Chapter 1. Overview of the higher education system in Italy

This introductory chapter provides an overview of the higher education (HE) system in Italy. The aim is to presents the main actors and institutions of the system and to discuss the framework conditions of the "entrepreneurial and innovation agenda" in Italy. In addition, the chapter assesses some recent policies that aim at strengthening Italy's innovative potential.

Introduction

The Italian higher education has a great potential to contribute to the cultural, societal and economic development of the country. Italy is home to a dense network of universities. Higher education institutions (HEIs) have put in place initiatives in all missions, including teaching, research and "engagement". This flourishing of activities depends on two subsequent reform phases started in 2010.[1] In the first phase, national authorities defined regulatory frameworks and incentives to steer HEIs towards improvements in the quality of teaching and research, and towards an increase in the efficiency of the system (i.e. a decrease in funding allocation). In the second phase, the regulator encouraged HEIs to diversify their strategies and missions, taking into account the expectations and needs of their "ecosystems", which encompass local, national and international stakeholders.[2] To help the diversification, the government has put in place a steady, albeit small, increase of funds, which have been allocated to HEIs based on an assessment exercise.

Despite these recent improvements, the Italian higher education system faces some important challenges and actions need to be taken to unleash its full potential. For instance, the share of 25-34 year-old Italians holding a tertiary degree is still much lower than in most OECD countries, notwithstanding recent improvements.[3] For all levels of education, expenditure per student is below the OECD average and the gap increases along with the educational level. Italy's expenditure on tertiary education is about 30% lower than the OECD average (2015) (OECD, 2018).

Excluding mobility exchange programmes, Italian universities attract fewer students from abroad, compared with other OECD countries. The share of foreign students in Italy is 5% (compared with 9% in EU23 countries). Recent improvements in the capacity to attract foreign students – the number of foreign students has increased by 12% between 2013 and 2016 – have been offset by the large number of Italian nationals studying abroad, which has increased by 36%, over the same period.

The country faces some structural challenges that affect, indirectly, the performance of higher education. The employment rate in Italy is lower than for the OECD, but the gap between Italy and the OECD average increases with educational levels and it reaches 18 percentage points for tertiary-educated young adults (OECD, 2017a). The employment rate for young adults with tertiary education (66% for 25-34 year-olds) is lower than for older age groups, with 81% of 25-64 year-olds employed overall. In 2017, approximately 30% of 20-24 year-olds in Italy were neither in employment nor in education or training (NEET), compared to 16% on average across OECD countries.

Table 1.1. Basic facts and numbers on higher education and research and development (R&D) in Italy

Population (1 January 2018)	60 483 973
Gross domestic product (GDP) in EUR per capita (2018)	29 071
Total government expenditure on tertiary education as % of GDP (2017)	0.3
Tertiary attainment in population aged 25-64 (2017, %), of which:	18.7
Short cycle tertiary education (%)	0.0
Bachelor's (first-cycle degree) (%)	4.3
Master's (second-cycle degree) (%)	13.9
Doctoral (%)	0.5

Expenditure on tertiary education institutions as % of GDP (2015)	0.6
Expenditure (from public and private sources) on R&D as % of GDP (2018)	1.35
Direct government budget for R&D as % of GDP (2015)	0.6
Number of students in publicly funded HE institutions (all levels, all modes; 2017/18), of which:	1 713 351
State universities	1 523 994
State-recognised universities	106 660
State-recognised telematic universities (offering on-line degrees)	82 697
Tertiary degrees conferred (2017/18), of which:	263 979
Degrees by state universities	236 659
Degrees by state-recognised universities	23 157
Degrees by state-recognised telematic universities	4 163
R&D personnel per thousand, total employment (2016)	19.1
Higher education researchers as % of national total (2015)	12.4
Number of citable research documents (2017)	97 516
Citations per document (2017)	0.76

Source: Authors' own compilation based on information provided by Eurostat, OECD, Scimago Lab, Ministry of Education, Universities and Research (MIUR) and National Statistical Institute (Istat).

Recently, government policies have focused on two main pillars: promoting research quality and opening to students' demand. After a long period during which almost all funds were distributed based on the "historical cost", the government decided to allocate funds taking into account the quality of research and the capacity of a given HEI to accommodate students' demand. These have become the two main drivers of funds allocation to HEIs.

