	21,2
Poland	:	:	:
Romania	39,7	32,0	47,9
Slovakia ⁽²⁾	27,0	27,3	34,1
Slovenia	30,2	29,8	23,7

Source: DG Research, WiS database

Notes: ⁽¹⁾Exceptions to the reference year: BG, CY, EE, LT, SI: 2000; IS: 1999

⁽²⁾FTE as exception to HC

The recommendation of the Frascati Manual (OECD, 2002) is to use the NACE classification to observe the fields in which BES researchers are working. It categorises businesses by their main economic activity and does not therefore necessarily tell us exactly what the researchers are doing, so it is not possible to make any links with the education data. Compared with the national patterns visible in Figures 1.6.a and 1.6.b, it could be argued that women are slightly less likely to be concentrated in companies where the main economic activity is Manufacturing or Real Estate, Renting or Business Activities (which includes research).

Looking at Annexes 2.4.a and 2.4.b we can see that, in most countries, there are higher proportions of women researchers in companies whose main economic activity is pharmaceuticals, but they are hidden when Manufacturing is aggregated. In Bulgaria, Estonia, Hungary, Lithuania and Slovenia the highest percentage of women is found in Manufacturing. The BES in Latvia was highlighted as having the highest percentage (56%) of women out of any sector in Europe in 2000 (see Figure 1.6.b) and boasts no less than 73% women researchers in companies whose main economic activity is pharmaceuticals.

Figure 2.4.a

Distribution of researchers across NACE categories in BES by sex in EU Member States, HC, 1999⁽¹⁾

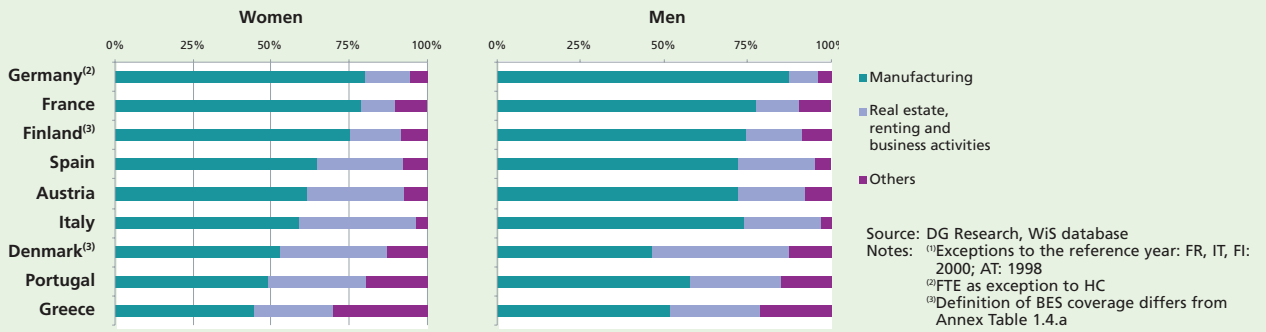
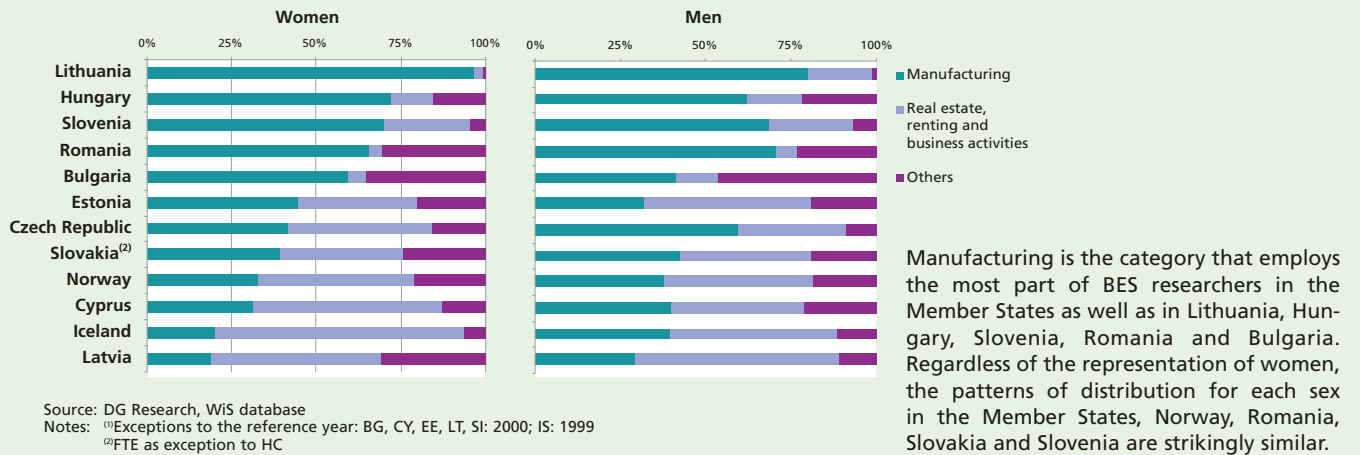


Figure 2.4.b

Distribution of researchers across NACE categories in BES by sex in Associated Countries, HC, 2001⁽¹⁾



Box 2

The Dissimilarity Index

The Dissimilarity Index (ID) provides a theoretical measurement of the percentage of women and men in a group who would have to move to another occupation to ensure that the proportions of women were the same across all the possible occupations. It can therefore be interpreted as the hypothetical distance from a balanced gender distribution across occupations, based upon the overriding proportion of women (NSF, 2000).

