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Higher education expenditure as a percentage of GDP is not precisely measured

Flanders spent 1.3% of its GDP on higher education in 2015, close to the bottom quartile of OECD countries. However, it should be noted that GDP refers to the Region of Flanders, while education expenditure refers to the education system of the Flemish Community. The two entities do not coincide exactly, making this statistic not directly comparable with the international data.

When excluding research and development, spending per student is distributed evenly between subsectors

Annual higher education expenditure per student differ between universities and professional higher education institutions (HEIs) in the jurisdictions with available data (Estonia, the Flemish Community and the Netherlands). While universities spent over USD 24 000 in 2015, professional HEIs spent nearly half of that amount, USD 13 000 (Table 10.2). However, when R&D expenditure is excluded, the amount of expenditure becomes similar, with professional HEIs spending slightly more.

Table 10.2. Annual higher education expenditure per student, by subsector (2015)

In PPP USD, based on full-time equivalents

		Estonia	The Flemish Community	The Netherlands
Universities	Total expenditure	14 394	24 321	29 286
	Excluding R&D	9 390	11 137	11 537
Professional HEIs	Total expenditure	6 773	12 787	12 972
	Excluding R&D	6 595	12 173	12 497

Source: Adapted from OECD (2019[21]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

Public expenditure on grants and scholarships is one of the highest among OECD countries

The Flemish Community places a strong emphasis on student support when financing higher education. Public expenditure on student grants and scholarships on a per student basis was USD 3 000 in 2015, the third highest among OECD countries. Students receiving means-based grants and scholarships also pay lower tuition fees in the Flemish Community.

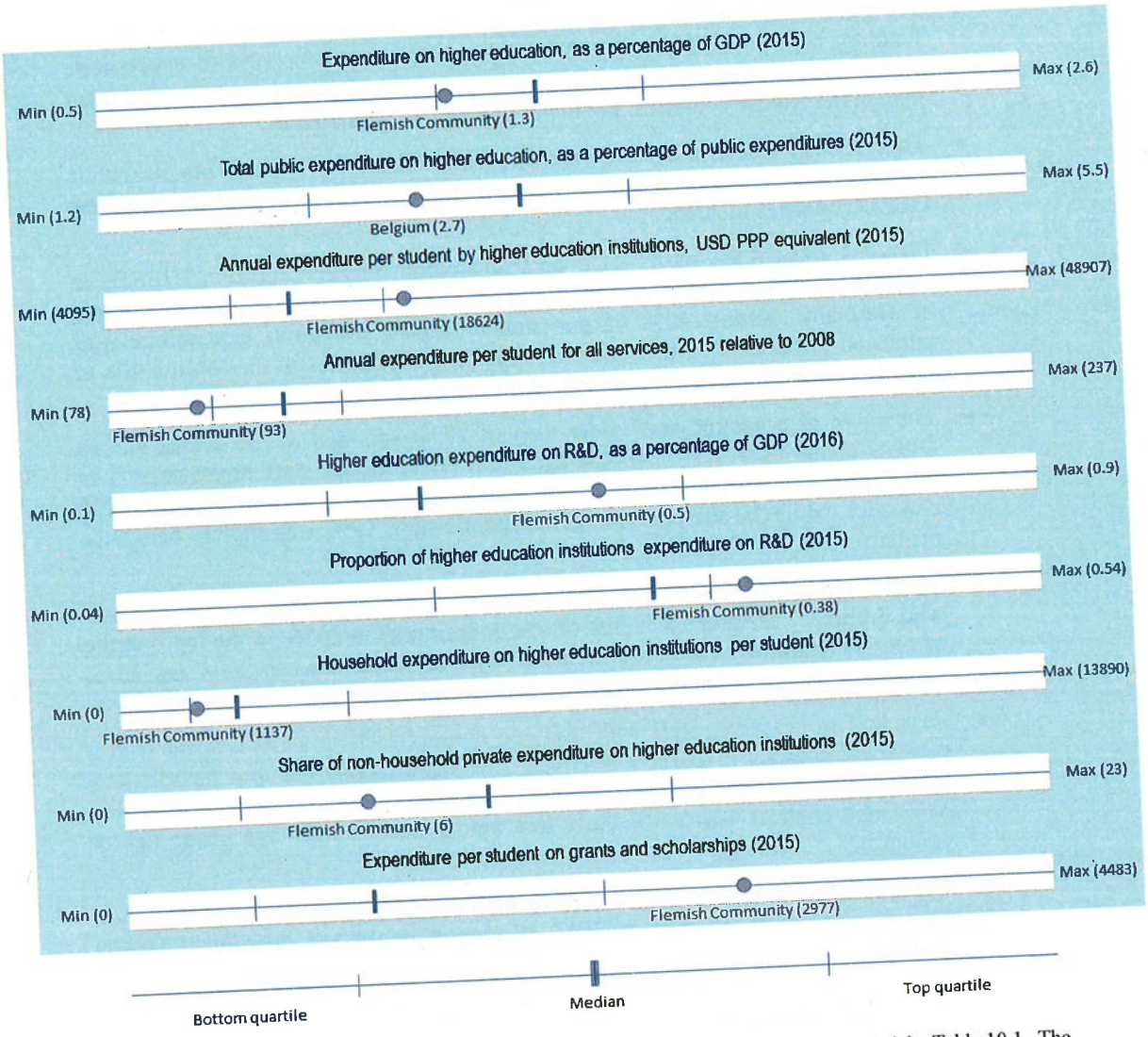
Unlike the neighbouring Netherlands, the Flemish Community does not have a student loan system. When combining grants, scholarships and loans, the average Flemish student received an amount in 2015 that was below the top quartile among OECD countries, but well above the median of USD 1 400.

A relatively high degree of cost sharing compared to the Nordic countries, but not as high as the Netherlands

The government financed 85% of higher education expenditure in 2015, a share that places Flanders in the top quartile of OECD countries, though below the Nordic countries. The share of expenditure from private sources on Flemish higher education

been decreasing in the Flemish Community, contrary to the upward trend observed in most OECD countries. Expenditure decreased by 7% between 2008 and 2015, which was one of the largest decreases among OECD countries. While Germany also decreased its annual higher education expenditure per student at a similar rate during this period, France and the Netherlands increased expenditure by around 6-7% over the same period.

Figure 10.1. Where does the Flemish Community stand in the OECD distribution? Financial resources



Note: The indicators represented in this chart are a subset of the indicators presented in Table 10.1. The coloured circle represents the Flemish Community's position in the OECD distribution. The circle is not coloured when data are available for less than half of the OECD countries (the minimum number of countries with available data is 14). For more information on methodological issues and metadata, see OECD (2019[2]) and the references cited therein. Follow the *Statlink* to download the data underlying the calculation of the scorecard.

Source: Adapted from OECD (2019[2]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

10.2. Financial and human resources

Highlights

- The Flemish Community was in the top quartile of OECD countries for annual expenditure on higher education institutions per student in 2015. Expenditure per student decreased by 7% between 2008 and 2015, in contrast to an upward trend in most OECD countries.
- The government contributes the majority of higher education expenditure. Private funding, both household and non-household, accounted for 12% of expenditure on higher education institutions in 2015. The share of private spending is higher than in the Nordic countries, but lower than in the Netherlands.
- The Flemish Community does not have a student loan system, but its public expenditure on grants and scholarships per student was one of the highest among OECD countries in 2015.
- Flanders spent 0.5% of its GDP on R&D within higher education (HERD) in 2016, a level close to the top quartile of OECD countries and comparable to that of Germany. Nearly 40% of per student higher education expenditure was allocated to R&D activities in 2015. This placed Flanders in the top quartile of OECD countries, and approximately at the same level as the Netherlands.
- The share of academic staff older than 60 (7%) was one of the lowest among OECD countries in 2016. Middle-aged (35-59) academic staff represented over three-quarters of academic staff, one of the highest proportions among OECD countries, while the share of younger academic staff, 16%, was slightly below the median.
- Women represented nearly half of academic staff (i.e. higher education personnel whose primary assignment is instruction or research) in 2016, in the top quartile of OECD countries. The share increased by over 10% between 2008 and 2015, which was the second highest increase among OECD countries, after Korea.
- Over half of academic staff with teaching duties (teaching staff) worked with a permanent contract in 2016, a relatively low share among the four jurisdictions that participated in the benchmarking exercise. The share of teaching staff with a permanent contract was particularly low among the younger age group (34 or younger).
- The Flemish Community spent a considerable share (75%) of its higher education current expenditure on staff in 2015, placing it in the top quartile of OECD countries.

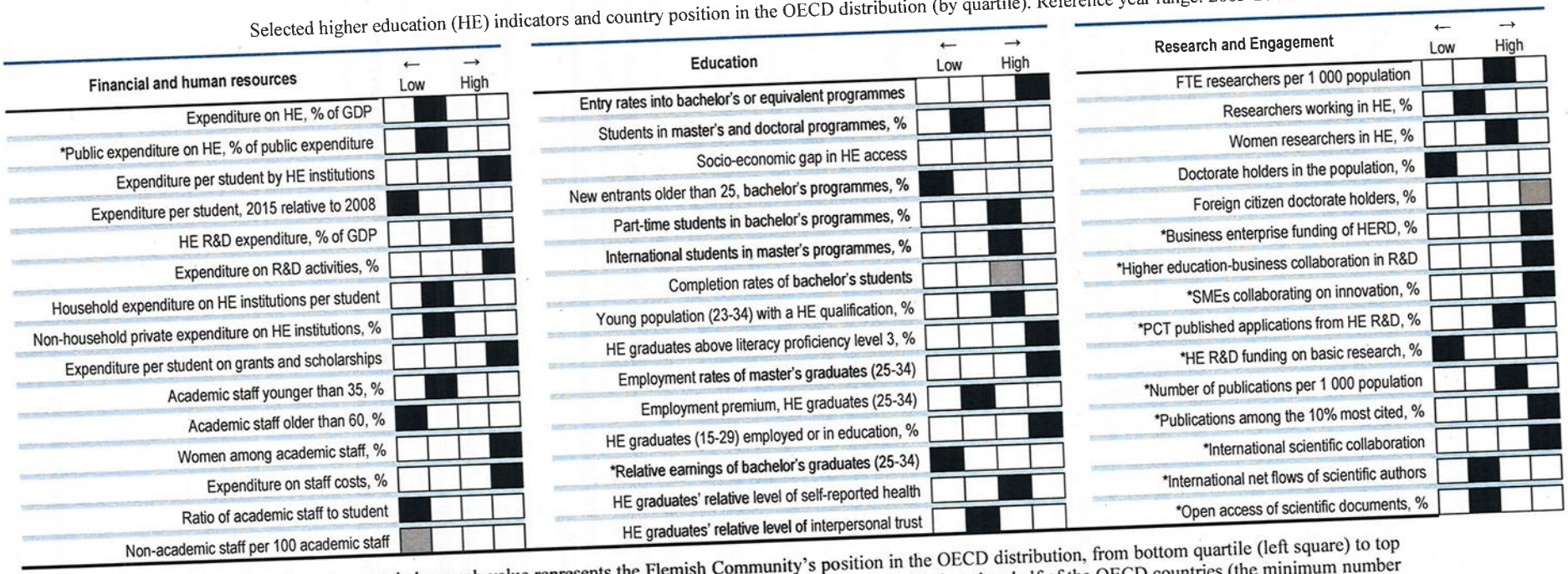
10.2.1. Financial resources

Higher education expenditure is relatively high on a per student basis compared to other OECD countries, but it is decreasing

In 2015, annual higher education expenditure per student in the Flemish Community was USD 19 000, in the top quartile of OECD countries. This is a similar level of spending per student to that of the Netherlands, and higher than neighbouring France, Germany and the national average of Belgium. Annual higher education expenditure per student has

Table 10.1. Higher Education system benchmarking: The Flemish Community of Belgium

Selected higher education (HE) indicators and country position in the OECD distribution (by quartile). Reference year range: 2005-2017.



Note: The coloured square below each value represents the Flemish Community's position in the OECD distribution, from bottom quartile (left square) to top quartile (right square). The square is shaded in grey (instead of black) when data are available for less than half of the OECD countries (the minimum number of countries with available data is 14), while no coloured square means that data are missing for the Flemish Community. For more information on methodological issues and metadata, see OECD (2019[2]) and the references cited therein. Follow the *Statlink* to download the data underlying the calculation of the scorecard.

* The value refers to Belgium.

Source: Adapted from OECD (2019[2]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942298

certificate upon completion of these modules. In addition, a system of means-tested grants supports student from poorer households.

Higher education policy is regularly reviewed and updated in the Flemish Community. Long-term plans are issued approximately every 5 years for both education policy (by the Flemish Ministry of Education and Training) and innovation policy (by the Department of Economy, Science and Innovation). The government aims at making the higher education system more internationalised and inclusive, with a transparent and competitive funding system (see Chapter 2 of OECD (2019[2])).