The focus on the quality of research and student has produced some positive outcomes. The Ministry of Education, Universities and Research (MIUR) of Italy, supported by the National Agency for the Evaluation of University and Research (ANVUR), has designed and implemented several policy initiatives such as the periodical Research Quality Assessment exercise (*valutazione della qualità della ricerca* or VQR, in the Italian acronym), the *Dipartimenti di Eccellenza* initiative and the implementation of the Standard Cost per Student (CSTD). The response of HEIs has been positive. Universities have reviewed their internal strategies and practices to improve their results and adapt to the new policy guidelines. Due to these innovations, the interactions between universities and external stakeholders has increased and so the number of students enrolled.

Regarding the third mission, which refers to activities carried on by HEI that go beyond teaching and research functions, the National Agency for the Evaluation of Universities and Research Institutes (ANVUR) shows that activities are carried out mainly by medium and large universities, and tend to be more frequent in the north of the country (ANVUR, 2016). There is, however, ample heterogeneity both in size of HEIs and in geographic location. Illustrating an important link between research activities and "engagement", ANVUR (2016) underlines that the number of technology transfer offices (TTOs), placement offices and other institutions interfacing HEIs with their external stakeholders has been increasing, paralleling HEIs' efforts to promote their research activities.

Another survey-based report on knowledge exchange (Netval, 2018) discusses the increasing activity in technology transfer of Italian HEIs. According to the report, a growing number of HEIs are now equipped with TTOs and related competencies. Expenditures for intellectual property (IP) protection has been increasing almost everywhere. Patents, however, are still highly concentrated: approximately 12 Italian HEIs (out of approximately 90 HEIs) generate some 50% of total patents, which concentrate, in

turn, into 4 scientific disciplines, namely: industrial and information engineering; chemistry; medicine; and biology.[4] In addition, the revenues from the valorisation of patents are typically concentrated: 50% of the revenues are concentrated in only 3 universities and 10 patents.

The great majority of Italian HEIs are active also in public engagement, while a relatively high number of institutions is involved in the production of public goods, through the management of cultural heritage and the protection of health (including clinical trials, bio-banks, etc.).

Science, innovation and knowledge economy

Italian HEIs operate in an internationally competitive framework of science, innovation and knowledge economy, which, however, faces some challenges. For example, among G20 economies, Italy had the 5th-highest penetration of machine-to-machine (M2M) subscriptions in 2017, the same as in Germany and just behind China (OECD, 2017b). Italy also accounted for almost 4% of the world's top 10% most-cited scientific publications in 2016, right behind the United States, China, the United Kingdom and Germany. Yet, Italy's international competitiveness also faces challenges. In particular, Italy has been displaying modest gains in labour productivity since 2001. Gender equality is another issue in the country. Women in Italy earn about 13% less than men, even after individual and job-related characteristics are taken into consideration and about 10% less when skills differences are also taken into account. Finally, data on the international mobility of researchers for 2002 to 2016 shows that Italy has lost more individuals than it has attracted. Over the past 15 years, the number of researchers that left Italy exceeded by 11 000 the number of researchers that entered the country, making the country the largest relative net donor among economies, with high levels of scientific output.

Issues on skills and firm profile

Italy also faces challenges related to its skills, the performance of the labour market and the product market regulation (PMR). For instance, Italy's national economy suffers from a large skills mismatch, with values above the OECD average both in terms of under-skilled and over-skilled workers (8% and 12% respectively) (OECD, 2017c). The frequency of mismatch in Italy may be related to the use of informal selection procedures among companies, especially small- and medium-sized enterprises (SMEs) (European Commission, 2016).

Second, small and micro firms dominate the Italian productive sector. Over 90% of firms in Italy employ less than 10 employees, more than any other OECD country. The vast majority of SMEs operate far from the productivity frontier. This has generated a situation in which innovations do not percolate from the most productive firms to the others (Criscuolo, Gal and Menon, 2014). In addition, SMEs are quite old, on average. This means that SMEs firms remain small throughout their activity. According to Bobbio (2016), SMEs in Italy may not invest in innovation because this implies growing in size and, as a consequence, being subject to more taxation and auditing.[5] Lastly, the Italian context is characterised by a high proportion of family-owned companies, a feature that is typically negatively associated with firm performance.