The formula for the Dissimilarity Index is: $ID = \frac{1}{2} \sum_i \left| \frac{F_i}{F} - \frac{M_i}{M} \right|$

Where: i denotes each occupation

F_i is the number of women researchers in each occupation

M_i is the number of men researchers in each occupation

F is the total number of women researchers across all occupations

M is the total number of men researchers across all occupations.

The brackets $||$ indicate that the absolute value is taken, but not the sign.

For example, if we have three occupations, A, B and C with 17, 37 and 91 women and 108, 74, 182 men respectively, the overall proportion of women is 28.5%. We therefore need to calculate:

$$\frac{\left| \frac{17}{145} - \frac{108}{364} \right| + \left| \frac{37}{145} - \frac{74}{364} \right| + \left| \frac{91}{145} - \frac{182}{364} \right|}{2} = \frac{0.1795 + 0.0519 + 0.1276}{2} = 0.1795$$

This means that 18% of researchers will have to change occupation in order to maintain the background proportion of 28.5% women in each occupation.

The ID must be interpreted alongside the Feminisation Ratio (see Box 3), which will indicate which gender is in the majority. The maximum value is 1, which indicates the presence of only either women or men in each of the occupations. The minimum value of 0 indicates an equal distribution between women and men across occupations. If the same occupational categories are used for different countries, the ID yields a comparable and descriptive statistic that reflects the extent to which the two sexes are differently distributed. The results also depend on the number of categories. If more categories are used, the indicator will reflect greater variability in the distribution, which in turn will yield results indicating a higher level of segregation.

Table 2.5.a

Index of Dissimilarity and Feminisation Ratio for researchers in HES in EU Member States, HC, 1999⁽¹⁾

	Index of Dissimilarity	Feminisation Ratio
Belgium ⁽²⁾	0,08	42,1
Denmark ⁽⁵⁾	0,20	38,9
Germany	0,23	34,4
Greece	:	:
Spain	:	:
France	0,12	47,6
Ireland	:	:
Italy	0,18	39,6
Luxembourg ⁽⁴⁾	-	52,6
Netherlands ⁽³⁾	0,18	35,6
Austria	0,21	34,6
Portugal	0,12	80,9
Finland	0,20	67,6
Sweden	0,23	58,7
United Kingdom	0,17	57,7

Source: Eurostat, S&T statistics; DG Research, WIS database

Notes: ⁽¹⁾Exceptions to the reference year: DK, DE, FR, UK: 2000; AT: 1998

⁽²⁾Data not official. Estimates made from BE-FL for 2001 and BE-FR for 2000

⁽³⁾FTE as exception to HC

⁽⁴⁾Numbers of RSEs too small to calculate the ID

⁽⁵⁾Definition of HES coverage differs slightly from Annex Table 1.2.a

Table 2.5.b

Index of Dissimilarity and Feminisation Ratio for researchers in HES in Associated Countries, FTE, 2000⁽¹⁾

	Index of Dissimilarity	Feminisation Ratio
Bulgaria	0,31	51,7
Cyprus	0,23	39,6
Czech Republic	0,09	47,9
Estonia	0,24	66,1
Hungary	:	:
Iceland	0,17	57,4
Israel	0,28	32,6
Latvia	0,30	87,7
Lithuania	0,28	90,3
Malta	:	:
Norway ⁽²⁾	0,18	55,6
Poland	0,17	46,0
Romania	0,08	52,1
Slovakia	0,17	69,5
Slovenia	0,27	52,8

Source: Eurostat, S&T statistics; DG Research, WIS database

Notes: ⁽¹⁾Exceptions to the reference year: IL, LT, NO, PL: 2001; IS, LV: 1999

⁽²⁾HC as exception to FTE

Belgium and Romania have the lowest levels of dissimilarity across the fields of science in the HES and Bulgaria has the highest levels (see Box 2). In fact, in Belgium and Romania only 8% of RSEs would have to change field of science in order to achieve proportions of 28% and 40% women respectively throughout each of the six main fields of science. Likewise, 31% of researchers in Bulgarian universities would theoretically need to switch to another field of science in order to have a proportion of 35% women in each field. In parallel, it can be seen from the gender split that since men outnumber women, they are likely to form a larger part of the RSEs who would have to move.