10.1.3. The Flemish Community's higher education scorecard

Table 10.1 shows a summary of the position of the Flemish Community relative to OECD countries according to a set of 45 indicators spanning the resourcing and the education, research and engagement functions of higher education, in a scorecard format where each box relates to one of the quartiles of the OECD distribution. These indicators are drawn from the compilation of evidence in the synthesis report of the OECD Benchmarking Higher Education Systems Performance project,[1] in which the Flemish Community participated in 2017-2018.

As shown by the most recent available data, the Flemish Community's higher education system displays a good general level of performance across the indicators on the resourcing of higher education, and on the education, research and engagement missions. The Flemish Community excels in terms of access to higher education, with one of the highest entry rates among OECD higher education systems. It is also has one of the highest levels of literacy proficiency and employment among higher education graduates.

In addition, over the last decade, the Flemish higher education system made great progress in the gender balance among academic staff. In the most recent year with available data, women represented around 50% of academic staff and 45% of higher education researchers, among the highest shares in the OECD area.

Flemish higher education institutions are well funded, even though expenditure per student has decreased between 2008 and 2015. Student financial support through grants and scholarships is also among the highest in the OECD countries. The decrease in the level of funding per student is a potential problem for the Flemish Community, and this is discussed in Section 10.5.

The most recent available data show that Belgium is among the OECD countries with the highest level of scientific productivity (i.e. the production and impact of academic publications); co-operation between higher education and the business sector; and research internationalisation. Bibliometric and third party funding data for the Flemish Community suggest it performs at least at the same level in all three of these dimensions. However, the share of scientific documents accessible for free by the public (i.e. open access) in Belgium is lower than the median for OECD member countries.

10.1. Higher education system performance: the Flemish Community of Belgium

10.1.1. Introduction

This country note draws on the evidence base of the OECD Benchmarking Higher Education System Performance project to review the performance of the higher education system in the Flemish Community. Its purpose is to assist the Flemish Community in taking stock of where it stands in relation to OECD member countries on different aspects of higher education and to provide input into future national policy planning processes.

This stocktaking exercise is supported in this note in two ways. First, a scorecard of 45 indicators is presented, which highlights the Flemish Community's position within the OECD. This scorecard draws on evidence compiled during the benchmarking exercise and is organised into three domains: financial and human resources; education; and research and engagement. The first sections of this note contain a brief discussion of the higher education system's position within these three domains.

The final section of the note contains a policy scenario exercise. Topics chosen for scenarios in the benchmarking country notes are issues that appear to present important policy challenges for jurisdictions and are likely to persist for the near future. Assumption choices used for the scenarios take into account recent trends in the Flemish Community and across the OECD. Following the presentation of the scenarios, a set of policy options are examined that could be feasible responses to the challenges under discussion and consideration is given to how successful action might orient the system towards the achievement of more positive scenarios.

10.1.2. Context and structure of higher education in the Flemish Community

The Flemish Community has responsibility over education policy for the language community of Flemish speakers, which has a working-age (15-64) population of over 4 million people, the large majority of whom live and work in the Region of Flanders (data source: Flemish Ministry of Education and Training).

Flanders has a level of gross domestic product (GDP) well above the EU average, both relative to the population and to the size of the workforce. Its economy, strongly oriented towards exports (which accounted for 80% of GDP in 2017), is based on a fabric of small and medium enterprises with a strong capacity for in-house innovation (European Commission, 2019[1]). An important function of the Flemish higher education system is to support this international and innovative economy, both in terms of skills and innovation.

In total, around 300 000 students are enrolled in higher education in the Flemish Community. Higher education is offered in universities (*universiteiten*) and professional higher education institutions (*hogescholen*), which can be public or government-dependent but fall under the same regulatory framework. Independent private institutions also enrol a small percentage (less than 1%) of students. Since 2003, professional higher education institutions were required to join associations comprising at least one university, with the aim to build better connections between the two subsectors, improve efficiency of programme offerings, and develop learning pathways across education levels and institution types.

To encourage participation, the Flemish Community introduced a flexible higher education system where students can enrol in the modules they want (without necessarily enrolling in a whole programme), pay a proportionate amount of tuition fees and receive a

Chapter 10. Benchmarking Higher Education System Performance: The Flemish Community of Belgium

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Notes

[1] This figure includes expenditure outside higher education institutions, such as government loans, grants and scholarships.

[2] The salaries are expressed in US Dollars using purchasing power parities (PPPs) for GDP.

[3] In Estonia, the data related to entrants are for all entrants, whereas in most other OECD countries the data refer to new entrants only.

[4] Part-time students are those with an intended study load less than 75% of a full-time load.

[5] The odds ratio reflects the relative likelihood of an event occurring for a certain group relative to a comparison group. If the odds ratio is greater than 1, then it is more likely that the event (scoring at level 3 or above) occurs for people in the group of interest (individuals with higher education) than in the comparison group (individuals with upper secondary education).

[6] The extrapolation of the demographic trends is carried out by projecting forward the current size of the age cohorts in the Estonian population. For example, the number of 19 year-olds in 2022 is assumed to be equal to the number of 18 year-olds in 2021.

[7] The number of people with a certain age in a given year is equal to the number of people who are one year younger in the previous year.

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ICT (University of Tartu et al., 2015[35]), can work against the success of government efforts.

High non-completion rates are also the result of the tuition fee structure in Estonia, which incentivises full-time study even when part-time study would be the most suitable option for students. According to 2016 EUROSTUDENT data, Estonian students are much more likely to work while studying than students in other European countries (Hauschildt, Vögtle and Gwosć, 2018[6]). Estonia can consider ways to reduce the difference between the cost of studying full-time and part-time and remove the incentive to enrol full-time in order not to pay fees. Higher education insitutions already charge some fees to full-time students who do not make sufficient study progress. However, this can act as an additional impetus not to continue with studies for students who are already not progressing quickly.

As removing part-time fees would also further reduce the non-government income stream available to insitutions, Estonia could instead explore a means for full-time students to contribute financially towards their education, and use the income earned to incentivise their completion and provide additional financial supports. For example, Estonia could use additional income from the contributions of full-time students to increase financial student support.

Finally, increasing evidence suggests that well designed structures for guidance and academic and social support of higher education students can increase completion (Mann Levesque, 2018[36]; Salmi, 2018[37]). New support schemes with dedicated human resources could help to better orient students before entry and offer academic and social support (for example, remedial courses and counselling services) to students at risk of non-completion. In the Netherlands and the Flemish Community of Belgium, there has been increasing policy focus on improving student guidance in recent years (see Chapter 5 of (OECD, 2019[3])).

Box 9.5. HEInnovate and interdisciplinary study

HEInnovate is a framework developed by the European Commission and the OECD for higher education institutions to self-assess how they manage resources; build organisational capacity; collaborate with external stakeholders; create and nurture synergies between their core functions; embed digital technology; promote entrepreneurship; and support knowledge exchange with the wider world (European Commission and OECD, 2018[33]).

The framework puts a high emphasis on the value of interdisciplinary activity, and recognises that creating interdisciplinary learning and research environments is a core task required to create an entrepreneurial university. Linking interdisciplinary education and research to important local or societal challenges can stimulate promotion and participation in interdisciplinary education environments. According to the framework, interdisciplinary education activities should be publicly recognised and awarded, for example cross-faculty summer schools, interdisciplinary research groups, cross-campus idea competition or campus-wide student associations.

Tackling non-completion could help mitigate adverse effects of the more negative scenarios

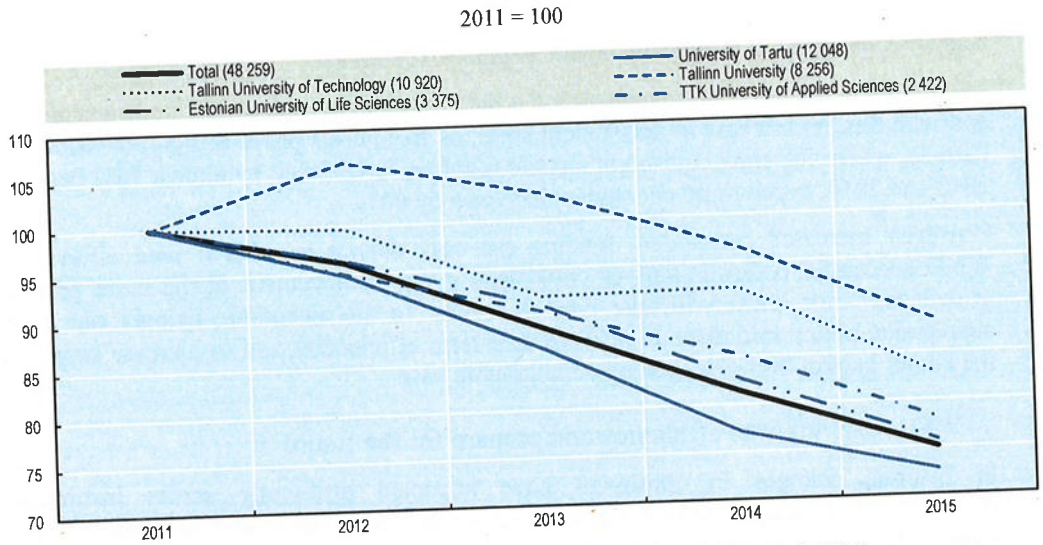
An additional avenue for increasing skilled labour market supply from the higher education sector is to tackle the problem of non-completion. Higher completion rates mean that more students achieve the maximum benefit from their higher education experience in terms of skill and knowledge acquisition. Furthermore, in the presence of a shrinking student and working population, high completion rates are important to minimise the constraints that skills shortages pose to the economy.

Among OECD countries with available data, Estonia had the lowest completion rate for the entry cohort of 2008, as just 51% of new entrants managed to complete their bachelor level programme within three years of the theoretical graduation rate. Given falling demand and labour market constraints, low completion represents a serious inefficiency in the Estonian system, and it is estimated by the OECD to cost Estonia around USD 40 million, or just under 10%, of higher expenditure annually (see Chapter 8 of (OECD, 2019[3])).

Increasing completion rates could deliver substantial benefits to the Estonian labour market and wider economy. National evidence suggests that the current level of non-completion is making it difficult to meet labour market demand in certain industries. Key reasons identified for non-completion include a lack of comprehensive information on the curricula, which can cause students to underestimate the requisite and workload associated with a programme; and the need for students to work to financially support themselves and gain experience (Kori et al., 2015[34]).

The Estonian government is already working to reduce non-completion rates through a mixture of initiatives including increasing funding for student support; the inclusion of non-completion rates among the indicators used to allocate formula funding to institutions and set national targets; and adopting measures to attract non-completers back into higher education. However, continued low levels of financial support combined with labour market demand even for non-completing students from certain fields of study, such as

Figure 9.16. Change in student enrolments at the five largest institutions (2011-2015)



Note: The numbers in brackets in the legend show the number of student enrolments in 2015.
Source: European Tertiary Education Register (ETER) (2018[32]), *ETER Database*, www.eter-project.com/.

StatLink https://doi.org/10.1787/888933942279

Redeployment of academic staff throughout the higher education system is difficult due to the specialised nature of staff. In Estonia, this difficulty could be compounded by the fact that the terms of employment for academic staff are within the remit of higher education institutions, and as a result, moving between institutions can imply a change in working conditions. Estonia has already brought forward legislation that could standardise the tenure qualification conditions of academic staff.[8] Standardising a wider range of terms and conditions for higher education staff could have the additional benefit of creating more flexibility in the workforce and also improving career prospects for younger academics, given that more than one-fifth of current academic staff in Estonia are likely to reach retirement age in the coming decade.

Estonia could also use the recent changes in the system as an opportunity to pilot new models of organising teaching and research in higher education institutions, other than the traditional "department-based" model. There is an increasing recognition of the importance of interdisciplinary research and study programmes to promote entrepreneurialism and innovation in higher education (Box 9.5). While interdisciplinary programmes already exist in Estonia, they are mainly at the master's level. Estonia could therefore explore the possibility of creating incentives in the system for introducing interdisciplinary curricula at other levels of education. This could have the joint benefit of maximising the recognised benefits of interdisciplinary activity and also work towards building a less specialised future academic workforce with interdisciplinary knowledge and competencies.

longer term to achieve and maintain substantial growth in international student numbers from outside the local region, and outside the EU.

Supply-side options to manage more negative scenarios

Many OECD countries are experiencing a decline in higher education student numbers, and with this, an increase in per-student costs, as fixed costs prove difficult to reduce. In Estonia, where full-time equivalent student numbers have fallen by almost 16% between 2010 and 2014, expenditure per student has risen by 60%.

However, increased per-student funding can only deliver benefits if used effectively. While successful policy initiatives could lead to the achievement of the more positive growth scenarios, these will take time to realise. In the meantime, Estonia can adopt supply-side policy initiatives to achieve near-term efficiencies and to increase supply to the labour market from the existing demographic base.

Estonia can improve efficiency and prepare for the future

In Estonia, changes in enrolment have impacted differently across institutions (Figure 9.16), making effective future planning at both system and institutional level more difficult. For example, some institutions may be maintaining larger buildings than necessary, or could be left with large payrolls relative to their revenues, and be unable to reduce costs effectively.

