



# International migration of researchers and gender imbalance in academia—the case of Norway

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## Abstract

Female representation among students and graduates in higher education is growing internationally. This is a promising trend for achieving gender balance in top positions in academia. But there is still a long way to go, as women accounted for 26 per cent in top positions at European higher education institutions in 2018. In this article, we examine the influence of international recruitment of researchers on the gender balance—or the lack of gender balance—in Norwegian academia. We draw on data from the Norwegian Register of Research personnel, linked with population statistics from Statistics Norway. These data show that 38 per cent of the researchers at Norwegian higher education institutions in 2018 were born abroad. The share of foreign full professors has increased from 16 per cent in 2001 to 27 per cent in 2018, while for postdocs there has been an increase from 31 to 69 per cent. In terms of overall gender composition, a higher percentage of the foreign-born researchers are male compared with the native Norwegians. The incidence of international recruitment differs significantly across academic fields and is particularly prevalent in engineering. This is also the field where the gender balance is most skewed generally. Taking these variables into account, we conclude that international migration is not among the factors contributing to the gender imbalance in Norwegian academia. In fact, international recruitment has contributed positively to the gender balance in Norway in the majority of the fields analysed.

**Keywords** Gender balance · International research mobility · International research migration · International recruitment

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## Introduction

Many countries have put gender balance high on the research policy agenda to utilise the pool of talent and to improve the quality of research. During the last decades the gender balance in research and higher education has improved, but imbalances persist and vary across countries, sectors, academic positions, and disciplines, as manifested in reports such as the *She Figs. 2021* (European Commission, 2021a). Women are particularly underrepresented in top academic positions. Moreover, the lack of gender balance is especially strong in some of the STEM fields (Science, technology, engineering, and mathematics). This has been a matter of concern to governments in many countries and there is increasing attention being paid to the problem. As an example, the Research Council of Norway has funded a programme to support efforts of the research institutions to promote gender balance.<sup>1</sup> At the same time, actions are devoted towards reasons for the lack of balance, including network programmes and scholarships directed towards female researchers.

There are multifaceted arguments for improved gender balance, ranging from ethical, and economic to legal arguments. The European Commission highlights gender balance from the perspective of avoiding waste of talent (2010) and has emphasised the importance of gender equality to strengthen European research and innovation (European Commission, 2020). In the Horizon Europe Strategic plan 2021–2024 the integration of gender equality is highlighted as a cross-cutting issue, especially concerning global challenges in which gender differences play an important role that determine the societal relevance and quality of research and innovation outcomes.<sup>2</sup> Gender equality is the fifth of 17 sustainability goals set by the United Nations (UN). Here it is stated not only as a fundamental human right, but also a necessary foundation for a peaceful, prosperous, and sustainable world. Gender balance is a cross-cutting theme in the UN Sustainable Development Goals.

The issue of gender imbalance, particularly in top positions, has also been addressed in numerous studies and many explanations have been put forward. One is often conceptualised by the metaphor “glass ceiling”—an invisible barrier that keeps women from rising beyond a certain level in the hierarchy (Probert, 2005). Another metaphor, the “leaky pipeline”, refers to the phenomenon where women are dropping out of research and academic careers at a faster rate than men (Alper, 1993; Berryman, 1983). Both phenomena are described in EU *She Figs. 2021*. Previously, the gender imbalance was even larger than today also at the lower academic career levels. In the demographic model, sometimes described as demographic inertia (Hargens & Long, 2002; Thomas et al., 2015), it is emphasised that demographical distribution changes very slowly and rather amounts to inertia. An equal gender representation will finally be achieved as time goes by, a view that has encountered precipitation as unlikely for some fields and academic positions (Lekve & Gunnes, 2022).

In this paper we look at the issue in the context of international migration and mobility. Internationalisation is one of the hallmarks of modern science and is manifested in many ways, such as through increased international research collaboration and funding (Aksnes et al., 2008). In addition, the labour market for researchers has been

<sup>1</sup> See <https://www.forskingsradet.no/en/apply-for-funding/funding-from-the-research-council/balanse/>

<sup>2</sup> Similarly, the Norwegian Minister of Education and Research, Henrik Asheim claims: “If we are better able to use the talent around us, improve the gender balance and take advantage of our diversity, then we will have even higher quality in education and research,” (The conference Creating a Competitive Edge through Diversity – Leadership for Nordic Research Excellence towards 2030 8–9 November 2017, Oslo.).