Key actors and elements of the Italian higher education system

The Italian higher education system includes different types of institutions: universities, Institute for Art, Music and Dance (the so-called AFAM sector, see below), private institutions awarding recognised qualifications, and technical institutions providing short-term tertiary education (ITS, *Istituti Tecnici Superiori*).[6]

The university system

The university system encompasses:

- 68 state universities – of which 6 institutions awarding only doctoral qualifications[7]
- 20 state-recognised universities
- 11 state-recognised online universities (*università telematiche*).

Since 1989, universities are autonomous within the regulatory framework foreseen by the law and the strategies promoted by the MIUR. Autonomy provides universities with the possibility to define their own governance structure and internal organisation, develop their own mission and strategy, plan programmes and award degrees, develop their own research activities, and "engage" in activities related to the so-called "third mission".

Other institutions of tertiary education

The *Alta Formazione Artistica Musicale e Coreutica* (AFAM, Institutes for Art, Music and Dance – based on the degree structure of the European Qualifications Framework, levels 6-8), accounts for 13 778 teachers and 2 413 administrative staff (2016-17) distributed in:[8]

- 59 State Music Conservatories, for a total of 21 616 students
- 20 State Academies of Fine Arts, for a total of 25 901 students
- 19 Higher Institutes for Musical Studies, for a total of 2 655 students
- 18 State-recognised Academies of Fine Arts, for a total of 9 574 students
- 4 Higher Schools of Design (ISIA), for a total of 943 students
- 1 National Dance Academy, for a total of 304 students
- 1 National Academy of Drama, for a total of 146 students
- 24 institutions authorized to award AFAM diplomas, for a total of 6 315 students.

In addition to universities and AFAM institutes, a number of institutions are allowed to award recognised higher education qualifications: Higher Schools for Language Mediators – awarding the *Diploma di mediatore linguistico* (1st-cycle qualification, EQF 6) – and Specialisation Institutes/Schools in Psychotherapy – awarding the *Diploma di specializzazione in psicoterapia* (3rd-cycle qualification, EQF 8).

In recent years, efforts were also put into developing a new, professionally-oriented stream of tertiary education, planned in co-operation with enterprises and local administrations. Italy's new ISCED level-5 tertiary professional/vocational education institutions (*Istituti Tecnici Superiori*, ITS), although still with a limited number of students (13 381 in 2019) and producing few graduates (2 601 in 2017) (INDIRE, 2019), provide for a system of diplomas that can be obtained after 2 or 3 years. The programmes, co-designed with firms,

are intended to allow young people and adults to operate as high-level technicians in innovative work processes that require specific skills in applied technologies.

There are currently 103 ITS foundations[9] scattered across Italy (mainly in the north), providing tertiary vocational education and training (VET) in different sectors, including: new technologies for the "Made in Italy" sectors;[10] logistics and mobility; energy efficiency; new technologies for cultural and tourism activities; information and communication technology (ICT); and medical technologies.

An assessment of the ITS system found that in some ITS sectors, more than 80% of students find a job within 1 year after graduating (AlmaLaurea, 2016). The employability rates of ITSs tend to be higher if the fields in which the ITS provides training matches the local sectoral specialisation of firms (OECD, 2017c). To promote the alignment between ITS training and demand for skills on the labour market, MIUR is providing additional funding to ITS with the highest employability rates.

Public research organisations

Three main actors conduct research in Italy: universities, public research entities (*Enti Pubblici di Ricerca*) and firms. These actors are complemented by numerous public and private entities. They operate within the framework of the *National Research Plan*, promoted by MIUR and approved by the Interministerial Committee for Economic Planning (*Comitato Interministeriale per la Programmazione Economica* CIPE). MIUR plans and co-ordinates research at the national, European and international levels, collaborating both with other ministries in their specific sectors and with the regions, which have competencies at the territorial level.

Public research entities, in particular, are national entities with the task of performing research activities in the main scientific fields, both in terms of knowledge creation and in terms of technical-scientific application. A total of 20 institutions have been recognised as public research entities: 14 are supervised by MIUR,[11] while another 6 are supervised by other ministries[12] and perform instrumental functions (e.g. the National Statistical Institute provides data for legislative purposes) as well as basic and applied research.

Ministries and institutional bodies

The Ministry of Education, Universities and Research (MIUR)

MIUR is responsible for the development and implementation of education and research policies within the Italian system. The Department for Higher Education and Research is the main ministerial department acting in the realm of higher education and research. Its competencies include: steering and funding higher education and research institutions; monitoring and evaluating institutions, and providing performance-based incentives; accrediting study programmes in all cycles, and implementing students' access and support policies; ensuring the participation of the Italian system at the international level and within European Union (EU) institutions.