Possible remediation initiatives include institutional mergers and other forms of consolidation and redeployment of staff. Some countries in the region, such as Denmark and Finland, have used mergers to gain efficiency and quality in their higher education systems. By preserving the existing institutional units, mergers can maintain the role of institutions to cater to people living in remote locations or preferring less popular programmes of study (Williams, 2017[31]). Estonia has also made use of mergers to reduce the number of institutions in recent years, which can help existing institutions dealing with enrolment fluctuations (OECD, 2019[3]).

However, Estonia must also be mindful of possible future growth in demand and ensure that flexibility remains to expand the system to meet future needs. Other forms of consolidation within the higher education system, such as building alliances or networks between institutions in specific regions, programmes or categories of students, could also be a way to manage fluctuating demand. Estonia, with a smaller higher education system and a relatively flat governance structure, could be better placed than many other countries to pilot some innovative means of collaboration between institutions.

Estonian higher education institutions cannot admit students solely on the basis of recognition of prior learning. Furthermore, institutions themselves can also set various conditions to RPL processes. One-fifth of Estonian students leave school annually without an upper secondary qualification (Estonian Ministry of Education and Research, 2018[28]), meaning that a significant proportion of the population may not have any alternative pathway to access the higher education system without first obtaining an upper secondary qualification.

Creating a national infrastructure for the recognition of prior learning, combined with flexible study options, could help to increase demand and achieve the "older cohort growth" scenario. National indicators and statistics related to this objective could be defined and collected, which would help to monitor progress.

Achieving the "international growth" scenario

Internationalisation of the student body has progressed at a relatively fast pace in Estonia, but stepped-up efforts to attract students could help to further increase demand from abroad and realise a scenario of higher international growth.

Of particular importance for Estonia concerning internationalisation are the connections to the region, including Scandinavia and the Baltic states. Estonia is well positioned to benefit from its membership of the Council of the Baltic Sea states as well as its membership of the European Union and other regional networks. For example, Nordplus, a regional co-operation, provides opportunities for short-term student mobility at all levels of education within the Baltic/Nordic region, which could help increase future regional demand for study experiences abroad. In addition, continued participation in European Union student mobility initiatives means that Estonia can benefit from the Europe-wide drive to further increase student mobility.

Strategic programme partnerships with higher education systems in neighbouring regions can allow Estonia to tap into wider regional demand. There are some indications that Estonia is already starting to move towards harnessing these regional links. For example, regional joint degree partnerships, such as the University of Tartu joint programme with the University of Stockholm on Sociolinguistics and Multilingualism (University of Tartu, n.d.[29]), can fulfil government objectives of increasing student mobility and promoting the Estonian language and culture.

Joint campus arrangements with peer countries can also promote stability in the system and increase demand for education in Estonia. A recent example in Estonia is the establishment of a campus of the Finnish Hospitality School in Tallinn (Haaga-Helia, n.d.[30]). Developing more of these linkages would lead to a strengthened system with more potential to draw from the regional pool of potential students.

Estonia could also increase demand from international students outside of the local and European region. This would require a broader strategy and package of measures covering both the education and research functions to compete in the global marketplace, as research performance and reputation weigh heavily in the decision-making process of prospective international students. Estonia has a large and varied suite of scholarship programmes that support international inward and outward mobility of both domestic and foreign students, as well as academic staff (see Chapters 5 and 6 of (OECD, 2019[3])). These could be continued or even expanded. However, without considerably increasing capacity for higher education research and development, it may be more difficult in the

An additional policy option for Estonian higher education is to recognise and formalise students' relationship with the labour market. Since there is high demand in the labour market in some industries, scope exists to build more innovative formal arrangements between the higher education sector and enterprises to support dual learning or longer paid student work placements than currently exist. This would help in achieving a better balance between study and work obligations. New programmes of this nature could allow students to enter studies with greater financial support, while also helping to meet labour market demand and achieve Estonia's aim of increasing work-based learning. For example, the United Kingdom recently introduced a "degree apprenticeship" model of study, which leads to a qualification at bachelor's or master's level (Box 9.3).

Achieving the "older cohort growth" scenario

Estonia already has a relatively high proportion of older students; however, in contrast to other OECD countries, these students tend not to study part-time and therefore often enrol in full-time education while working and managing other personal obligations. This is as a result of the tuition fee structure in Estonia; students studying full-time in Estonian do not pay tuition fees if they can make enough study progress, while part-time students are charged fees that are at the discretion of institutions (see Chapter 3 of (OECD, 2019[3])).

More flexible study options could help attracting new entrants and support lifelong learning or further study for existing graduates. Other jurisdictions, for example the Flemish Community of Belgium, have created flexible study modalities that are specifically aimed at students who wish to combine work and study (Box 9.4). This could also help to achieve Estonia's ambitious future vision for lifelong learning of its citizens (Estonian Ministry of Education and Research, 2014[2]).

Box 9.4. Flexible study in the Flemish Community of Belgium

The Flemish Community is the only jurisdiction in the European Union that requires all higher education institutions to offer part-time studies and that all degree programmes be provided in the form of flexible learning pathways. The Flexible Learning Paths Act (2004) provides the framework to support flexible pathways, based on a definition of study programmes as an aggregate of modules, each of which is a well-defined unit of learning, teaching and assessment activities. Higher education institutions validate the completion of a module by issuing a credit certificate. Tuition fees are based on the number of credits in which students are enrolled, and there is no distinction between part-time and full-time students in terms of financial support. This, together with other policies on flexible study provision, is likely to contribute to the comparatively high share of students studying part-time in the Flemish Community.

Source: OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

Finally, Estonia could consider introducing an enhanced system for the recognition of prior learning. Of the four jurisdictions participating in the benchmarking exercise, Estonia was the only one that did not report having a policy in place for the full recognition of prior learning. Prior learning can be recognised in some cases. For example, the TULE programme funded the completion of higher education for students who had previously achieved 50% of the credits towards a qualification, implying the recognition of credits previously earned within the higher education system. However,

Achieving the "younger cohort growth" scenario

Achieving higher enrolment rates among the 19-24 year-old cohort could have the strongest potential impact on enrolment numbers (Figure 9.15). Systemic features could be addressed, which could increase future enrolment rates in the younger age cohort.

Estonian students generally do not finish upper secondary school until age 19, and increasingly are choosing not to immediately continue to higher education (OECD, 2019[31]). Apart from conscription requirements which delay entry in some cases, the tight labour market ensures that potential students can easily find jobs. Relatively low levels of financial support for living costs of full-time students, combined with higher fees for part-time students, make continued labour market participation for secondary graduates attractive. Strengthening support for living costs while studying could help to raise enrolment rates in younger cohorts, and boost their chances of completing their studies.

Estonian 15-year-olds are high performers in PISA, and impact on socio-economic factors on student performance is lower in Estonia than in most OECD countries (OECD, 2016[26]). Therefore, students from lower socio-economic backgrounds are more likely in Estonia than in many other countries to have the necessary foundational skills to progress to higher education. A strong student support package could also increase opportunities for students from disadvantaged backgrounds to enter and complete higher education.

Box 9.3. Degree apprenticeships in the United Kingdom

The degree apprenticeship model in the United Kingdom was launched in 2015, and combines a period of apprenticeship with higher education study, which leads to a qualification at bachelor's or master's level. Apprentices typically spend 20% of their time studying in the higher education institution and the remainder of their time in the workplace. Qualifications for entry can be specified by the employer, depending on the field or industry of the apprenticeship.

The apprenticeships are supported financially by the government through a designated degree apprentice fund. Apprentices do not pay tuition fees, and are paid at least the national apprentice wage by the employer. Students therefore are less likely to have debt at graduation, and will have developed labour market relevant skills along with completing a recognised higher education qualification. Analysis by the Office for Students in the United Kingdom has also found that degree apprenticeships benefit both upper secondary graduates from disadvantaged backgrounds and mature learners, potentially increasing social mobility.

An independent evaluation of the degree apprentice fund has also found that participation in the process has been transformative for many higher education providers and is allowing for stronger and wider collaborative partnerships to be built between higher education and enterprise. The degree apprenticeship has also been used as a successful means to address specific skills gaps, for example in public sector areas such as nursing, social work and policing.

Source: Warwick Economics & Development (2019[27]), *Evaluation of the Degree Apprenticeship Development Fund - Report to the Office for Students by Warwick Economics & Development*, https://www.officeforstudents.org.uk/media/7cd79cd8-536f-49e5-a55f-ebd83b344b16/dadfevaluation.pdf.

Under the assumptions of "international growth", notable increases could be made to the size of the student population in Estonia. In this scenario, even if enrolment rates of Estonian students do not change from 2016 levels, the numbers of students in Estonia could be at a level of 53 100 students by 2030. However, a strong growth in the numbers of international students, without other positive changes, will also not be sufficient to return the higher education system to previous peak enrolments.

It is clear that neither demographic change alone, nor gradual increases in enrolment rates, nor substantial increases in international students will suffice to bring higher education enrolment numbers in Estonia near to their peak at the beginning of the decade. Only a composite of the three positive scenarios occurring together could restore the size of the student population to its previous peak.

Estonia could therefore consider which of the scenarios are most likely to occur or are most achieveable in the current context, and plan accordingly.

9.5.4. Implications for policy

Managing demographic transition effectively and increasing the size of the highly skilled workforce – in part by expanding or sustaining the number of skilled graduates – is likely to be a policy priority for Estonia in the coming years.

Without successful intervention, the baseline scenario of declining enrolments and the more negative "younger cohort reduction" scenario are likely to create a continued shortage of advanced skills. There are a number of options to sustain or increase the number of higher education graduates, many of which Estonia is already pursuing. Potential policy choices include demand-side options, where policy efforts are made to increase demand for existing higher education services and achieve the more positive scenarios for enrolment outlined in the previous section.

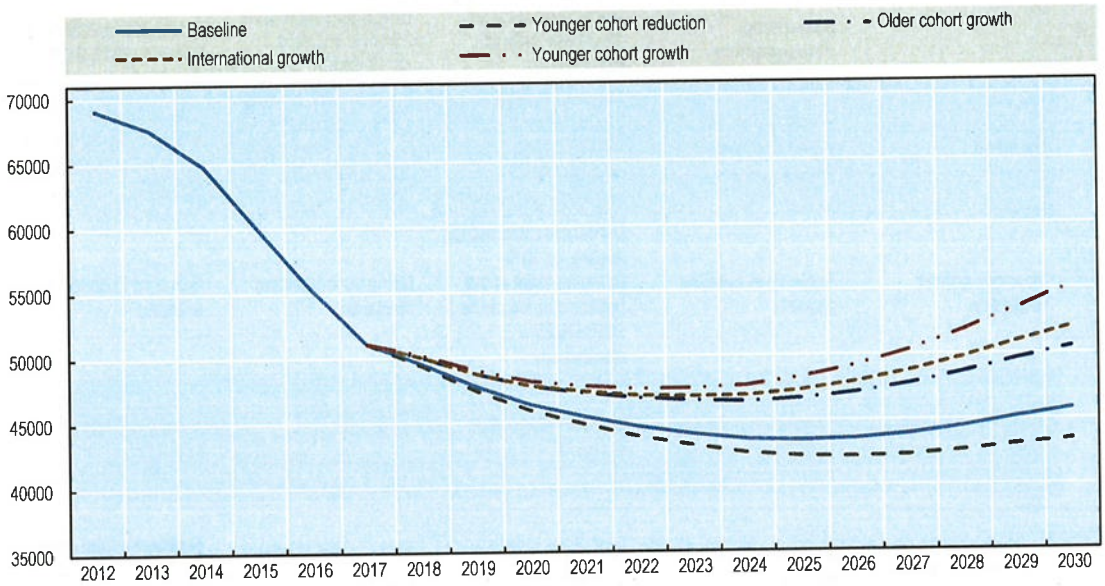
However, supply-side policy initiatives, where efforts are made to create greater efficiency and effectiveness in the current system, can also be pursued to reduce potential adverse impacts in the case of the more negative scenarios occurring, or to streamline the system to prepare for future enrolment increases.

Demand-side options to achieve more positive scenarios

Estonia has positive prospects for increasing future demand for higher education. The economy grew by 17% between 2010 and 2017 (OECD, 2018[24]). The average salary level increased by 18% in the same period (OECD, 2018[25]), and unemployment is generally low (OECD, 2017[1]). The growing economy, together with Estonia's reputation as one of the most advanced digital economies in the world, has created the potential for attracting both skilled and non-skilled workers into the country. Net migration has been positive in recent years and reached a record high in 2017, as more Estonians returned home to live, and increasing numbers of immigrants arrived from the surrounding regions (Statistics Estonia, 2019[22]).

If Estonia is also able to build on the progress and strengths of its higher education system and achieve one or more of the growth scenarios outlined in the previous section, the adverse effects of falling enrolments could be mitigated more quickly and the level of adjustment required by the system could be reduced.

