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EDUCATION INDICATORS IN FOCUS

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The internationalisation of doctoral and master's studies

- **One in ten students at the master's or equivalent level is an international student in OECD countries, rising to one in four at the doctoral level.**
- **Almost 60% of international doctoral students in OECD countries are enrolled in science, engineering or agriculture.**
- **The United States hosts 38% of international students enrolled in a programme at the doctoral level in OECD countries. Luxembourg and Switzerland host the largest proportion of international students, who make up more than half of their total doctoral students.**
- **International master's and doctoral students tend to choose to study in countries investing substantial resources in research and development in tertiary educational institutions.**
- **Of all international students enrolled at the master's or doctoral level across OECD countries, the majority (53%) are from Asia, and 23% are from China alone.**

Master's and doctoral or equivalent programmes are the most advanced educational programmes, informed by state-of-the-art research or professional practice (UIS, OECD and Eurostat, 2015). With the emergence of the knowledge economy and of knowledge communities (OECD, 2004), research and the top professional services have become more and more internationalised (OECD, 2009, 2012). Accordingly, many students are seeking opportunities to study abroad at master's or doctoral level. International experience is seen as valuable for researchers and professionals. For example, the European University Association (2015) recommends that "doctoral candidates should be able to take part in international research activities". This could come through international collaborations or by studying abroad for all or part of a study programme.

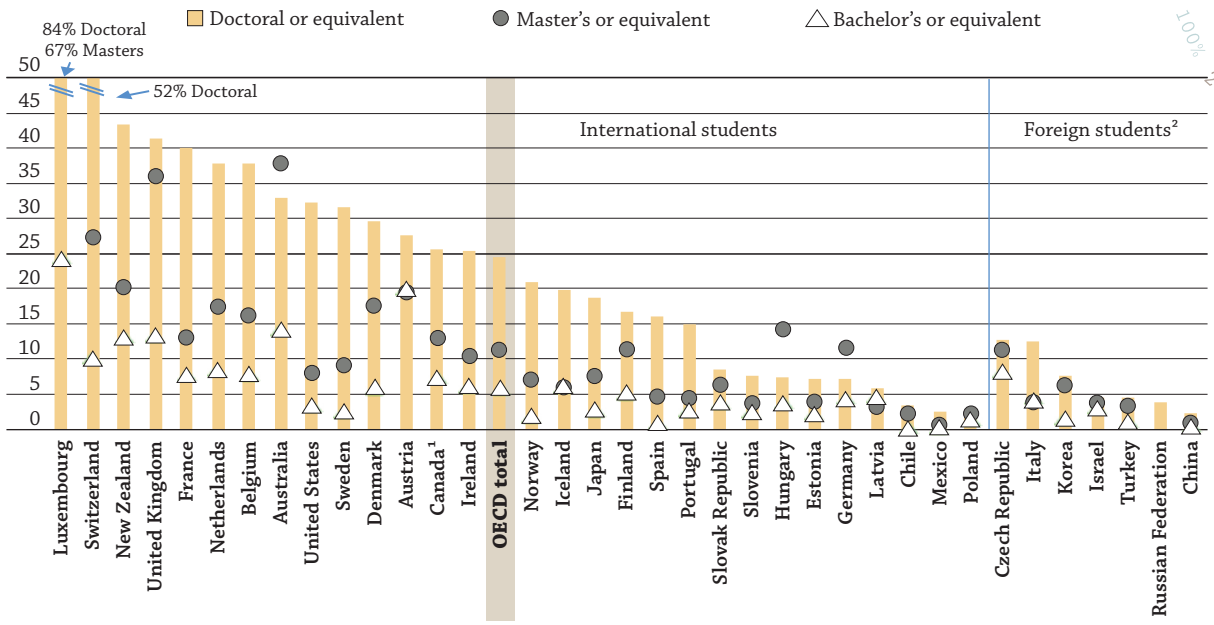
From the point of view of the host countries, attracting international students is appealing for a variety of reasons, including the fees and other living expenses the students pay, and the social and business networks that they help to build with their home countries. In addition, international students, particularly at the master's or doctoral or equivalent level, can contribute to research and development (R&D) in the host country, initially as students and later on potentially as researchers or highly qualified professionals. Doctoral students, in particular, form an integral part of the research staff of a country.

How many students go abroad for their master's or doctoral studies?

International students represent 11% of all the students enrolled in master's or equivalent programmes in OECD countries, about twice as much as for bachelor's or equivalent programmes. Luxembourg had the largest proportion of international students at the master's or equivalent level (67%) followed by Australia (38%), the United Kingdom (36%) and Switzerland (27%). Across all OECD countries, with the exception of Australia, Germany, Hungary and Poland, the proportion of international students is higher at the doctoral than at the master's or equivalent level. Within OECD countries, 25% of the students enrolled at the doctoral level are international students (Figure 1).