MIUR strongly co-operates with ANVUR and all the other academic stakeholders. It also co-operates with regional governments for the students' welfare system and for the management of structural funds.

The National Agency for the Evaluation of Universities and Research Institutes (ANVUR)

ANVUR was established in 2010 and started operating the following year. Its evaluations span the whole range of university activities (research, third mission/impact, quality assurance, performance of administrative staff) and extend to AFAM institutions and research entities. Concerning research and third mission/impact, the agency has run two National Research Quality Assessment exercises: VQR 2004-10 and VQR 2011-14.

The Conference of Italian University Rectors (CRUI)

The Conference of Italian University Rectors (CRUI) is the association of state and state-recognised universities. Established in 1963 as a private association, the CRUI has acquired over time an institutional and representative role for the whole university world. Since 2001, the CRUI has been supported in its functions by the CRUI Foundation, which is entrusted with developing projects and services in conformity with the strategies of the conference. In 2014, the CRUI Foundation created the University-Business Observatory, with the participation of university experts and representatives of the economic and business worlds. The observatory has the aim of fostering co-operation and dialogue between the labour market, the research system and young people. On a yearly basis, it publishes its national report on activities carried out and main recommendations to improve the system (Fondazione Crui, 2018).

The National University Council (CUN) and National Council of University Students (CNSU)

The National University Council (CUN) is an elective body representing the whole university system. It serves as an independent advisory body to MIUR on relevant topics such as national programmes, policies and administrative practices affecting higher education, classification and definition of academic fields and disciplines, funding and teaching regulations.

The National Council of University Students (CNSU) is an advisory body representing all students enrolled in Italian universities, including third-cycle and doctoral students. It formulates proposals to MIUR on programme accreditation, the student welfare system and student services, policies on the strategic development of the university system and funding allocation. On a two-year basis, the CNSU also publishes a report on the conditions of students.

Networks of universities

AlmaLaurea

AlmaLaurea is an interuniversity consortium founded in 1994, which currently brings together 75 universities and accounts for approximately 90% of Italian graduates. The consortium is financially supported by the member universities, by MIUR and by the firms and organisations that use its services.

AlmaLaurea conducts an annual survey of graduates' profile and occupational condition one year, three years and five years after graduation. The survey monitors the students' academic careers and reviews the graduates' features and achievements.

Network for the valorisation of university research (Netval)

Netval is a network of Italian universities and public research organisations, representing over 80% of the Italian public research system.

Its mission includes: disseminating and strengthening the skills of Italian universities and public research organisations in the field of the valorisation of research results; providing an interface with industry; consolidating expertise in the area of commercial projects and intellectual property management; and developing international contacts.

PNICube

Since 2004, the PNICube association is committed to supporting Italian universities and university incubators in activities to stimulate academic entrepreneurship and has been a leading player in the field of start-up support at the national level.

Over the years, PNICube has started several thousands of students and researchers on the path towards entrepreneurship: it is estimated that, in Italy, at least 20% of innovative start-ups have been set up thanks to the work carried out by the universities and PNICube university incubators. Furthermore, PNICube has built, during the years, an ecosystem able to support academic entrepreneurship through venture capital, corporate venture capital, business angels, companies interested in open-innovation activities and foreign bodies such as trade department of foreign countries.

Funding policies in Italian higher education

Strategic planning and indicators for periodic evaluation

The funding policies and mechanisms that characterise the Italian university system mirror the main steering tool used by the Ministry of Education, University and Research: the three-year strategic planning act (*Programmazione triennale)*. Indeed, on a three-year basis, MIUR sets the strategic priorities of the university system in terms of requirements for study programmes, research, student support, internationalisation and recruitment. These priorities are discussed with ANVUR, CUN, CRUI and CNSU.

On the basis of these priorities, each university develops its own strategic plan and presents to MIUR a co-funding application for its implementation. External stakeholders (firms, local authorities, civil society, etc.) also co-operate with the universities to elaborate the strategies.

Each strategic action – both at the system and institutional levels – is monitored through a set of indicators defined by MIUR. The co-funding applications are evaluated *ex ante* on the basis of the target set for each indicator; at the end of the period, the funds are confirmed if the university achieves its targets.[13]

For the period 2019-21, after an improvement of the mechanism applied for the period 2016-18, part of the budget allocated by the ministry on the basis of the results achieved by HEIs will follow two of the key indicators used to monitor actions undertaken in research, teaching, student services, internationalisation and recruitment. The resources allocated with this mechanism are approximately EUR 340 million per year for state universities. All in all, the strategic planning will be supported with EUR 405 million per year for state universities. A similar increase will be ensured for state-recognised universities as well.