Figure 9.15. Higher education enrolment in Estonia: five possible scenarios



Note: See Table 9.7 to see the assumptions underlying the calculations of the values for each scenario.

StatLink https://doi.org/10.1787/888933942260.

Under the baseline assumptions, based on a continuation of the most recent enrolment trends, Estonia can expect that enrolments will continue to fall in the short term. However, the projected trend suggests that Estonia is over the largest part of its higher education enrolment decline. In the baseline scenario, higher education enrolment should therefore contract at a slower pace in the coming years, and eventually may begin to pick up during the mid-2020s. Despite the increase in the latter part of the period, there would still be an estimated 5 000 fewer higher education students in 2030 than in 2016 (with about 46 300 students projected), making this scenario a more negative one in terms of future growth in student numbers.

In the "younger cohort reduction" scenario, which assumes a further 10% decline in enrolment rates of the young population, enrolment would fall to about 42 300 students by 2024 and only increase by about an additional 1 500 students over the following six years to 2030.

Figure 9.15 also indicates how increasing enrolment rates from different groups of students could have an impact on the overall student numbers by 2030. Enrolment rates of the younger age group (19-24) in Estonia are comparatively lower in relation to other OECD countries than those aged 25 and older. This implies that the "younger cohort growth" assumption, where enrolment rates in the 19-24 age cohorts grow towards the top quartile of OECD countries, is likely to provide greater increases in student numbers than the "older cohort growth" assumption. The "younger cohort growth" assumption implies a scenario where higher education enrolments could recover to a level of around 56 700 students by 2030, while in an "older cohort growth" scenario, the gains in enrolment might be more modest, reaching a level of 51 400 by 2030.

Table 9.7. Assumptions for the calculations of enrolment scenarios

	Underlying demographics	Enrolment rates of 19-24 age cohorts (2017-2030)	Enrolment rates of 25+ age cohorts (2017-2030)	International student growth (2018-2030)
Baseline	Based on the size of younger cohorts in previous year[7]	For each individual age group, the rate is set to its 2016 value, adjusted for international students[6]	For each individual age group, the rate is set to its 2016 value, adjusted for international students[6]	The number of international student is constant between 2016 and 2030
Younger cohort reduction	Same as in baseline scenario	Enrolment rates reduce linearly by 10% (bringing them in the bottom quartile of the 2016 OECD distribution)	Same as in baseline scenario	Same as in baseline scenario
Older cohort growth	Same as in baseline scenario	Same as in baseline scenario	Enrolment rates grow linearly by 30% (bringing them to the top quartile of the 2016 OECD distribution)	Same as in baseline scenario
International growth	Same as in baseline scenario	Same as in baseline scenario	Same as in baseline scenario	Numbers grow linearly to 2.5 times their 2016 levels by 2030
Younger cohort growth	Same as in baseline scenario	Enrolment rates grow linearly by 40% (bringing them to the top quartile of the 2016 OECD distribution)	Same as in baseline scenario	Same as in baseline scenario

The "younger cohort growth" and "older cohort growth" assumptions increase the age-specific enrolment rates in one age group, while keeping the enrolment rates in the other age group at the same levels as the baseline. The "younger cohort growth" assumption is that the enrolment rates for people aged 19-24 will increase linearly until they reach the level of the 2016 top quartile of OECD countries (which equates to an increase of approximately 40% in enrolment rates for Estonia on 2016 levels). In the case of the "older cohort growth" assumption, enrolment rates increase by 30% on their 2016 levels by 2030, which would bring Estonia into line with the 2016 top quartile of the OECD.

Under "international growth" assumptions, the population of international students would expand and meet the growth rates achieved by the most successfully internationalised (top quartile) OECD countries over the period 2004-2016. This implies that international student numbers would increase by approximately 2.5 times their 2016 levels by 2030, to a level of over 10 000 students (compared to the 2016 level of 3 500 students).

Finally, a more negative "younger cohort reduction" assumption is included, where enrolment rates in the cohort aged 19-24, already relatively low in 2016, would continue to reduce by a further 10%. This would bring enrolment rates into the bottom quartile of the 2016 OECD distribution by 2030.

Figure 9.15 illustrates how the development of student numbers in the Estonian higher education system might unfold under these five different sets of assumptions.

of foreign citizens were registered in 2016, which is 0.5% of the total population. In addition, Estonia has had one of the highest emigration rates of skilled labour in the OECD area in the past decade, although return migration has been increasing in recent years. In 2010/11, around 16% of native-born Estonians with higher education credentials lived abroad (OECD, 2015[23]; OECD, 2017[1]).

9.5.3. Scenarios for Estonia up to 2030

Scenarios can be used to consider where the recent trends observed in Estonia might lead in future years. They can be used as a basis for contemplating how policy initiatives or contextual factors could change future enrolment in higher education; and to plan for future policy actions by considering which of the hypothetical futures presented are most desirable or most likely to be realised in the Estonian context.

Table 9.7 outlines a set of assumptions which are used to create a set of simple scenarios for future demand for higher education in Estonia. Assumptions focus on the three key subgroups of prospective higher education students; the younger cohort, the older cohort and international students. Assumptions are made for the period out to 2030 and are based on:

- the age-specific enrolment rates in higher education in Estonia and in other OECD countries, beginning from age 19
- the share of international students in Estonia, and the growth in international student numbers in other OECD countries.

Using these assumptions, two "negative" scenarios and three "positive" scenarios are generated for higher education enrolment in Estonia in the period out to 2030. Contemplating each of these scenarios in turn can help policymakers to consider ways to consolidate the system to increase efficiency in the case of more negative enrolment scenarios, or develop new initiatives to achieve more positive enrolment scenarios.

The "baseline" set of assumptions presented in Table 9.7 assumes an extrapolation of the situation as it was in 2016 (the most recent year for which data are available) until 2030, given the current enrolment rates across different age groups[6]. It also assumes that the number of international students will remain constant at their 2016 level. Therefore, the projected changes to enrolment using the baseline set of assumptions are based purely on the changes in the underlying demographics.

The main alternative assumptions on the changes to enrolment rates and international student numbers are based on the most recent (2016) levels of the same indicators in other OECD countries for which data are available. The assumptions made for growth in enrolment rates could be considered reasonable targets for Estonia to attain, given the fast-growing economy and the increasing public investment in the higher education system in recent years. In addition, they are rates that have already been achieved by at least one-quarter of the other OECD countries.

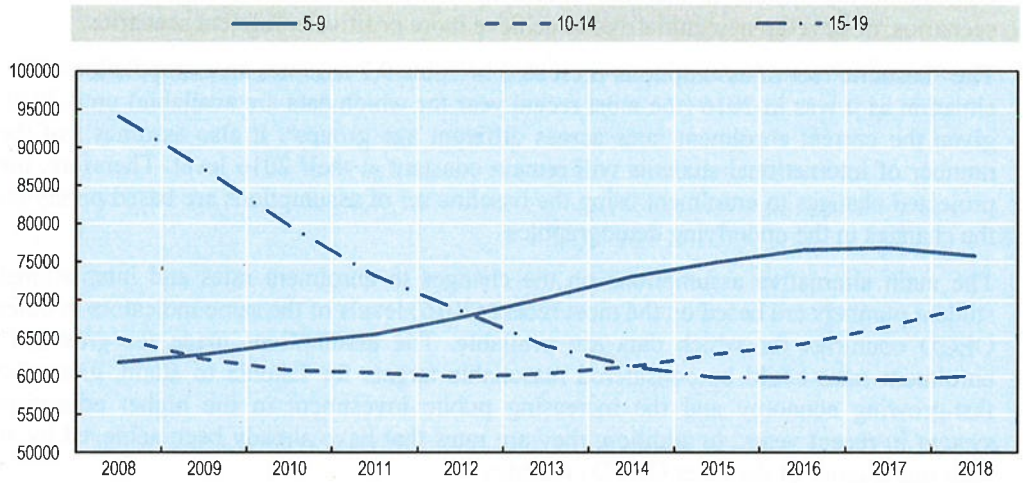
48% in 2016 (OECD, 2018[4]). As a result of these two trends, the total number of students in Estonian higher education students institutions decreased by 16% between 2005 and 2016.

However, demographic data suggests that the rate of decline could diminish in the coming years. The 10-14 year-old age cohort has begun to increase modestly, while changes to the size of the 5-9 and 15-19 year-old age cohorts have been smaller in recent years (Figure 9.14). This could allow domestic demand for higher education to stabilise in the near future, if there is no further decline in entry rates to higher education.

Estonia has managed to increase the number of international students substantially in recent years; however, these numbers are currently not large enough to offset the decline in domestic student numbers. Estonia also has a relatively high level of higher education participation among older age groups, with the proportion of students aged older than 25 already among the highest in OECD countries. In addition, enrolment rates among individuals older than 25 as a percentage of the population are above the median of OECD countries. This may limit the extent to which expanding enrolment among older students could replace falling enrolment numbers among traditionally-aged entrants.

Declining higher education enrolments and graduates are limiting the availability of skilled workforce to the labour market. Evidence suggests that the Estonian labour market is tight, i.e. in short supply of labour and skills. Unemployment is generally low, the size of the workforce is shrinking, and employers indicate skills shortages as one of the main barriers to expanding their economic activity (OECD, 2017[1]). Further declines in enrolment and graduates will worsen this problem, sharpening the constraints that skill availability already places on the growing economy.

Figure 9.14. Estonia's young population by different age groups (2008-2018)



Source: Statistics Estonia (2019[22]), *Statistical database*, http://pub.stat.ee/px-web.2001/dialog/statfile1.asp.

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While gaps in the labour market can be filled by migration, Estonia has also faced challenges in attracting and retaining skilled workers. There are a relatively small number of international immigrants compared to other OECD countries; 6 000 permanent entries

Box 9.1. Scenario development for policy analysis

Governments plan for the future of higher education in the context of a number of sources of uncertainty. Scenarios can be defined as descriptions of hypothetical futures that could occur and that, although somewhat speculative in nature, are nonetheless internally consistent and causally coherent (OECD, 2006[20]). The development of scenarios can provide support to national discussions on contextual and systemic trends, highlight possible consequences of current circumstances on higher education and the economy, and outline the main available policy directions.

In a context of increasing complexity in societies and economies, more emphasis is being placed on anticipatory exercises in the policy process (OECD, 2015[21]). Contemplating different policy scenarios can feed into the development of broad long-term strategic planning for higher education systems or pre-policy research related to particular policy topics.

Short and medium-term scenarios are likely to be more accurate and useful to the decision-making process of policymakers. The scenario exercise presented in Section 5.1 therefore focuses on the immediate decade ahead (i.e. up to 2030), and is developed using the following steps:

- statement of a subject area or issue of national policy concern and the rationale for the concern
- outline of the assumptions used to develop the set of future scenarios
- explanation of the likely impact of the assumptions on future trends
- discussion of implications for policy.

9.5.1. Continued demographic changes may pose difficult challenges for Estonia's higher education system

Box 9.2. Summary of policy concern

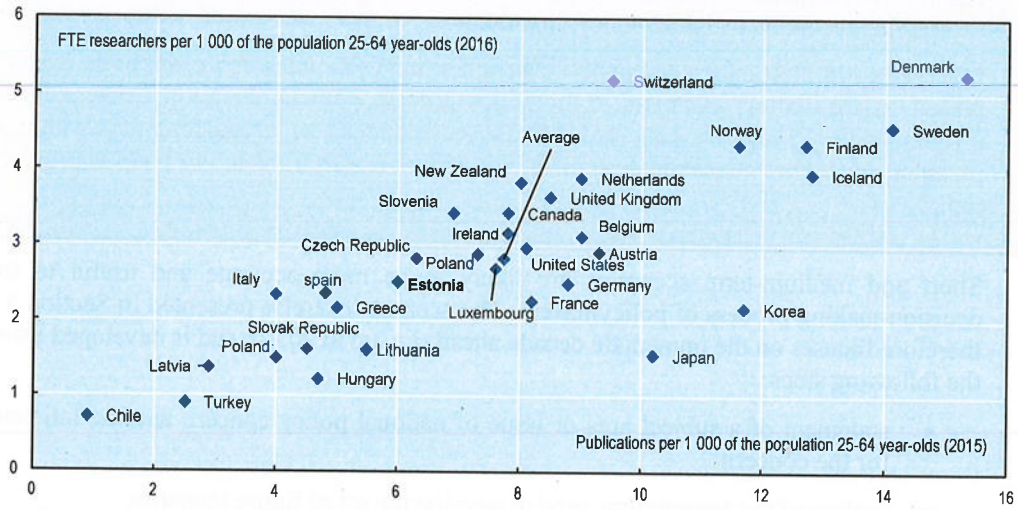
Estonia is undergoing a period of demographic transition, which is affecting its higher education system and the labour market. The number of young people has been decreasing for more than a decade. This has resulted in falling higher education enrolments and a shrinking workforce. International student numbers are growing, but are insufficient to replace domestic enrolment demand. However, the number of students may start to grow again in the coming years. This poses the question of how Estonia can effectively plan for sustained growth and improvement in the higher education system in a context of uncertainty about future demand.