increasingly internationalised with positions that are often open for applicants from abroad. For example, in Norway, most vacant positions at higher education institutions are advertised internationally (Frølich et al., 2019) and people from abroad account for a relatively large and increasing share of the population researchers. At the same time, the composition of the internationally recruited researchers might differ from the native Norwegians along several dimensions, such as gender, academic position and field. Against this background, the following main research questions are addressed in this study: (a) What is the gender balance among the native and foreign researchers in Norway across fields and over time? (b) Has the international recruitment hampered the process of achieving gender balance in the Norwegian higher education (HE) system? We will look at incoming mobility to Norway for the crucial career steps of associate professor and full professor in different fields of research. The study is based on data from the period 2007–2018.

Addressing the gender dimension of international mobility and recruitment is important because such mobility is encouraged and supported by most Western countries and women have been shown less likely to be internationally mobile than men (Guthrie et al., 2017). Moreover, there is an asymmetry of mobility flows, where some countries and regions are more attractive than others depending on historical, political, and economic factors, as well as academic tradition (Laufer, 2020). Attracting mobile researchers is a way to tap into a global pool of talent and support the development of national innovation and production systems (Guthrie et al., 2017). In the EU, mobility has been a cornerstone of the European Research Area (ERA) and its success is determined by highly skilled people who move across borders to where their talent can be best employed (ERA Priority 3, open labour market for researchers) (European Commission, 2020). Laudel (2005) studied migration among a subgroup of researchers, the scientific elites. She identified them in publication patterns in Nature and Science and found that scientific specialities have very different migration patterns and assumed that reasons for migration are at least partly field-specific and depend on working conditions and decisions of individual scientists, while policy must consider the whole of the science system.

While the positive dimensions of this mobility often are emphasised, there are also potential negative dimensions such as brain-drain (Kahn, 2021). In Norway, the large and increasing influx of researchers from other countries has led to a debate concerning the adverse impact of this development questioning implications on specific fields, the role of academics and legitimacy in the Norwegian society (Morgenbladet, 2021).

There is little knowledge about the consequences of increased international mobility of researchers on gender balance. The EU MORE 3-survey (European Commission, 2018) among 10,000 European researchers revealed that women are more mobile at early stages of their career, while men are more mobile later. Laudel and Gläser (2008) studied career phases with an emphasis of the transition phase from apprentice to the colleague state in a scientific community, where a successful PhD and a research-intensive phase prior to academic employment are essential for a successful career way. In this phase an increasing number of researchers spend time abroad, some of them migrate. Other studies have investigated reasons for low representation of women at higher career levels in academia by investigating driving forces for geographic mobility which influence men and women differently (Leemann, 2010; Canibano, 2016; Canibano et al., 2020). A study of the academic labour market in Finland, Norway and Sweden (Pietilä, 2021) showed that the proportion of foreign-born staff increased rapidly in the 2010s. Especially in Sweden and Norway the share of native-born men is decreasing and the shares of women and foreign-born men at professor level is increasing.

To our knowledge, no other previous studies have looked at the impact of international migration of researchers on gender balance within countries at detailed level. Thus, our study aims to provide further knowledge on this dimension of international migration and mobility.

Obviously, this issue will arise differently among countries. A further look at the statistics in the She figures report (European Commission, 2021a), reveals that there are large differences across nations in the gender composition of the academic staff and students. For example, the proportion of women among doctoral graduates in 2018 ranges from 31 per cent in Japan to 63 per cent in Albania. For researchers in the higher education sector (2018) the proportion is highest for Armenia (64 per cent) and lowest for Japan (27 per cent). Norway is positioned somewhere in between with gender parity (50 per cent) among doctoral graduates and a female proportion of researchers of 38 per cent. On both indicators Norway, scores slightly above the EU average, at 48 and 34 per cent, respectively.

Thus, these differences imply that the question of gender balance and international mobility will depend on the national situations. With an increasing global labour market for academics, the system in any country (e.g. Norway) will be influenced by international trends such as more international mobility among researchers (Lekve & Gunnes, 2022). In this way the national HEI systems are influenced by forces from the outside. An influx of researchers with a given gender composition might contribute to reducing the gender gap in one country while increasing it in another. In a global perspective, it might be a zero-sum game: migration of female researchers from one country to another reduces the population of women in first country and increases it in the second, recipient country. Still, it is important to address the issue also in domestic contexts to reveal how different countries are affected by the issue. This study aims to assess whether the lack of gender balance in Norway and the slow progression towards equity can be explained by the immigration of foreign scientists among whom men predominate.