Funding policies for teaching and research in Italian universities

University system funding from the central government amounted in 2018 to EUR 7.7 billion and encompasses the following items (ANVUR, 2018):

- Fund for Structural Resources to State Universities (FFO), the main line of funding (EUR 7 335.4 million)
- State Supplementary Fund (FIS), to integrate the regional funds dedicated to study grants (EUR 234.2 million)
- contribution to state-recognised universities (EUR 68.2 million) and to the University of Trento[14] (EUR 16.4 million)
- contribution for capital charges and interests on loans (EUR 34.2 million)
- contributions for university colleges (EUR 16.8 million), university residences (EUR 18.1 million) and sports activities (EUR 6 million).

Since 2009, the yearly FFO allocation is divided into three main strands:

1. a basic quota (*Quota base*), allocated on the basis of previous allocations and the Standard Cost per Student (CSTD – EUR 1.38 million), calculated taking into account the programmes offered, the number and qualification of academic staff, the number of non-academic staff and the services offered, the socio-economic conditions of the students and the availability of public transport
2. a performance-based quota (*Quota premiale*), allocated on the basis of the results of the National Research Quality Assessment Exercise (VQR, EUR 1 693.5 million), of the quality of recruitment, and of the improvement with respect to 2 indicators chosen by universities themselves. This quota is equal to 23% in 2018 and will be increased annually between 2% and 5% to reach 30% of the overall funding in the next few years
3. a residual quota providing for compensations to avoid "shocks" in state transfers and for targeted measures such as strategic planning, student welfare and student services, doctoral grants, incentives for the recruitment of academics and young researchers (*Quota interventi specifici* – EUR 145 million).

Within the three-year strategic planning act, the Ministry of Education Universities and Research (MIUR) defines the share of funding allocated to each strand, also to help universities in their financial planning. The same model – excluding CSTD – is used for the funding of state-recognised universities. In the coming years, the CSTD should become the only criteria in allocatinMIRUg the basic quota, i.e. up to 70% of the overall funding. The CSTD share has been gradually increasing every year so that institutions can progressively adapt to the new system.

After suffering from a reduction of financial allocations, partially buffered by increased efficiency, Italian HEIs are now benefitting of a positive trend. Between 2009 and 2015, there was a constant decrease in public funds allocated to universities. This trend was mirrored by the reduction of students' enrolment and, consequently, of the revenue generated by students' fees. In addition, the economic crisis had negatively affected HEIs' capacity to collect resources, from external stakeholders. Since 2016 the trend has inverted and financial resources have been increasing. However, funds allocation has not yet reached the same levels of 2009.

Box 1.1. Excellence department (*Dipartimenti d'Eccellenza*)

The so-called "Excellent Departments", which are designed following European good practices, are an initiative to support innovation in universities. This initiative puts special focus on strategic planning in research.

180 excellent departments obtain extra financial support for 5 years (EUR 1.35 million per department, on average). The government selects these based on a two-step procedure:

1. Their performance, as assessed by ANVUR (which ranked the best 350 departments on the basis of the VQR 2011-14, as measured by the Standardised Indicator of Departmental Performance, ISPD).
2. The result of an independent evaluation carried out by a committee, appointed by MIUR. This committee selects the best 180 departments on the basis of the ISPD (weight 70%) and of a strategic development programme proposed by the department (weight 30%), evaluated on the basis of coherence and feasibility criteria. These programmes include recruitment of academic and non-academic staff, infrastructures for research, financial incentives to the personnel, development of 2nd- and 3rd-cycle study programmes.

In order to ensure participation of as many state universities as possible, Law 232/2016 limits in the number of applications per university and gives each university the opportunity to select its "best performer" (usually the one with the highest ISPD) to be evaluated only on the basis of its strategic development programme.

Funding for research institutes and research projects

The Fund for the Ordinary Financing of Research Entities and Institutions (FOE) is the main source of funding for Italian research entities. MIUR allocates FOE every year, with the following objectives:

- ordinary assignments (FOE) for the ordinary functioning of research entities, including recruitment procedures
- internationally-relevant research activities, to comply with the commitments undertaken by the government on the basis of international agreements
- development of extraordinary projects, linked to specific activities identified by law or on the basis of dedicated agreements
- Flagship Projects and Projects of Interest (PRIN; see below).