9.5.2. Key related evidence

Estonia's population is among the smallest of OECD countries. It has approximately 1.3 million inhabitants (Statistics Estonia, 2019[22]), and the population has been declining and ageing in recent years. The share of young people entering higher education has also reduced; entry rates of young Estonians under 25 have decreased from 53% in 2013 to

Open Science Cloud, which has a goal of ensuring that all scientific publications are FAIR (Free, Accessible, Interoperable and Reusable) (European Commission, 2018[19]). In addition, regulations on institutional and personal research funding require all publications arising from a supported research project or research grant to be registered on the public Estonian research portal, the Current Research Information Systems (CRIS).

Figure 9.13. Researchers and scientific publications per 1 000 people aged 25-64 (2015 and 2016)



Source: Adapted from OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942222

9.5. Scenarios for policy

This section of the note extends the comparisons drawn in the previous sections by looking forward, and presenting a set of scenarios relevant to the future of Estonia's higher education system. The purpose of these scenarios is to provide evidence-based conjectures about future trends in areas of national policy importance, which can stimulate debate and support policy-planning exercises (Box 9.1).

including the Mobilitas programme, which funds doctoral and post-doctoral positions for international researchers.

Bibliometric indicators can be used to provide some indications of the level of mobility of researchers and collaboration on research across national borders. These measures suggest that while flows of researchers in and out of Estonia in any one year are small as a proportion of overall researchers, net flows of scientific authors as a proportion of the overall research community over the period 2002-2016 were positive, and were in the top quartile of OECD countries. In that period, Estonia experienced a net gain of 4 researchers for every 100 full-time researchers in the population (Figure 9.12).

Estonia's contribution to research documents based on international scientific collaboration is close to the OECD median, with 29% of research documents published as the result of international joint work.

Volume of outputs are lower, but the impact of research appears higher according to bibliometric indicators

Estonia produces fewer publications overall per 1 000 people aged 25-64, with 2.5 publications in 2016, below the OECD median level and less than one-half that of the most productive countries (Figure 9.12). But Estonia performs better on the impact of the publications, as measured by citations of scientific documents produced by researchers. In 2017, over one-tenth of all Estonian publications were among the 10% most cited publications, placing Estonia at the OECD median level on this indicator.

The impact of research is often measured by considering how successfully knowledge is transformed into useful products or services. Patent application statistics are one way of measuring this. The Estonian higher education R&D sector is responsible for a relatively high proportion of overall patents. This is unsurprising, as higher education accounts for a larger than average share of the overall R&D sector, and Estonia appears to have forged some strong links with the enterprise sector. However, the overall volume of patents from the higher education sector per 100 researchers remains relatively low, below the median of OECD countries for which data is available.

While the the number of researchers and publications per 1 000 of the population are lower than median levels (Figure 9.13), the estimated annual number of publications per researcher is slightly above the OECD median level. Estonian researchers produce an estimated 0.5 scientific publications annually, compared to the OECD median of just under 0.4 (see Chapter 8 of (OECD, 2019[3])).

Access to knowledge in Estonia is less open than in many other OECD countries

Making research results widely available through open access mechanisms can support research efficiency and quality by reducing duplication, and by increasing the ability to replicate results and generate knowledge spillovers (OECD, 2019[3]). Estonia is in the bottom quartile of OECD countries in making knowledge publicly available. In total, 23% of publications were available in some form of open access in 2016, a proportion which is among the lowest in OECD countries.

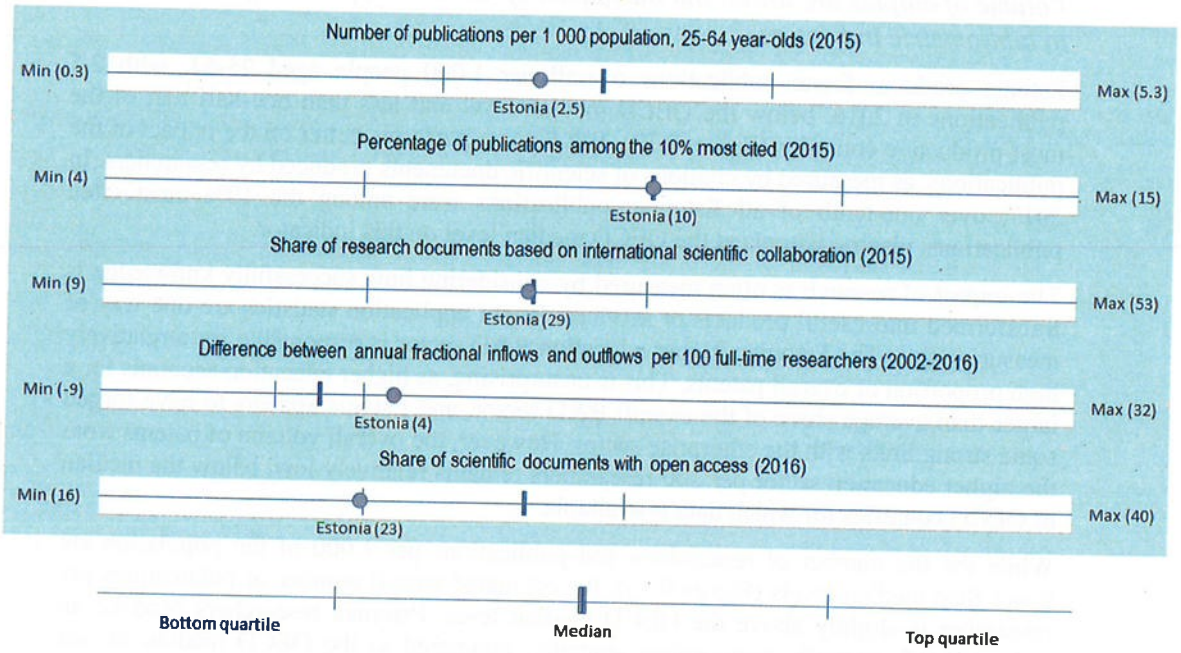
Open access may become more common in the future in Estonia, as a new Open Science strategy has been developed to cover the period 2016-2020, based on the outcomes of the deliberations of a specially established expert group on open science in 2015 (Open Science Expert Group of the Estonian Research Council, 2016[18]). Estonia is also aligning national open science infrastructures to the European Commission's European

Estonia is building on this record by introducing new initiatives to further strengthen collaboration with business. For example, the recently-formed ADAPTER network of universities and research institutes creates a framework for co-ordinating education and other contract services to business enterprise, while the NUTIKAS initiative provides targeted funding for public research institutes to support applied research and develop commercial products in conjunction with business enterprises.

9.4.2. Internationalisation and knowledge production

Figure 9.12 shows the position of Estonia within the OECD distribution on the scorecard of indicators related to internationalisation of research and development activities and knowledge production.

Figure 9.12. Where does Estonia stand in the OECD distribution? Internationalisation and knowledge production



Note: The indicators represented in this chart are a subset of the indicators presented in Table 9.1. The coloured circle represents Estonia's position in the OECD distribution. The circle is not coloured when data are available for less than half of the OECD countries (the minimum number of countries with available data is 14). For more information on methodological issues and metadata, see OECD (2019[3]). Follow the *Statlink* to download the data underlying the calculation of the scorecard.

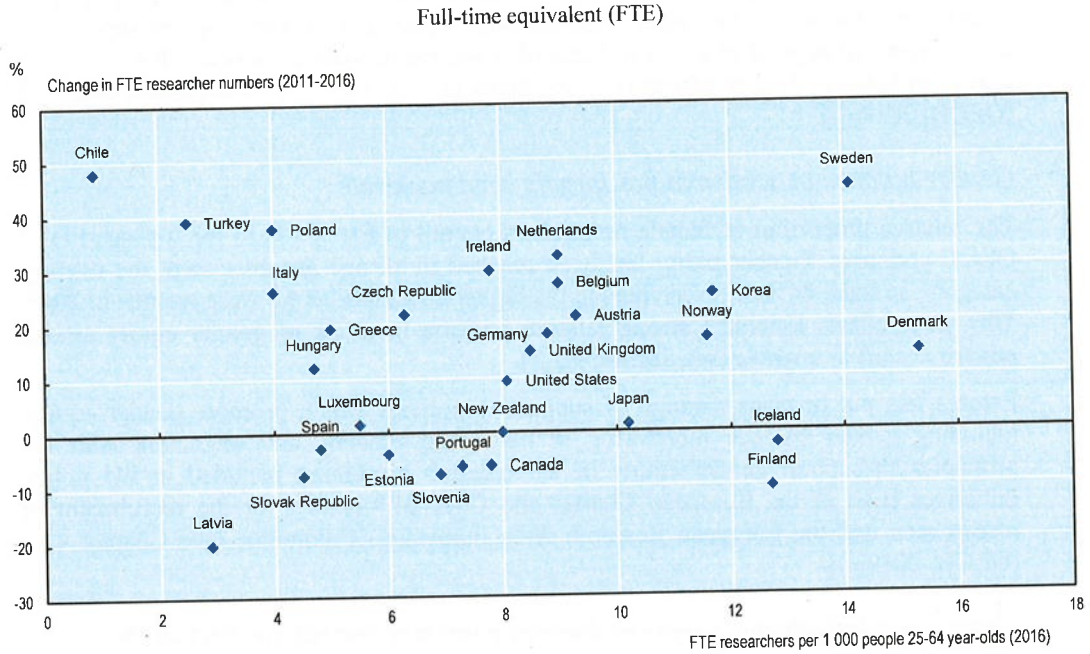
Source: Adapted from OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942203

International collaboration could be further improved

As a small economy, Estonia recognises that international collaboration is essential for achieving their R&D goals. Numerous policy initiatives have been put in place to promote greater internationalisation of higher education research and development,

Figure 9.11. Researcher concentration and recent growth in OECD countries (2011-2016)



Source: Adapted from OECD (2018[16]), *OECD Science, Technology and R&D Statistics*, https://doi.org/10.1787/strd-data-en.

StatLink https://doi.org/10.1787/888933942184

Estonia appears to have built solid links between higher education R&D and the business sector

Estonian higher education appears to have created stronger links with the business sector compared to some other OECD countries. The proportion of higher education expenditure on research and development (HERD) funded by business in 2016 was slightly above the median level of OECD countries. It should be noted, however, that funding for HERD from business is generally low across the OECD, with the median OECD country receiving just 5% of higher education research and development funding from business in 2016.

Enterprises also are more likely to co-operate with the higher education sector on research and development (R&D) in Estonia. This may reflect the fact that the higher education sector performs a comparatively greater portion of R&D compared to other OECD countries, making it a more prominent potential partner for collaborative efforts with businesses. In the 2014 Community Innovation Survey, Estonia ranked in the top quartile of OECD countries in the level of reported collaboration between higher education and small and medium enterprises on innovation.

Co-operation between business and higher education is particularly visible in the information and communications technology (ICT) sector. For example, the IT Academy is a joint initiative of the government, businesses and higher education institutions to support students, learning and research in the ICT sector and related areas of study.

investment strategies in OECD countries are targeting increases in spending on applied research and experimental development, to orient research more towards tackling specific challenges. This is also the case in Estonia, where specific policy instruments support the development of applied research in areas of smart specialisation, business R&D and co-operation between higher education institutions and business (see Chapters 6 and 7 of (OECD, 2019[3])).

Gender balance in academia has largely been achieved

The relative proportion of female researchers overall in Estonia is in the top quartile of OECD countries. Gender parity has been reached in all age groups except the over-60 category; in total, 44% of researchers in the higher education sector were women in 2016. This also reflects Estonia's strong relative position in terms of gender equity among academic staff as a whole (see Section 9.2.2).

Estonia has put in place a range of supportive policies which promote gender equity, including gender balance monitoring in the hiring process, and alignment with the principles to support gender equity in the research profession included in EU policy initiatives such as the European Charter and Code of Conduct for the recruitment of researchers, and the European Research Area Innovation Committee (see Chapter 4 of (OECD, 2019[3])).

There is a relatively low supply of doctorate holders and researchers in the population

The proportion of doctorate holders in the population is below the OECD median in Estonia, at 0.6% of the population, compared to the OECD median proportion of 1%. At the same time, the numbers of doctoral graduates from Estonian higher education institutions appear to be growing slowly; there were 190 new doctoral graduates in 2012, while by 2016 the number had increased to 239 (OECD, 2018[4]).

A similar picture can be seen with regard to the proportion of researchers in the population in Estonia. Overall concentrations of researchers in the labour force are also at the lower end of OECD countries, below median levels, and they have been static over the period 2011-2016. As Figure 9.11 shows, other countries with lower proportions of researchers in the population have been able to surpass Estonia in terms of growth in recent years.