It should be noted that different terms are being used to describe the phenomenon of physical border crossings. According to Teichler (2015), when using the word *mobility* one often refers to non-permanent border crossings, for example guest researcher visits. However, *mobility* could also mean permanent stays in which researchers do not return to the country of origin. In the latter case one could also use the word *migration*, which underscores the permanence of the border crossing. In this paper we have accordingly used the terms interchangeably. However, as the study is based on register data covering researchers with employment in Norway (see below), there is a certain permanence in the stays, which means that *migration* arguably is the most accurate term. In addition, *internationally recruited* is sometimes applied.

## Norway's higher education and research system

As the study focuses on one specific country, Norway, we will in this paragraph provide some further background information on its research and higher education system. Norway is a small country which contributes to 0.5 per cent of global research and development (R&D) (OECD, 2020). Attracting the best talents and promoting diversity have been high on the political agenda when international recruitment is discussed in Norway (Vabø, 2020). Norway may be an interesting country for analysing this issue because of its location, its working conditions and its endeavor to keep strong research links to the rest of Europe and the USA, facilitating the mobility of foreign researchers. As part of the EEA agreement, all EU citizens are allowed to work in Norway (EFTA, 2022) and also

researchers from non-EU countries can obtain work permissions and residence permits as skilled workers (UDI, 2022). Over the past decades there has been a strong growth in the labour migration to Norway, and the number of such migrants has increased from 8500 in 2000 to 180,000 in 2016 (Slettebak, 2021).

The Norwegian higher education system consists of three types of higher education institutions, universities, specialised universities, and university colleges. Since 1995, the academic career structure in Norway has consisted of two types of tracks: a research-oriented track and a teaching-oriented one (Frølich et al., 2018). From time-use surveys among academic staff we know that there are no “teaching/research only institutions” in Norway although there are variations (Wendt et al., 2021). All higher education is meant to be research-based. The first track is the normal academic pathway at the main universities and specialised university institutions and is the one analysed in the present study. In Norway, anyone who holds a doctoral degree can apply for a permanent position as associate professor. However, the usual career pathway is to spend some years in temporary positions as post-doc or researcher to qualify for a tenured position (Frølich et al., 2018). Being appointed as associate professor is often considered to be the main barrier or bottleneck in the Norwegian academic career path. This is due to the fact that there is a surplus of PhD candidates and postdocs compared with the number of tenured positions available (Kyvik, 2015).

Since 1993, it has been possible for associate professors in Norway to apply for promotion to full professor based on research or creative and performing artistic competence. This is now the most usual way of becoming full professor in Norway (Kyvik, 2015). This scheme was partly justified by the fact that it could help increase the number of female full professors, and thus serve to equilibrate the gender balance. Today 66 per cent of new professors have their promotion through this system (Frølich et al., 2019).

This implies that the recruitment of associate professors, as the recruitment pool for full professorships, is crucial to obtain gender balance in the top positions in Norwegian HEIs. We have thus selected associate professors and full professors positions for further analysis. We will also examine the gender balance among researchers born in Norway or abroad.

## Data and method

The study is based on the Norwegian Register of Research personnel, operated by NIFU, combined with population statistics from Statistics Norway. The Register of Research personnel is part of the official Norwegian R&D statistics. The register covers all researchers/university graduated personnel that participated in R&D at Norwegian HEIs, as well as research institutes and health trusts. The register includes information on position, age, gender, educational background, and workplace. Personnel data is retrieved from the administration of the R&D-performing institutions per October 1st, and the registry goes back to the 1960s. Mobility, gender balance and career paths of the academic staff in Norway has thus been monitored through several decades through this rather unique database. Information on country of birth is retrieved from Statistics Norway. We also have information about which country foreign-born researchers immigrated from, if other than birth country.

The dataset also includes variables gender, position, and field of research. As a first step, we present an overview of the current situation in Norway (2018). Then we analyse individuals who have achieved new positions as full professors and associate professors. This

population of researchers are of particular interest as they reflect the most recent developments. New professors are operationalised as individuals who were not registered as professors or academic leaders in the Register of Research Personnel the two previous years.

In total, there were more than 30,000 researchers at Norwegian higher education institutions, research institutes and health trusts in 2018. Of these, 10,600 were foreigners. Approximately 46 per cent of the researchers were female. This article, however, deals with the higher education institutions in Norway. Approximately 19 300 researchers, exclusive lecturers, were employed at Norwegian HEIs in 2018. Foreigners amounted to 38 per cent of these researchers, and the share of female researchers was the same as for the overall population, 46 per cent.