Also, funding for research has decreased in real terms in the last few years (-5.4% between 2011 and 2018). The following paragraphs illustrate the other main funding channels for research and research entities.

Research Projects of National Interest (PRIN)

PRIN funds are targeted to research projects that can potentially achieve a significant advancement in knowledge and increase opportunities for the national research community to benefit from international and European co-fund initiatives.

The PRIN programme, in fact, funds projects which require the collaboration of several researchers and whose financial needs exceed the means available to single institutions. The research group can either be composed by multiple research units from different universities or research entities or, in some specific research fields (e.g. humanities or mathematics), by single individuals.

The main characteristics of PRIN calls are the following: i) only universities and public research entities can apply; ii) projects are portable (in case of principal investigators, or PIs, who move to another institution); iii) funds are entirely transferred in advance, at the beginning of the project; iv) reports are expected only at the end of the project.

FIRST and National Technological Clusters (CTN)

MIUR supports research activities mainly with the Fund for Investment in Scientific and Technological Research (FIRST), including also additional PRIN financing dedicated to infrastructural investments and funds targeted at under 40 researchers.[15] FIRST resources have been cut substantially; more than 50% from 2010 to 2018, when it totalled EUR 83 million. However, starting from 2017, part of the FIRST has been allocated to national technological clusters (CTN), identified as the main tool to reach the targets in terms of public-public and public-private collaboration.

CTNs are given the task to recompose and integrate research strategies and technological roadmaps at the national level. Consistently with Horizon 2020, their objective is to put together critical competencies to mobilise the industrial system, the research system and the public system – both at the national and regional levels – in order to set common research agendas and share roadmaps for technological development.

Study fees and study grants

Student fees are the second most important source of funding after FFO provided by the central government. Access to university in Italy requires the payment of two different fees:

- A general fee to the university, covering the cost of teaching, research and administrative services.
- A targeted fee for the student support system, paid to the regional agencies for students support. Also, smaller administrative fees can be charged.

Each university can autonomously decide the overall amount of fees, within a cap set at the national level, which equals 20% of state funding.[16] This measure has put under pressure university budgets in recent years, due to the reduction of public funding allocated to the institutions. Average tuition fees in public tertiary institutions are lower in Italy than in a number of non-European OECD countries (OECD, 2017a); they are also lower than in the Netherlands and Spain but higher than in most other European countries.

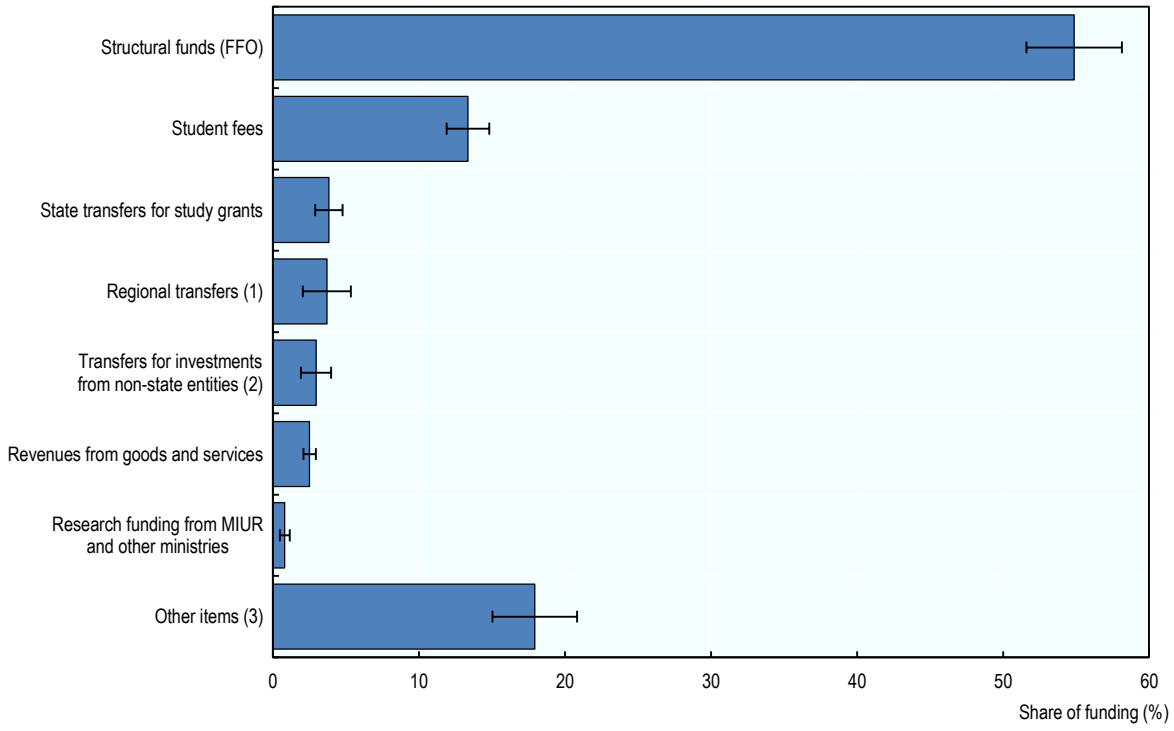
Two main measures support students coming from difficult socio-economic background:

- study grants, including the exemption from the payment of fees, which also consider merit-based criteria
- no tax area, i.e. a full fee exemption for all students below a certain threshold of equivalised income (EUR 13 000) who achieve a minimum amount of European Credit Transfer Scale (ECTS) credits per year.

The students' support system is co-funded by the state (with the State Supplementary Fund, FIS; see above), by the regions (for at least 40% of the FIS), and by students (with the

above-cited targeted fee). The FIS is allocated to regional governments on the basis of co-funding rate,[17] number of eligible students and the number of places in students' residencies. Unfortunately, the available funding is not sufficient to ensure that all students eligible for a study grant are covered. The scenario is fragmented at the national level: some regions have achieved or are close to full coverage, while others struggle in reaching that goal. However, the situation is improving, also thanks to a progressive increase in state co-funding.

Figure 1.1. Composition of the budgets of state universities – Average shares with 95% confidence intervals, 2015



1. Current transfers and revenues from contracts and agreements with regions and autonomous provinces.
2. All private and non-state public entities, including regions, Autonomous Provinces, hospitals, etc.
3. Including all other contracts and agreements, revenues from assets and loans.
Source: Authors' elaboration from MIUR – Bilanci Atenei (https://ba.miur.it/) accessed on May 2019.

International credit mobility

International credit mobility is offered to students to widen academic preparation and achieve transversal competencies and skills. Universities manage credit mobility by matching EU mobility programmes and funding with bilateral/multilateral agreements, institutional funding and support from the state.

MIUR allocates EUR 50 million every year to complement grants for international students' mobility. The criteria to allocate funds to universities include the number of registered students (potentially mobile students), the number of beneficiaries of students support services (grants and exemptions), the number of ECTS credits achieved abroad by regular students, the number of graduates with 12 ECTS credits achieved abroad in their career, the number of doctoral students who spent at least 3 months abroad. Universities are asked to ensure that mobility grants for students take into account their socio-economic situation.

Box 1.2. Recent policy developments

Recruitment

Recruitment of academic staff is at the centre of ministerial funding policies. Thanks to the resources allocated for 2019, the following provisions have been adopted:

- Recruitment of 1 500 young tenure-track researchers covered by national resources (EUR 30 million in 2019 and EUR 88 million starting from 2020).
- Elimination of turnover limitations for financially-robust universities. Institutions with salary expenditures under 80% of the budget and with a positive income/salary expenditure ratio can recruit up to 110% of retirements of the previous year.
- Career progression for existing researchers. 676 positions of associate professors are funded by the ministry to support universities in ensuring career progression to researchers in possession of the national scientific habilitation (EUR 10 million starting from 2020).
- Longer validity of the national scientific habilitation, from six to nine years.

Accreditation of doctoral programmes

Starting from the academic year 2019/20, ministerial guidelines for the accreditation of new doctoral programmes have been adopted to simplify the procedures and put more emphasis on the scientific production of the Doctoral Scientific Committee. This revision, which anticipates a wider reform of the regulations for doctoral education, safeguarded the number of innovative doctoral programmes. The overall number of accredited doctoral programmes totals 993. Most of these programmes are innovative programmes, based on interdisciplinary frameworks and on international and/or industrial collaborations.