According to the OECD Careers of Doctorate Holders survey, around 10% of the population with a doctoral qualification living in Estonia were foreign citizens in 2016, the same proportion as the OECD median level. Estonia has potential to increase both the numbers of native and foreign doctorate holders further in the future. The numbers of foreign doctoral candidates choosing Estonia for their studies has grown by more than 50% between 2013 and 2016 (from 218 in 2013 to 339 in 2016). At the same time, the numbers of Estonian doctoral candidates choosing to study in other OECD countries has increased at a much slower rate, from 264 candidates in 2013 to 289 in 2016 (OECD, 2018[17]).

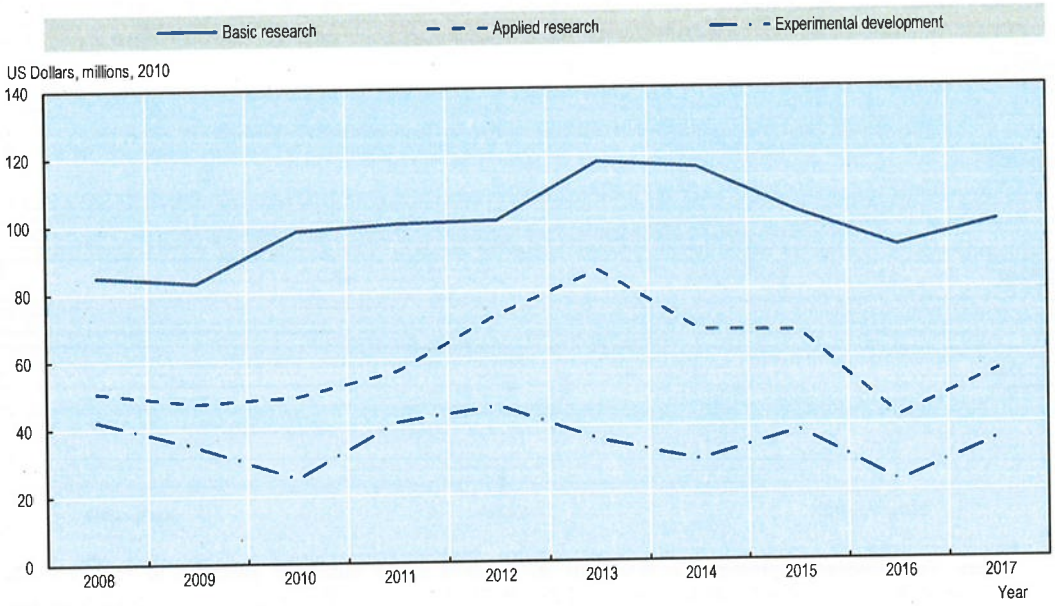
Estonia has strengthened R&D capacity in recent years

Estonia has prioritised the development of national capabilities in research and development in recent years. While previous national research strategies have focused on increasing investment and building capacity, the most recent strategy covering the period of 2014-2020 is geared towards harnessing the value created by the R&D sector in Estonia for the good of the economy and society (Estonian Ministry of Education and Research, 2014[15]).

The higher education sector plays a larger role in national R&D activity in Estonia than in many other OECD countries. The proportion of researchers working in the higher education sector was in the top quartile of OECD countries in 2016, comprising 56% of all researchers in Estonia, close to the maximum proportion of 63%.

There is marginally greater emphasis on basic research (research aimed at creating new general knowledge without a specific purpose in mind) in Estonia than in many other OECD countries, with 59% of higher education research classified as basic research in 2015, slightly above the median OECD level of 54%. However, as much of the funding in higher education research and development in Estonia is project-based, the apportionment of investment between different types of research is volatile over time (Figure 9.10).

Figure 9.10. Gross domestic expenditure on higher education R&D, by type of activity in Estonia (2008-2017)

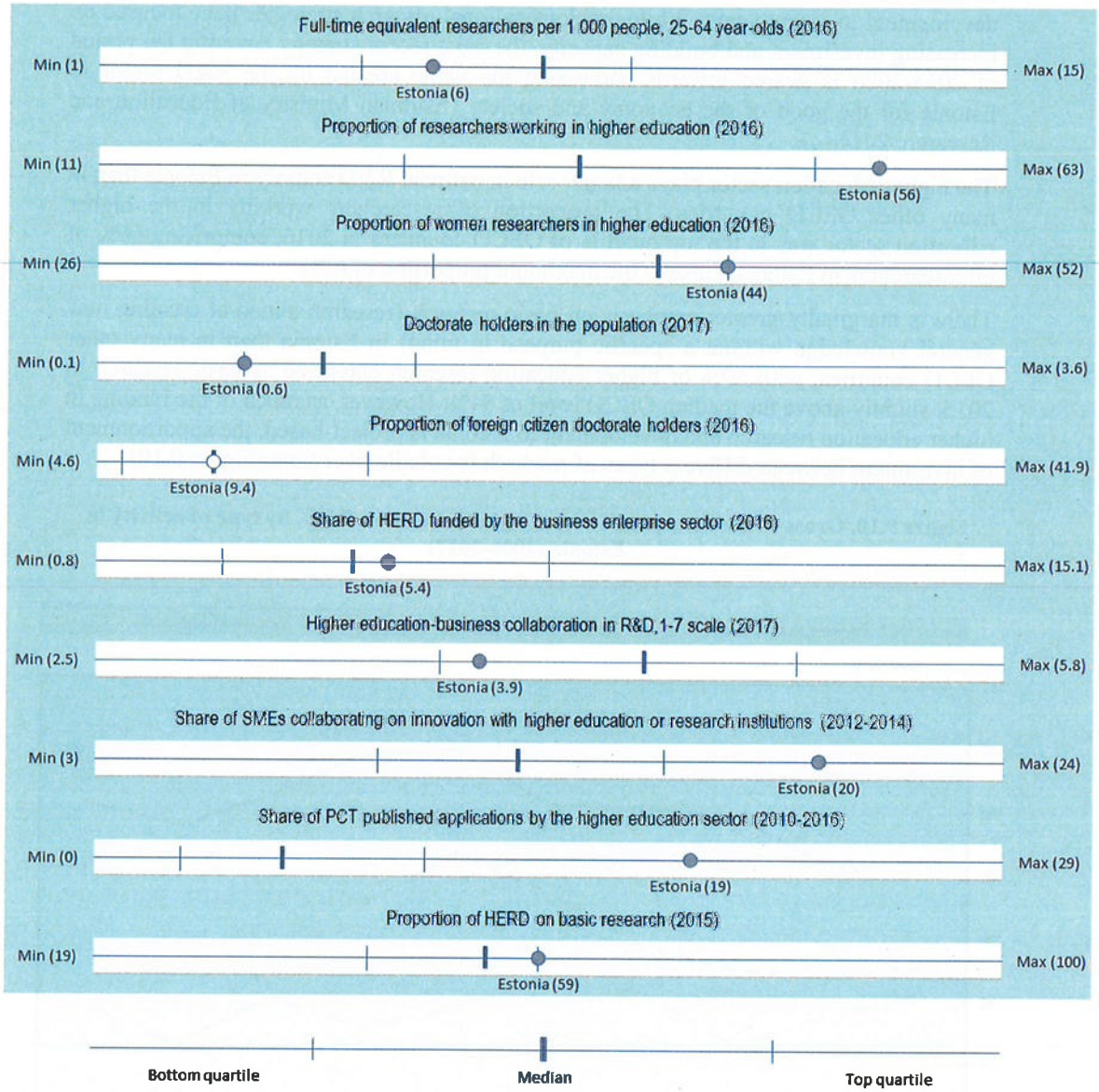


Source: Adapted from OECD (2018[16]), *OECD Science, Technology and R&D Statistics*, https://doi.org/10.1787/strd-data-en.

StatLink https://doi.org/10.1787/888933942165

Basic research is crucial to expanding and improving the body of knowledge available for the benefit of society, and the higher education sector is where the majority of basic research is carried out across the OECD. At the same time, many public research

Figure 9.9. Where does Estonia stand in the OECD distribution? Research inputs and activities



Note: The indicators represented in this chart are a subset of the indicators presented in Table 9.1. The coloured circle represents Estonia's position in the OECD distribution. The circle is not coloured when data are available for less than half of the OECD countries (the minimum number of countries with available data is 14). For more information on methodological issues and metadata, see OECD (2019[3]). Follow the *Statlink* to download the data underlying the calculation of the scorecard.

Source: Adapted from OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942146

Source: Adapted from information provided by the Estonian Ministry of Education and Research.

Estonia aims to have some form of work-based learning included in all higher education programmes (European Commission/EACEA/Eurydice, 2016[14]). In particular, the more professionally-oriented programmes are required to include a traineeship, a period of work-based learning which typically takes place following the completion of academic work on a programme and makes up a minimum of 15% of the study load. Since 2016, PRÕM, a programme co-funded by the European Union, aims to favour co-operation between institutions and enterprises for the development of work-based learning in higher and vocational education, through creating programmes where most study is completed in the workplace rather than in lectures.

9.4. Research and engagement

Highlights

- The higher education research and development sector plays a leading role in the research and innovation system in Estonia, with 56% of all researchers in the country working in higher education in 2016.
- Gender parity among researchers has been reached in all but the oldest age groups. Overall, in 2016, women researchers made up almost 45% of the total cohort of researchers in the population.
- Survey data suggests that Estonia achieves relatively high levels of collaboration between business and the higher education sector compared to many other OECD countries. This higher level of collaboration also extends to small and medium enterprises in Estonia, which report one of the highest levels in the OECD of collaboration on innovation with the higher education sector.
- In 2016, in Estonia international scientific collaboration, as measured by joint authorship of scientific publications, was close to the OECD median. In the same year, net flows of scientific authors were positive for Estonia, suggesting a net brain gain of researchers.
- Estonia produces a lower volume of publications overall per 1 000 people aged 25-64, with 2.5 publications in 2017, below the OECD median. In 2017, over one-tenth of all Estonian publications were among the 10% most cited publications, the same level as the OECD median.
- Estonia is in the bottom quartile of OECD countries in the amount of scientific knowledge that is made publicly available. In total, 23% of publications from Estonian research activities were available in some form of open access in 2016, a proportion which is among the lowest in OECD countries.

9.4.1. Inputs and activities

Figure 9.9 provides a detailed overview of the benchmarking scorecard indicators associated with research inputs and activities.

(2016[10]) estimate that information on labour market outcomes cannot be obtained for over 10% of Estonian graduates, who are most likely living abroad.

Second, Estonia has a relatively high level of labour market inactivity, due to a variety of reasons. The share of young people with dependent children is relatively high in Estonia, with 40% of women and over 20% of men in the 18-29 year-old cohort having at least one child (Table 9.4). Family care is a common reason for labour market inactivity. Furthermore, young men usually spend a year serving the national conscript obligation, and a common period to undertake this duty is immediately after graduation. Therefore, it is not surprising that that many Estonian graduates are inactive, even though few are involuntarily unemployed. The share of Estonian graduates younger than 30 who are inactive and not in education (10%) is the fifth-highest in the OECD area, whereas the share of unemployed, not-in-education graduates (2%) is the sixth-lowest.

Apart from these factors, other indicators point to a more positive picture of graduate labour market outcomes in Estonia, also in comparison to other OECD countries. Less than 5% of Estonian higher education graduates reported working in jobs with routine tasks in the Survey of Adult Skills, one of the lowest shares in the OECD area.

The Estonian government is seeking to improve the labour market outcomes of graduates

The government set a target of 88% for the employment rate of higher education graduates by 2020, and also has put in place a number of policy initiatives to enhance the labour market relevance of higher education (Table 9.6). For example, the information needed to monitor and improve the employment situation and working conditions of graduates is being gathered through a national graduate survey. In addition, evidence to support planning for future provision is generated through OSKA, a forecasting tool used to anticipate labour market and skills needs based on quantitative and qualitative evidence (European Commission, 2017[11]).

The government has introduced a number of measures to ensure employment for higher education graduates. The share of graduates employed or in education is included in the formula funding, providing a financial incentive to higher education institutions to ensure that higher education programmes confer the necessary skills for further study or work.

The graduate employment rate is also one of the criteria involved in the quality assessment of study programme groups in Estonia (EKKA, 2011[12]). In addition, higher education institutions are required to take the needs of the labour market into account when designing new study programmes under a government regulation on the Standard of Higher Education (Estonia, 2009[13]).

Table 9.6. Initiatives to improve labour market relevance in Estonia (2017)

Information gathering	National Graduate Survey
	OSKA programme to develop labour market forecasts
	Utilisation of administrative records
Incentives to institutions	Share of graduates in education or employment included in institutional formula funding
	Graduate employment rate included in the criteria for study group assessment
	Obligation for institutions to take into account labour market information when designing new programmes
Work-based learning	A requirement for all higher education programmes, and particularly for less academically oriented programmes
	PRÕM programme to develop the necessary co-operation between education institutions and employers

Higher education graduates in Estonia have high levels of literacy and numeracy proficiency

Internationally comparable measures of higher education learning outcomes are not currently available. However, the OECD Survey of Adult Skills can provide some insight into the cognitive and workplace skills of young graduates. These data allow for the performance assessment of higher education graduates in basic skills such as literacy and numeracy.