Our dataset contains limited information about outgoing mobility of Norwegian-born researchers, as we do not have information about Norwegians studying for a PhD abroad.

In addition, we present a brief analysis based on data of applications for positions as associate professors at Norwegian higher education institutions. NIFU has mapped applications for vacancies in the period 2016–2018 (Frølich et al., 2019), and statistics from this study shed light on the process of recruiting associate professors. Data were collected through a survey at departmental level. The survey examines the total number of applicants for each advertised position, the number of qualified applicants and characteristics of those who in the end were appointed, including gender and whether the applicant has applied from Norway or abroad. In this article, we utilise data regarding the recruitment of associate professors. There were 980 advertisements for associate professor positions at the institutions participating in the survey, and more than 11,000 applications. Of these applicants, 48 per cent were female and 38 per cent applied from abroad.

## Results

### The current status

We will start by providing some overall figures for Norway in 2018, which is the most recent year for which statistics are available. International recruitment is highest for the temporary positions, such as postdoc and research fellow. In 2018, a total of 38 per cent of the researchers at Norwegian HEIs were born outside Norway (Table 1).

International recruitment has been most prevalent in the STEM fields. In the natural sciences and engineering and technology half of the researchers in the HEIs in 2018 (respectively 51 and 55 per cent) were born abroad, see Table 1. In other fields, this proportion is much lower.

In 2018, 34 per cent of the researchers in humanities and the arts were foreign, while this proportion was 27 per cent in the social sciences. In medical and health sciences, 32 per cent of the researchers were born abroad.

In terms of gender distribution, almost half of the researchers at Norwegian HEIs were women (46 per cent). The share of women was highest in medicine and health sciences, 63 per cent, and lowest in engineering and technology (27 per cent).

Overall women accounted for 31 per cent of the full professors and 49 per cent of the associate professors, while 45 per cent of postdocs and 54 per cent of the research fellows were female. Approximately 30 per cent of full professors and associated professors were foreigners, while at postdoctoral level more than 70 per cent of the postdocs were born abroad. In Table 2 gender and academic position is divided by status of

**Table 1** Overview of researchers<sup>1</sup> at Norway’s HEI in 2018 according to origin, gender and field of science. Foreigners and women

	Total	Foreigners	Share of foreigners	Women	Share of women
Humanities and the arts	2751	933	34%	1314	48%
Social sciences	6382	1732	27%	3244	51%
Natural sciences <sup>2</sup>	3562	1824	51%	1295	36%
Engineering and technology	2973	1625	55%	815	27%
Medicine and health sciences	3629	1152	32%	2270	63%
Total	19,297	7266	38%	8938	46%

<sup>1</sup>Researchers include full professor, associate professor, assistant professor, researcher, postdoc and research fellow. Lecturers are excluded

<sup>2</sup>Agricultural and veterinary sciences are included in natural sciences due to low numbers

Source: NIFU, Statistics Norway

**Table 2** Full professors, associate professors and postdoctors by native/foreign<sup>1</sup> and share of women in Norwegian HEIs. 2018. Per cent

Position	Status	Share of total (%)	Share of women (%)	Share of men (%)	N=
Full professor	Native	70	31	69	3021
	Foreign	30	30	70	1096
Associate professor	Native	69	51	49	3151
	Foreign	31	45	55	1305
Postdoctor	Native	28	53	47	444
	Foreign	72	42	58	1130

<sup>1</sup>Native/foreign relates to country of birth

Source: NIFU, Statistics Norway

origin. The percentage of women is almost identical for native and foreign full professors (one percentage point difference), while there is a larger difference for associate professors (6 percentage points) and postdocs (11 percentage points).

Table 3 presents a closer look at full professors. It is striking that the share of female full professors is similarly low among native and foreign full professors in each of the fields analysed. In humanities and the arts 36 per cent were female (38 per cent of the natives and 34 per cent of those born abroad), while in social sciences, 33 per cent of the native and 37 per cent of the foreign full professors were women. In engineering and technology, only 14 per cent of the full professors were women. The share of women was higher for the foreign full professors (16 per cent), compared with 13 per cent for the natives. We see the same trend for natural sciences, with 21 per cent female full professors born abroad, and 19 per cent of the native.