Besides the advantages for aspiring top professionals of being trained in an international environment, other factors could help to explain the high proportion of international master's and doctoral students. For example, programmes in specific areas of study may not be available in some countries, or they may not have the same reputation as other programmes in the same field available abroad. In addition, students in these programmes may belong to a particular subgroup of the student population that is more likely to travel and live abroad, independently of their educational choices.

Figure 1. **Student mobility in tertiary education, by ISCED level (academic year 2012/13)**
International or foreign student enrolments as a percentage of total



1. Academic year of reference 2011/2012.
2. Data on foreign instead of international students (see box).

Source: OECD (2015a), *Education at a Glance 2015: OECD Indicators*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eag-2015-en*, Chart C4.2.

International students are those who have crossed borders for the purpose of study. The UNESCO Institute for Statistics, the OECD and Eurostat define international students as those who are not residents of their country of study or those who received their prior education in another country. When data on international students are not available, data on total foreign students (including immigrants who moved to the country for purposes other than study) are used instead.

What do international students study?

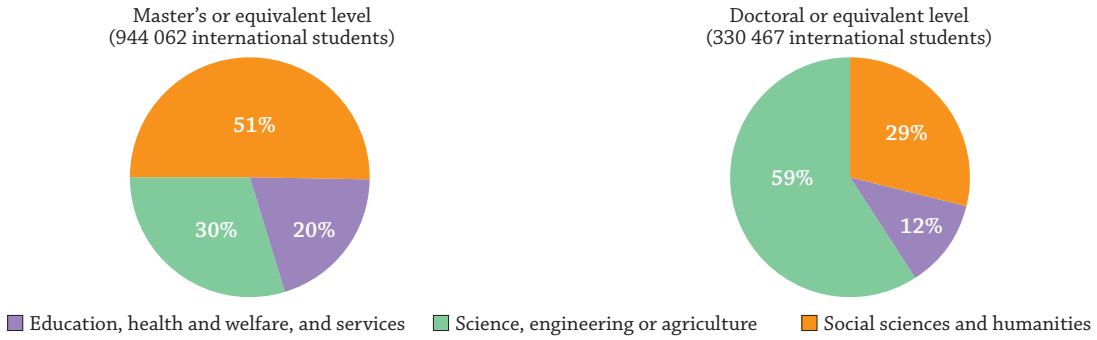
Across OECD countries, at the bachelor's and master's or equivalent levels, most international students are enrolled in social sciences and humanities. In contrast, a large majority (59%) of international doctoral students study science, engineering or agriculture.[1] In comparison, the proportion of doctoral students enrolled in these fields is smaller for national students, although it is still relatively large (40%) (Figure 2). In some countries (Luxembourg, the Netherlands, New Zealand, Switzerland and the United States), more than half of all students enrolled in a doctoral programme in the field of science, engineering or agriculture come from abroad.

This reinforces the potential for countries to expand their labour force's skills base, as doctoral students may stay on in their host countries as professionals, technicians and researchers after their studies, fostering innovation and the successful introduction of new technologies and organisational processes in the economy. Some estimates suggest that in OECD countries, about one-quarter of international students stay in the host country after graduating from a tertiary education programme, including programmes at a level other than doctoral (OECD, 2011).

[1] Throughout this document, the expression "Science, engineering or agriculture" is used to indicate the following three fields of study: science, mathematics and computing; engineering, manufacturing and construction; and agriculture and veterinary. "Social sciences and humanities" indicates the following two fields of study: social sciences, business and law; and humanities and arts.

Figure 2. **International students in the OECD at master's and doctoral or equivalent levels, by field of education (academic year 2012/13)**

Share of international or foreign student enrolments as a percentage of total in three broad fields of education



Notes:
For Canada, the academic year of reference is 2011/12.
For the Czech Republic, Israel, Italy, Korea and Turkey, data for foreign students are used instead of international students.

Source: OECD Education Database, *http://stats.oecd.org/* (accessed 21 January 2016).

Where are the international students coming from and where do they go?[2]

The United States hosts 21% of all international students enrolled in a programme at the master's or equivalent level in OECD countries. This is the largest share, followed by the United Kingdom (16%), France and Germany (both 11%), and Australia (8%). At the doctoral or equivalent level, the top five countries remain the same but the market is more concentrated: the United States has a much larger share (38%), whereas the United Kingdom (13%), France (8%), Australia and Germany (both 5%) have smaller shares. In terms of countries of origin, 23% of international students studying in OECD countries come from China, more than from any other country, followed by India (8%) and Germany (4%). The majority (53%) come from Asia.

Mobility within Europe is somewhat lower at the master's and doctoral or equivalent levels (26% of international students enrolled in EU21 countries come from another EU21 country) than for tertiary education overall (where the proportion is 30%). In Canada and the United States, regional mobility accounts for an even smaller share of the total. In those two countries, only about 10% of the international students at the master's and doctoral or equivalent levels come from Northern or Latin America.