In Estonia, around three-quarters of 16-34 year-old higher education graduates reached level 3 of the proficiency scale of the Survey of Adult Skills (PIAAC), in both literacy and numeracy, slightly above the OECD median level. A proficiency level of 3 implies an ability to understand and respond appropriately to dense or lengthy texts, and complete tasks that require an understanding of mathematical information that may be embedded in unfamiliar contexts.

When compared to upper secondary graduates, and controlling for basic demographic and social characteristics, young Estonian higher education graduates were substantially more likely to reach level 3 on both the literacy and numeracy scales than individuals with only upper secondary education. The odds ratio[5] of reaching proficiency level 3 for 16-34 year-old higher education graduates, compared to individuals with only upper secondary education, is over 2 for both numeracy and literacy proficiency, slightly below the OECD median.

Higher education also yields social and personal benefits

Higher education graduates younger than 35 were more likely than individuals with only upper secondary education to report more positive social outcomes in Estonia, according to their reports in the background questionnaire of the OECD Survey on Adult Skills. These indicators show that substantial non-monetary benefits are associated with higher education, even though these benefits might be less pronounced in Estonia than in other countries in some cases.

For example, the odds ratio of reporting trust in other people was about twice as large for higher education graduates, as compared to upper secondary graduates (close to the OECD median level). Higher education graduates were also more likely than upper secondary graduates to report being in good health (1.6 higher odds, compared to upper secondary graduates), though the difference between these groups is smaller than in most other OECD countries.

The economic benefits of higher education for graduates are mixed when compared to other countries

About 90% of Estonian higher education graduates under 30 are employed or in education. Among 25-34 year-old graduates of higher education, the employment rate was nearly the same as that for graduates of upper secondary education (or post-secondary, non-tertiary education) in 2017. Higher education graduates with a bachelor level qualification do, however, achieve a 20% earnings premium on average.

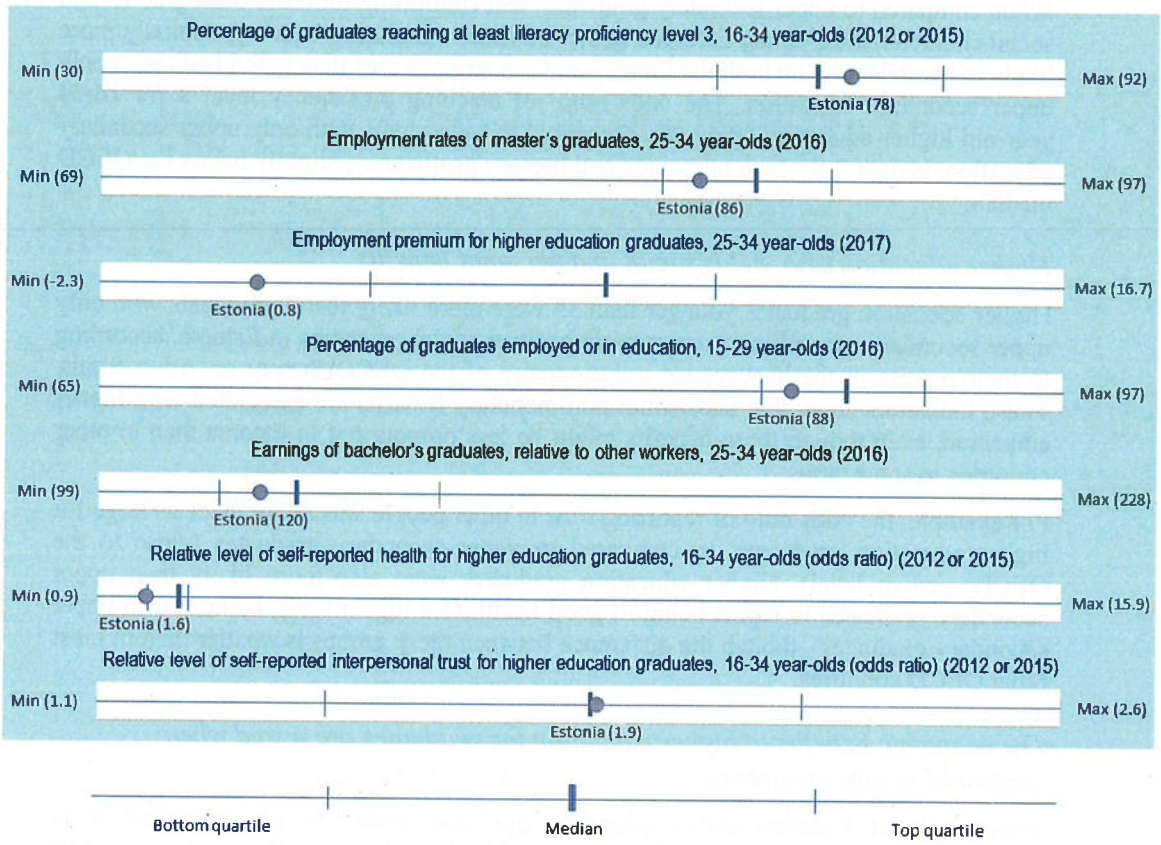
The limited labour market advantages of Estonian higher education graduates can be attributed, in part, to two disparate factors. First, Estonia has experienced a large emogration of young higher education graduates relative to other OECD countries, whose earnings are not captured in national labour market indicators. Jaggo, Reinhold and Valk

International students enrolled in occupationally specific programmes offered at professional HEIs are more likely to find employment in Estonia after graduation than those enrolled in universities (Estonian National Audit Office, 2015[8]; Estonian Ministry for Education and Research and Archimedes, 2015[9]). However, the proportion of international students is much lower in professional higher education institutions (1%) than in universities (8%), and as professional HEIs do not offer programmes in English, students studying there must already speak Estonian, which also makes subsequent labour market integration an easier process.

9.3.2. Graduate outcomes

Figure 9.8 shows the position of Estonia within the OECD distribution on the set of scorecard indicators associated with the outcomes of graduates.

Figure 9.8. Where does Estonia stand in the OECD distribution? Graduate outcomes



Note: The indicators represented in this chart are a subset of the indicators presented in Table 9.1. The coloured circle represents Estonia's position in the OECD distribution. The circle is not coloured when data are available for less than half of the OECD countries (the minimum number of countries with available data is 14). For more information on methodological issues and metadata, see OECD (2019[3]). Follow the *Statlink* to download the data underlying the calculation of the scorecard.

Source: Adapted from OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942127

old have the option to undertake study activity and assessments even while on academic leave (a period during which a student can suspend studies while remaining enrolled).

Table 9.4. Share of 18-29 year-old new entrants to higher education with dependent children, by gender (2015)

The share of individuals with children in the overall 18-29 year-old population is indicated in brackets

	Estonia	Finland	Lithuania	Norway	United States	Median
Women	5.9 (39.8)	5.8 (18.9)	1.9 (29.7)	4.1 (16.3)	11.5 (36.8)	4.4 (18.9)
Men	2.6 (23.1)	2.5 (11)	0.8 (18.3)	0.7 (5.9)	6.1 (23.9)	2.5 (11)

Note: Data refer to first-year students for Estonia and Lithuania. The medians are calculated across 11 countries, including Canada and Germany, whose data refer to first-time graduates. See Chapter 5 of (OECD, 2019[3]) for other metadata.
Source: Indicators of Education Systems (INES) Survey on Equity in Tertiary Education.

The proportion of international students in Estonia is close to the OECD median

International students in Estonia – those who have entered the country for the purpose of study – are not numerous, though their numbers have been increasing in recent years. One master's student in ten is an international student (below the OECD median), while at the bachelor's level, 5% of students are international, a similar level to the OECD median. However, Estonia has experienced an increase in the proportion of international students, which has almost doubled between 2014 and 2016. This is one of the highest rates of increase in the OECD member countries. Estonia is now close to a 1:1 ratio between the number of incoming foreign students and the number of national students who pursue their studies abroad, as compared to an OECD median of around 2:1. Much of the international mobility to Estonia is of a regional nature, with half of international students coming from neighbouring countries, in particular Finland (where 40% of all international students originate).

Table 9.5. Selected indicators on international students (2016)

	Number of international students per national student abroad	Percentage of international or foreign students coming from neighbouring countries	National students enrolled in other OECD and partner countries in 2016, 2013=100	Incoming mobile students in 2016, 2013=100
Estonia	0.9	50	95	185
(OECD quartile)	(2)	(3)	(1)	(4)
OECD median	1.9	28	110	124
Finland	2.3	16	125	106
Latvia	1.2	18	86	184
Lithuania	.	.	89	140

Source: Adapted from OECD (2018[7]), *Education at a Glance 2018: OECD Indicators*, https://doi.org/10.1787/eag-2018-en.

Estonia will benefit most from international students if they can be retained after graduation to meet labour market needs. However, international students have a comparatively low rate of entry to the Estonian labour market. Only 20% of bachelor's and master's international students stay in Estonia after graduation compared to, for example, around 60% of bachelor's and 40% of master's international students in Norway.

larger share of students studying part-time, possibly because older students have less time to devote to study, due to work and family obligations.

Over half of Estonian students work during the lecture period (Hauschildt, Vögtle and Gwosć, 2018[6]). On average, they spend 50 hours a week working or studying, 20 hours of which are spent working paid jobs unrelated to studies, the highest amount among countries participating in the EUROSTUDENT survey (Hauschildt, Vögtle and Gwosć, 2018[6]).

The relatively small proportions of part-time students, together with the low completion rate, could be a function of the fee structure for higher education. Higher education is free only for full-time programmes taught in Estonian. This provides incentives for adults entering higher education to choose the full-time enrolment option, even when studying part-time might better suit their personal situation. And, because higher education institutions can ask for reimbursement of tuition fees of full-time students failing to progress at the right pace, they have weak incentives to propose part-time study. Limited support for flexible and part-time study appears to therefore limit higher education participation and, especially, study completion.

Figure 9.7. Proportion of students older than 25 and of part-time students, bachelor's programmes (2016)

Note: See Chapter 5 of (OECD, 2019[3]) for methodological information on the indicators represented in this chart.
Source: Adapted from OECD (2018[4]), *OECD Education Statistics*, https://doi.org/10.1787/edu-data-en.

StatLink https://doi.org/10.1787/888933942108

Estonia has a relatively high proportion of entrants to higher education with children, especially among women (Table 9.4). For students with children under 7 years-old, there are no tuition fees, regardless of study progress, making it easier for them to balance family and study commitments. In addition, students with children younger than 3 years-

Over 40% of Estonian 25-34 year-olds have a higher education degree

Higher education attainment among Estonia's 25-34 year-old age cohort was just below the OECD median in 2017. This could be partly related to the country's focus on higher-level programmes (bachelor's, master's and doctoral), and the absence of short-cycle programmes, which were reclassified as vocational education in Estonia in 2009. For example, higher education attainment in Estonia is just above that of Finland, another country where short-cycle higher education programmes are not available.

For expected entry rates to bachelor's programmes, Estonia lies above the median of the OECD distribution, with 60% of young people expected to enter a bachelor's programme at least once in their lifetime based on current age-specific entry patterns. Students in Estonia are also more likely to be studying for higher qualifications; over one-third of higher education students in Estonia are enrolled at the master's or doctoral level, a proportion close to the top quartile of the OECD distribution.

Access to higher education varies by social background, though less than in other OECD countries

In Estonia, as in other OECD countries, higher education enrolment rates vary according to family background. Young adults (aged 18-24) whose parents did not complete higher education are about half as likely as those whose parents did attain a higher education qualification to enter a bachelor's or long first degree (integrated bachelor's/master's long-cycle study) programme. The gap in access by parental education is narrower in Estonia than in many other OECD countries. Estonia ranks 6th among the 16 countries with available data on this indicator (i.e. Estonia has the 6th narrowest gap in entry rates).

Women completed their bachelor's studies in larger proportions than men in all countries with available data, but the gender gap in completion observed in Estonia is the largest among the 16 OECD countries apart from Finland. Some 42% of women who started their studies in 2008 completed on time (in 2011), compared to 22% of males.

Fewer higher education students complete their study programmes than in many other OECD countries

Only about half of entrants to higher education who started their bachelor's studies in Estonia in 2008 had graduated by 2014, three years after their expected graduation time. This is the lowest rate among the 16 OECD higher education systems with available data.

Women completed their bachelor's studies in larger proportions than men in all countries with available data, but the gender gap in completion observed in Estonia is the largest among the 16 OECD countries apart from Finland. Some 42% of women who started their studies in 2008 completed on time (in 2011), compared to 22% of males.