**Table 3** Full professors by gender, native/foreign and field of science, 2018. Total and per cent

	Full professor	Female full profes- sor	Native full profes- sor	Foreign full profes- sor	Share of female profes- sor (%)	Share of female foreign full profes- sor (%)
Humanities and the arts	737	268	480	257	38	34
Social sciences	1407	478	1075	332	33	37
Natural sciences <sup>1</sup>	755	149	492	263	19	21
Engineering and technology	527	135	321	206	13	16
Medicine and health sciences	691	303	523	168	44	44
Total	4117	1333	2891	1226	31	30

<sup>1</sup> Agricultural and veterinary sciences are included in natural sciences due to low numbers

Source: NIFU, Statistics Norway



## The temporal development

In this subsection we will have a closer look at how the gender balance and recruitment of foreign researchers has developed since 2007, as the following Table 4 depicts, the female representation among the tenured personnel has grown steadily over time both for full professors and associate professors in Norway. The percentage of women has increased from 18 per cent for full professors in 2007 to 31 per cent in 2018. For associate professors, there has been an increase from 35 to 49 per cent in the same period. Thus, each year the proportion of female full professors has increased by 1.2 percentage points on average, while this figure is 1.3 for the associate professor.

Below, we will look specifically at new researchers, i.e. researchers who have been recently hired. By limiting the analysis to this group of researchers, we get a more up-to-date picture of the recruitment situation. This analysis shows that the extent of international recruitment has increased significantly over time, while the gender gap is reduced. In 2007, 28 per cent of the new full professors were female. In 2018 this proportion had increased to 42 per cent. Thus, when one looks at newly recruited full professors only, the proportion is much higher than in the total population of full professors which is shown in Table 2. If this development continues, Norway will soon reach gender parity also at the top level, among the newly-recruited full professors. At the level of new associate professors, we find a similar development, but here women are now (2018) in clear majority, accounting for 56 per cent of the newly appointed individuals. This proportion was 44 per cent in 2007.

In terms of nationality, 19 per cent of new full professors in 2007 were female and native, whereas 9 per cent were female and foreign. Eleven years later, the share of female new full professors had increased to 42 per cent as described above, where 28 per cent were native women and 14 per cent foreign women. Thus, Norwegian men are still the largest group of new full professors, but the share of women, both native and foreign, is growing steadily. Also for the associate professors, there has been a notable increase in the share of foreign women (11 to 19%) and men (14 to 21%), while there has been a decrease in the share of native men (39 to 23%). The share of native women has been relatively stable (34 to 37%).

## The development at field levels

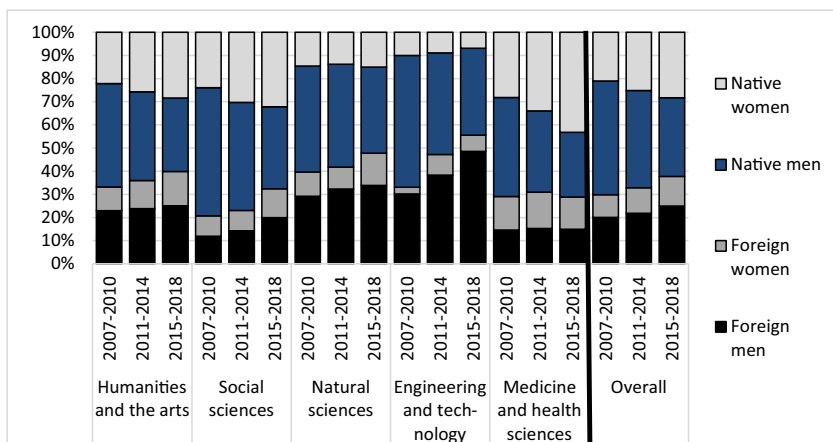
As we have seen, the prevalence of international recruitment varies significantly across fields, and below this dimension is further analysed. For reasons of better readability the data have here been clustered in four-year periods. A closer look at the recruitment of new full professors, see Fig. 1, shows that the share of foreign full professors has increased in all fields except medicine and health sciences, where it has been approximately 30 per cent in all periods. Strongest growth is found in engineering and technology where the proportion was 33 per cent in 2007–2010 and 56 per cent in 2015–2018. Thus, in the latter field, the majority of the new full professors are hired from abroad.