International doctoral students tend to study in countries investing substantial resources into R&D in tertiary educational institutions. For example, Switzerland, the country with the highest level of expenditure on R&D per student in tertiary educational institutions (around USD 13 600), is also the country with the second highest proportion of international students at the doctoral level (after Luxembourg). Australia, Belgium, Luxembourg, the Netherlands, Sweden and the United Kingdom spend more than USD 5 000 in R&D per student in tertiary educational institutions and have a high proportion (>30%) of international students. In contrast, Chile, the Russian Federation and Mexico have less than 5% of international students at the doctoral level and spend less than USD 2 000 per student on R&D in tertiary educational institutions (Figure 3). The correlation of expenditure on R&D per student in tertiary educational institutions with the proportion of international doctoral students is 0.69, even stronger than with the proportion of international master's students (0.57).

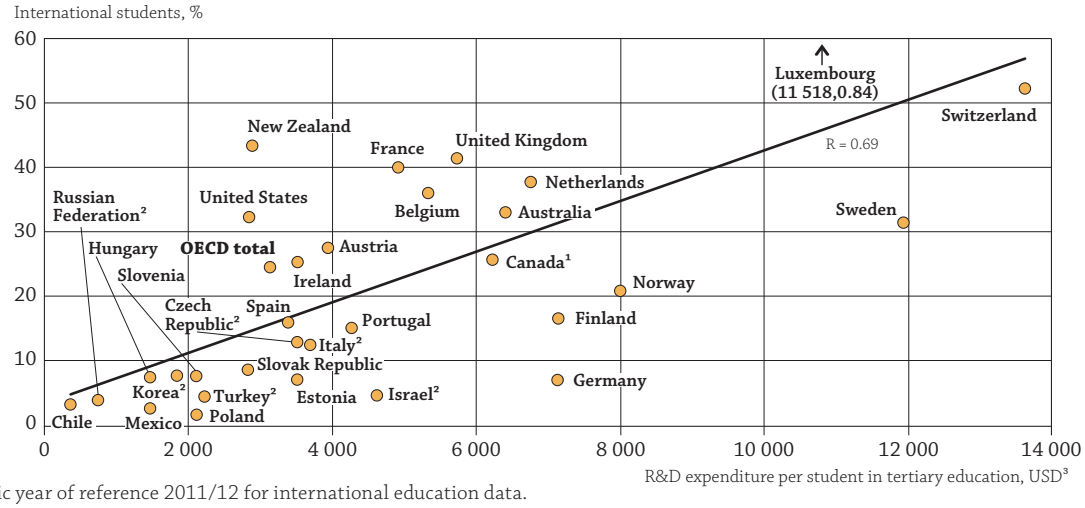
R&D is defined according to the *Frascati Manual* and comprises basic research, applied research and experimental development (OECD, 2015b). Expenditure on R&D per student in tertiary educational institutions includes both public and private expenditures. It is measured in USD converted using purchasing power parity (PPP) for GDP.

R&D expenditure in tertiary educational institutions could attract international master's and doctoral students by enhancing the quality of research training in that country's universities, as well as its research capacity and visibility. Alternatively, it could be a proxy for other factors attracting international students, such as the general innovativeness of the economy (where students might stay to work after their degree), or other social and cultural factors, such as the presence of a thriving knowledge society. These other factors could be attractive not only for students enrolled in doctoral or academic master's programmes, but also for those enrolled in professional master's or equivalent programmes.

[2] Within this section, the OECD total (used to compute shares of students by destination and origin) includes countries reporting data on foreign students only and excludes Greece, for which data are not available. For Canada and the United States, the number of international students refers to academic year 2011/12 and 2013/14, respectively. Data by country of origin for Germany include only master's students. EU21 countries are the 21 countries that are members both of the European Union and of the OECD. The data are drawn from the OECD Education Database.

Figure 3. **Student mobility in doctoral education and countries' R&D investment in tertiary educational institutions (academic year 2012/13)**

International or foreign students as a percentage of total enrolment at the doctoral or equivalent level, and expenditure on R&D per student in tertiary educational institutions



1. Academic year of reference 2011/12 for international education data.
2. Data on foreign instead of international students; these countries are excluded from the computation of the OECD total.
3. Refers to calendar year 2012.

Sources: OECD Education Database, *http://stats.oecd.org/*, (accessed 21 January 2016), and OECD (2015a), *Education at a Glance 2015: OECD Indicators*, OECD Publishing, Paris, *http://dx.doi.org/10.1787/eag-2015-en*, Table B1.2.

The bottom line: One in ten students at the master's or equivalent level is an international student within the OECD, and one in four at the doctoral or equivalent level. International doctoral students tend to choose countries investing substantial resources on R&D in tertiary educational institutions. This offers these countries a channel to attract future workers with advanced training, particularly in science and technology; in several OECD countries more than half of those enrolled in a doctoral programme in science, engineering or agriculture are international students.

For more information

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