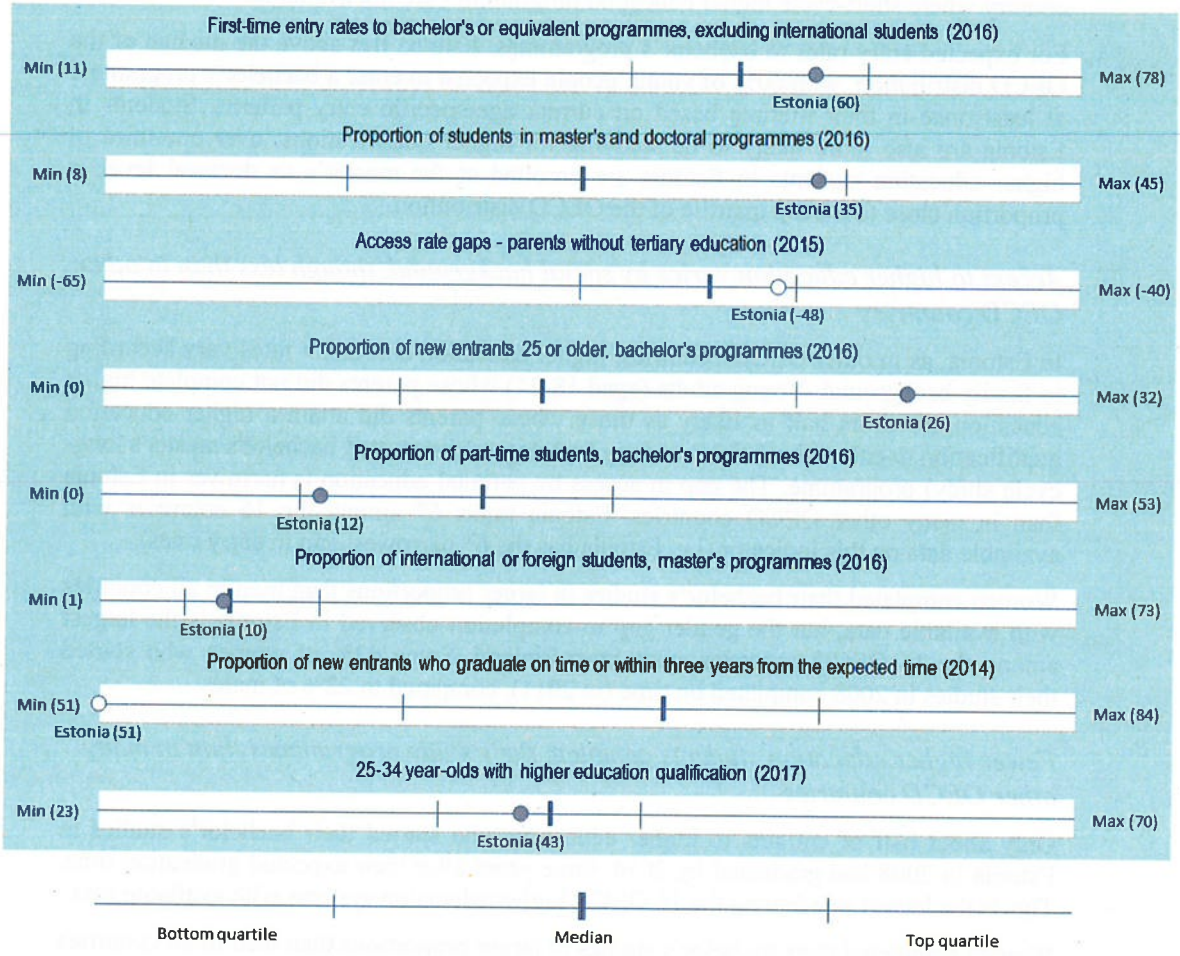
Few students study part-time, even though many start their studies when they are 25 or older

Estonia is atypical among OECD countries for having a high rate of adults who are 25 or older among entrants, and a relatively low proportion of part-time students. Denmark is in the same situation, with over one-quarter of new entrants to bachelor's programmes aged 25 or older, and only around 10% of bachelor's students enrolled part-time.[4] Among OECD countries in general, an older student population tends to be associated with a

9.3.1. *Access, student profile, completion*

Figure 9.6 shows a detailed overview of the benchmarking scorecard indicators related to higher education access, profile of students and their success in completing their studies.

Figure 9.6. Where does Estonia stand in the OECD distribution? Access, student profile, completion



Note: In Estonia, all entrants are included in the indicator on "first time entry rates to bachelor's or equivalent programmes". The indicators represented in this chart are a subset of the indicators presented in Table 9.1. The coloured circle represents Estonia's position in the OECD distribution. The circle is not coloured when data are available for less than half of the OECD countries (the minimum number of countries with available data is 14). For more information on methodological issues and metadata, see OECD (2019[3]). Follow the *Statlink* to download the data underlying the calculation of the scorecard.

Source: Adapted from OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942089

ratios are often used as an imperfect proxy for learning quality, based on the assumption that fewer students per staff member allows for a greater level of student-teacher interaction.

In Estonia, there were 0.072 academic staff members per student in 2016, or approximately one academic staff member for every 14 students. This is a larger ratio than the OECD median (1:15) and also larger than the ratio in neighbouring Finland, Latvia and Lithuania. However, it should be noted that staff-student contact time also depends on the breakdown of academic staff time between teaching, research or other tasks (see Chapter 3 of (OECD, 2019[3])).

9.3. Education

Highlights

- Estonia has an overall high level of access and attainment in higher education. This is noteworthy, since it does not offer short-cycle higher education programmes, which contribute to the high levels of attainment in many OECD countries. Access to higher education is unequal across demographic groups, though less so than in many other countries.
- Estonia has a large proportion of entrants[3] to higher education who are 25 or older, and a relatively small proportion of part-time students. This is atypical among OECD countries, in which older students typically study on a part-time basis. Estonian students work and have dependent children at rates above the OECD average.
- Estonia has had an especially low rate of completion (51%) within three years from the expected time, the lowest among OECD countries reporting this indicator.
- Estonia has a policy of attracting international students that includes direct financial incentives to institutions. The proportion of international students in Estonia in 2016 is near the OECD median, and rapidly rising.
- Young higher education graduates aged 16-34 in Estonia performed relatively well on literacy and numeracy proficiency in the OECD Survey of Adult Skills compared to those with lower levels of educational attainment. They were also more likely to report that they are in good health and they tend to trust others.
- In 2016, higher education graduates earned about 20% more on average than those without higher education. According to data from the Survey of Adult Skills, higher education graduates younger than 35 are also less likely than upper secondary graduates to work in jobs with routine tasks where little learning is involved.
- However, employment premia for graduates appear to be smaller than those observed in other OECD countries. For example, in Estonia, the employment rate of higher education graduates in 2016 was just 1% above that of individuals with only upper secondary or post-secondary non-tertiary education. This could be attributed to the current labour market in Estonia, where employment rates are high in general and there are shortages of qualified staff in some industries.

balanced gender composition of academic staff across all age cohorts (excluding the cohort older than 60, where the share of women is around 40% for both countries).

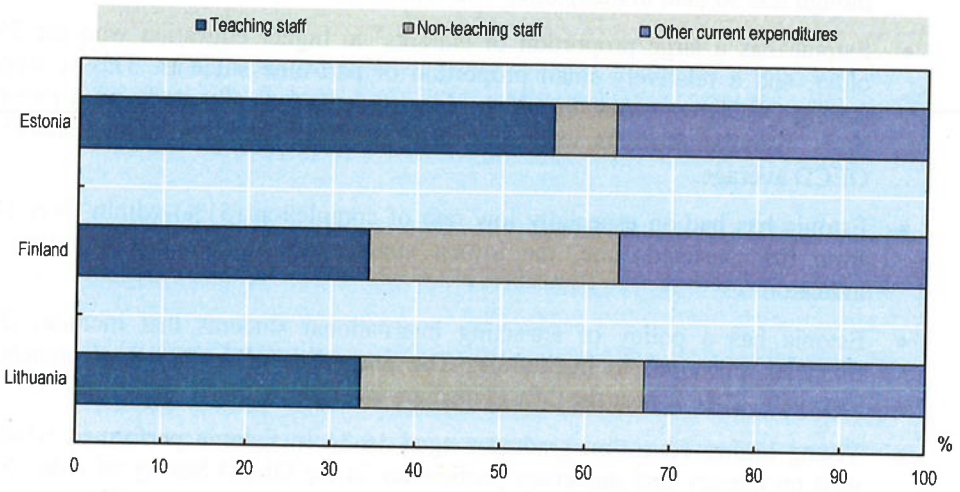
Balanced gender participation in the academic workforce does not guarantee gender equality in the profession. Women often remain underrepresented at senior levels of academia and management in higher education (see Chapter 4 (OECD, 2019[3])).

Estonia spends a large proportion of higher education current expenditure on teaching staff relative to the OECD median, but very little on non-teaching staff

The distribution of current expenditure among cost items varies across higher education systems, shaped by how higher education activity is organised. In some systems, higher education institutions offer more administrative and logistical support to their academic staff than in others, and therefore employ more non-academic staff.

Overall, in 2015, staff expenditures accounted for 63% of the current expenditure of Estonian higher education institutions, in the bottom quartile of the OECD distribution.

Figure 9.5. Higher education current expenditure, by cost category (2015)



Source: OECD (2018[4]), *OECD Education Statistics*, https://doi.org/10.1787/edu-data-en.

StatLink https://doi.org/10.1787/888933942070

The distribution of staff expenditures between teaching and other staff is atypical among OECD countries. Teaching staff expenditures account for 56% of current expenditure, the highest share in the OECD area after Austria and Greece, while expenditure on non-teaching staff represents just 7% of current expenditure, the lowest proportion among OECD countries except Austria.

There are fewer academic staff per student than in most other OECD countries

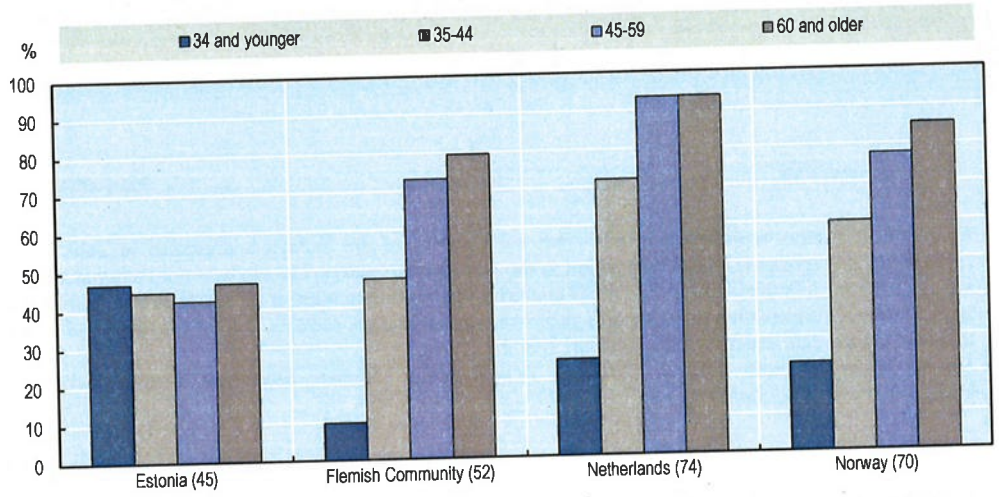
Contact time spent by academic staff with students can be valuable to enhance student learning. Academic staff can teach or support students through lectures, tutorials and practical sessions, as well as by providing individual advice and feedback. In the absence of other data on the quality of teaching and learning in higher education, staff-to-student

While salary is an important aspect of the working conditions of teaching staff, security and continuity of employment are also important, both for teachers and students. According to existing regulations, university councils or professional HEIs should prepare an open competition process to select candidates to be hired on a permanent basis. Non-permanent contracts may be used if a position cannot be filled through the open competition process.

Notwithstanding these regulations, a relatively low share of teaching staff are employed based on permanent contracts. In 2016, 45% of academic staff with teaching duties in Estonia had a permanent contract. This is lower than in the Flemish Community, the Netherlands and Norway (Figure 9.4).

Figure 9.4. Share of teaching staff with permanent contracts, by age (2016)

Academic staff with teaching duties, excluding doctoral students.The share with permanent contracts across all ages is reported in brackets.



Source: Adapted from OECD (2019[3]), *Benchmarking Higher Education System Performance*, https://doi.org/10.1787/be5514d7-en.

StatLink https://doi.org/10.1787/888933942051

Notably, in contrast to other jurisdictions, in Estonia, the share of teaching staff with permanent contracts does not vary substantially with age; older Estonian academic staff are as likely to be on non-permanent contracts as younger staff. Estonia plans to establish a system of tenure for academic staff in new higher education legislation, which may result in an improved academic staff profile in terms of age and permanence of employment.

Women represent around 50% of academic staff in Estonia

The share of women among academic staff is nearly 50%, placing Estonia in the top quartile of the OECD distribution, along with Finland and its Baltic neighbours Latvia and Lithuania. This gender balance holds for all age groups; the share of women is 51% among both staff younger than 35 and staff in the age bracket of 35-44 years-old, and it is 52% among 45-59 year-olds. Estonia and New Zealand are the only countries with such a