In terms of gender, there is a significantly higher share of new male foreign full professors over foreign females in all fields, again with the exception of medicine and health sciences, where there is almost gender parity. In engineering and technology foreign females accounted for 7 per cent of the total population of full professors in 2015–2018. At the same time, the share of new male native full professors seems to be decreasing in all fields, while the share of native female full professors is relatively stable in the STEM fields and increases

**Table 4** Gender balance for full professors and associate professors at Norwegian HEIs, 2007–2018

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Full professor (N)	2964	3029	3089	3186	3285	3397	3559	3673	3766	3884	4042	4117
Female full professors (%)	18%	19%	20%	21%	23%	24%	25%	26%	27%	28%	30%	31%
Associate professor (N)	2936	3010	3086	3164	3157	3250	3356	3545	3744	3976	4239	4456
Female associate professors (%)	35%	36%	38%	38%	39%	40%	42%	44%	46%	47%	48%	49%

Source: NIFU, Statistics Norway



**Fig. 1** New full professors at Norwegian HEIs by field of science, <sup>1</sup>gender and native/foreign. <sup>2</sup>2007–2018. Per cent  
<sup>1</sup>Natural sciences include veterinary and agricultural sciences. <sup>2</sup>Native/foreign relates to country of birth. N 2007–2010 = 1156, N 2011–2014 = 1281, N 2015–2018 = 1344  
 Source: NIFU, Statistics Norway

in medicine and health sciences. However, the share of men among the new full professors is still higher than the share of women in most fields, and especially in the STEM fields.

Table 5 shows similar statistics as presented in Fig. 1, but for the entire population of full professors (not limited to the newly appointed). Moreover, here we have calculated the proportion of men and women *within* the two groups of native and foreign full professors. This has been done in order to see whether the gender composition of foreign professors differs from that of the natives. At the overall level, we see that females account for 30 per cent of the foreign full professors in 2015–2018. In other words, three out of ten professors recruited internationally are women. Interestingly this share is almost identical for the native Norwegians (31 per cent). In other words, at the overall level gender composition of the foreigners does not differ from that of the native Norwegians. In the previous periods, 2007–2010 and 2011–2014, the female proportion was lower in both groups of full professors. However, the gender composition was less skewed for the foreign full professors.

At field level, the picture varies. In the most recent period, the gender composition of the foreign full professor is more equal than for the natives in the social sciences (37 vs 33 per cent), the natural sciences (21 vs 19 per cent), engineering and technology (16 vs 13 per cent). In medicine and health sciences there are no differences between the two groups (both 44 per cent), while the picture is reversed in one field, only: humanities and arts (34 vs 38 per cent).

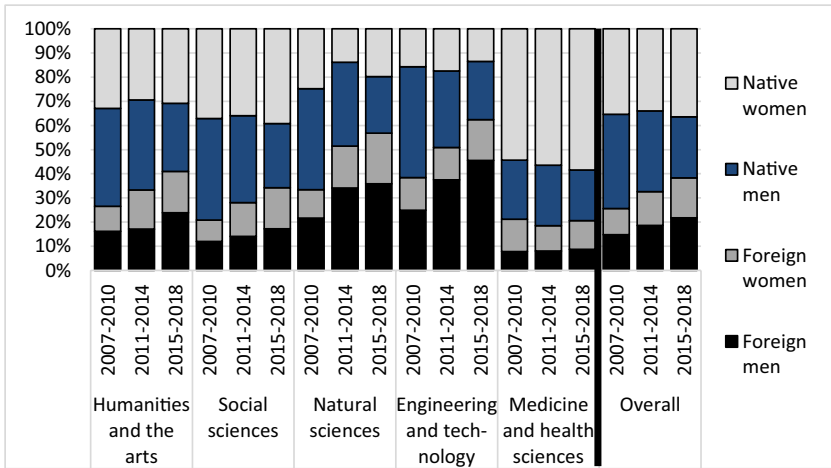
We have also conducted analyses for the associate professors. Figure 2 shows the composition of the new associate professors, i.e. those who have been recently hired. Overall, 39 per cent of the new associate professors in 2015–18 were foreign-born, which is one percentage point higher than for the new full professors (cf. Figure 1). In technology and engineering two out of three (63 per cent) new associate professors were foreign.

Compared with the results presented in Fig. 1, there is clearly a higher share of women, both native and foreign, among the new associate professors than among the new full professors. This applies to all fields. In 2015–2018 the differences were largest in engineering and technology and medicine and health sciences. For the first field, it was especially the

**Table 5** Native and foreign<sup>1</sup> women as a share new and full foreign/native professors by field of science<sup>2</sup> at Norwegian HEIs, 2007–2018. Per cent

		2007–2010 <sup>3</sup>	2011–2014 <sup>3</sup>	2015–2018 <sup>3</sup>
Overall	Native women	21%	25%	28%
	Proportion of all new full professors	21%	25%	28%
Humanities and art	Foreign women	20%	25%	31%
	Proportion of all new full professors	10%	11%	13%
Social sciences	Native women	26%	29%	30%
	Proportion of all new full professors	22%	26%	28%
Natural sciences	Foreign women	27%	31%	38%
	Proportion of all new full professors	10%	12%	15%
Engineer-ring and techno-logy	Native women	30%	32%	34%
	Proportion of all new full professors	24%	30%	32%
Medicine and health sciences	Foreign women	21%	27%	33%
	Proportion of all new full professors	9%	9%	12%
Foreign women	Native women	32%	36%	37%
	Proportion of all new full professors	15%	14%	15%
Native women	Foreign women	14%	16%	19%
	Proportion of all new full professors	11%	10%	14%
Foreign women	Native women	17%	19%	21%
	Proportion of all new full professors	10%	9%	7%
Native women	Foreign women	9%	11%	13%
	Proportion of all new full professors	3%	9%	7%
Foreign women	Native women	15%	15%	16%
	Proportion of all new full professors	28%	34%	43%
Native women	Foreign women	25%	35%	44%
	Proportion of all new full professors	15%	16%	14%
Foreign women	Native women	38%	45%	44%
	Proportion of all new full professors	38%	45%	44%

<sup>1</sup>Foreign relates to country of birth<sup>2</sup>Natural sciences include veterinary and agricultural sciences<sup>3</sup>Share of native/foreign full professors is calculated for the last year of the periodSource: NIFU, *Statistics Norway*



**Fig. 2** New associate professors at Norwegian HEIs by field of science,<sup>1</sup>gender and immigrant status.<sup>2</sup> 2007–2018. Per cent  
<sup>1</sup>Natural sciences include veterinary and agricultural sciences. <sup>2</sup>Native/foreign relates to country of birth. N 2007–2010=1811, N 2011–2014=1883, N 2015–2018=2462  
 Source: NIFU, Statistics Norway

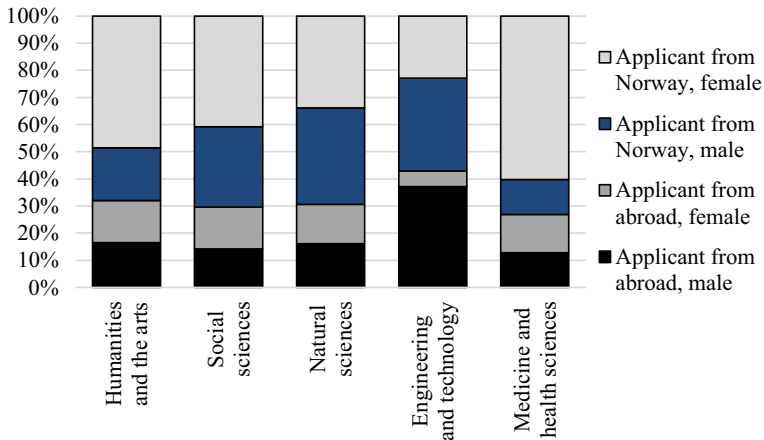
share of foreign female associate professors that was higher, for the latter it was the share of native female associate professors.

### Applications for new positions

Finally, we will include some statistics on foreign and native applicants for new positions. In this context, the recruitment of new associate professors is particularly interesting, as some higher education institutions only advertise vacancies as associate professor, and not as full professor. Typically, the person appointed as associate professor will go on to qualify for full professorship through the professor promotion scheme. As described in the data and method section, the analysis is based on data of applications for associate professor vacancies at Norwegian higher education institutions in the period 2016–2018 (Frølich et al., 2019), in total more than 11,000 applications.

Figure 3 shows the distribution of qualified applicants<sup>3</sup> for advertised associate professor positions at Norwegian higher education institutions by field of science, gender and whether they applied from Norway or abroad. There are differences in the application patterns by field of science. Engineering has few women (29 per cent) and a high share of applicants from abroad (43 per cent). To some extent this is also the case in natural sciences. However, in the latter field there is a somewhat higher proportion of qualified applicants from Norway (69 vs. 57 per cent). In medicine and health sciences, native female applicants made up more than half (60 per cent) of the qualified applicants, and foreign women 14 per cent. Thus, in this field women are in a large majority (74 per cent).

<sup>3</sup> By qualified applicant, we here mean applicants who are qualified in accordance with the call text, i.e. those who meet the formal requirements for the position in accordance with the field to which the call applies.



**Fig. 3** Qualified applicants for position as associate professor in Norway in 2016/2018 by field of science,<sup>1</sup> gender and region of application.<sup>2</sup> Per cent. N = 538

<sup>1</sup>Natural sciences include veterinary and agricultural sciences. <sup>2</sup>Relates to whether the applicant applied from within Norway or abroad

Source: NIFU, survey data

It might be interesting to compare these results with the statistics of new associate professors, presented in Fig. 2. However, the two analyses are not directly comparable, as the time periods differ and the data on applications cover a limited sample. Nevertheless, it seems evident that the proportion of foreign applications for associate professor positions is lower than the proportion of foreign new professors in all fields except medicine and health. This suggests the success rate of the foreign applicants might have been higher than for the natives. This is also the case when limiting the analysis to foreign women only.

## Discussion

The needs of increasingly knowledge-based and innovation-driven economies have triggered a demand for tertiary educated workforce worldwide. At the same time there is a growing awareness and evidence about the benefits of diversity and gender equity. If women are less mobile, it might influence their career, as networks and cooperation possibilities are poorer (Elsevier, 2020; Jöns, 2011) and their contribution to solving scientific and societal challenges may be hampered.

This study has shown that the Norwegian HE system has undergone rapid changes in terms of internationalisation, where the share of foreign researchers has grown considerably over the last years, especially at lower levels of the academic career ladder and especially within the STEM fields. The most striking example is technology and engineering, where two out of three new associate professors in Norway (2015–2018) were foreign-born. This illustrates how the Norwegian HE system strongly is affected by a global labour market for researchers. Thus, the current pattern is very different from the situation previously seen in Europe, where academic labour markets remained highly national (Musselin,

2004). Now international mobility has been shown to be much more widespread across several countries (Boring et al., 2015; Pietila, 2021).

Previous research has shown that the driving forces for international mobility influence male and female researchers differently (Leemann, 2010; Canibano, 2016; Canibano et al., 2020) and that there are gender specific mobility patterns across career stages (European Commission, 2018). In this study a main question has been to assess whether there are gender differences in the international recruitment of researchers to Norway and whether the gender composition of these researchers differs from the population of native Norwegian researchers. The policy background for this question is the gender imbalance particularly among full professors, which is a matter of great concern in Norway and other countries (European Commission, 2021). Although increased international recruitment largely is considered as a positive development, a male dominated international recruitment pattern would have a negative effect on gender balance and equity in the research system. The results for Norway in 2018 show that among foreign researchers the share of women is lower (45 per cent) than among native Norwegians (52 per cent). These overall findings might suggest that internationalisation has slowed down the development towards obtaining gender balance.

However, there are significant differences in gender balance by field of research. Moreover, international recruitment is particularly prevalent in engineering and technology, where the gender balance is most skewed. This is in accordance with previous studies showing that international mobility has a field-specific nature (Laudel & Bielick, 2019). Thus, the overall figures are affected by these patterns. When the issue is analysed at the level of fields, a different picture emerges. The female proportion of foreign professors (2015–2018) is higher than the female proportion of native full professors in all fields, except humanities and arts, while it is equal in medicine and health. Contrary to what would be expected from the overall results, this suggests that the international recruitment has in fact contributed positively to the gender balance in Norway in the majority of the fields.

These results are based on analyses of one country only. Thus, our conclusions do not necessarily hold elsewhere, as both the gender parity ratios and rate of international mobility show great variation across countries. As a topic for further studies, it would therefore be interesting to analyse the issue also in other national contexts.

Our study is based on data limited to incoming mobility. A more comprehensive picture would be obtained by including outgoing mobility as well, i.e. emigration. Such a study could show the net gender effect of immigration and emigration combined and the effect of Norwegian researchers on other national systems. Due to data limitations, this has not been possible. This would be another interesting topic for future studies, provided that data are available.

## Conclusions

Women's underrepresentation in senior positions in academia has long been a concern and much attention has been paid to the problem. This study has shown that international mobility should not be considered among the reasons causing the gender gap in Norway. There is no evidence that this gap is caused by an inflow of foreign male researchers who are outperforming Norwegian women in the competition for positions.

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## Declarations

**Conflict of interest** Dag W. Aksnes is a member of the distinguished reviewers board of *Scientometrics*.

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