New three-year strategic planning

At the moment of drafting this report, the new ministerial document for strategic planning and indicators for periodic evaluation was under discussion with the main stakeholder and should be published soon. The document contains the goals to be achieved by institutions for the period 2019-21 in teaching, research and its value-generating potential, student support, internationalisation and recruitment. The same document also includes the criteria to allocate 20% of the *quota premiale* (around EUR 340 million), an updated version of the indicators for periodic evaluation and criteria to allocate student support funding.

Monitoring quality and performance

Monitoring performances

As mentioned in the introduction, great effort was made by the whole university system to improve performances and use funds more efficiently. A set of tools and indicators have been used by the ministry to measure and evaluate the results achieved, to create a sort of national dashboard available for both the ministry and universities themselves to measure progress. A wide set of databases developed at the national level, in fact, cover several dimensions such as: student and graduate careers; academic and administrative personnel; study programmes, research quality, research and third mission development and

environment; budgets and financial sustainability. The existing indicators (Table 1.2) are used by ANVUR for *ex post* accreditation and by the ministry for performance-based funding.[18] In addition to these indicators, VQR results are used to allocate funding on the basis of performances and to accredit doctoral programmes.

Table 1.2. Sets of performance indicators used to evaluate Italian Universities.

Students and study programmes (for institutions and programmes):
1. Time to completion
2. Attractiveness
3. Sustainability
4. Effectiveness
5. Quality of the academic staff
Internationalisation (for institution and programmes):
1. Outgoing mobility
2. International attractiveness
Quality of research and research environment (for institutions only):
1. Evaluation of research
2. Quality of doctoral programmes
3. Attractiveness of the doctoral programmes
4. Attractiveness of the research environment
Economic and financial sustainability (for institutions only):
1. Economic and financial sustainability index
2. Index of indebtedness
3. Index of personnel costs
Additional indicators for the evaluation of teaching:
1. Time to completion
2. Effectiveness

Source: MIUR

Accreditation system

The accreditation process of study programmes is designed by the ministry – after consultation with ANVUR – on the basis of the criteria defined by the legislation and taking into account the priorities and the indicators defined within the strategic planning. On a five-year basis, accreditation is extended to whole institutions.

The main features of the accreditation process are summarised in Table 1.3.

The accreditation process is based on a robust internal quality assessment (QA) system developed by each university on the basis of the guidelines provided by ANVUR. The agency defines the main responsibility for the institutional players, proposes to MIUR criteria and indicators for accreditation and periodical evaluation, defines the guidelines for onsite visits of QA experts and defines the minimum content of QA documents to be developed. The accreditation of new study programmes takes into account also interactions with the labour market and innovation in teaching and learning, taking advantage of a dialogue with the main stakeholders of the university system, and requiring and evaluating the definition of the expected job positions for graduates. Graduate employment rates and the use of the competencies achieved, instead, are considered in the *ex post* evaluation.

Table 1.3. Synthesis of the accreditation process

	Ex ante accreditation criteria	Periodical evaluation	*Ex post* accreditation criteria	Duration of accreditation and of its formalisation
Accreditation of institutions (including new branches of existing ones)	1. Financial and structural sustainability	1. Student access and success rate	1. Confirmation of *ex ante* criteria	Lasts five years. It can be shortened if the results of the *ex post* accreditation are considered critical. Formalised through Ministerial Decree.
	2. Research profile	2. Employability of students	2. Results of periodical evaluation	
	3. Quality assessment (QA) system	3. Mobility and internationalisation	3. Results of onsite visit by QA experts	
	4. Information on programmes offered, student services, international mobility	4. Research results		
	5. Number and profile of personnel available	5. Financial management		
Accreditation of new study programmes	1. Information on programme offered, including services to students	1. Student access and success rate	1. Confirmation of *ex ante* criteria	Lasts three years. Its duration can be adapted on the basis of the results of periodical evaluation and *ex post* accreditation. Formalised through Ministerial Decree.
	2. Presence of a sustainable number of qualified teachers	2. Employability of students	2. Results of periodical evaluation	
	3. Number of learning activities and weight in terms of ECTS	3. Mobility and internationalisation	3. Results of onsite visit by QA experts	
	4. Structural resources			
	5. Number and profile of personnel			
	6. QA system at the programme level			
	7. Accreditation of existing programme			
Accreditation of existing programmes	If the presence of a sustainable number of qualified teachers with respect to the number of registered students is verified, the *ex ante* accreditation is confirmed.	Same as new programme	Same as new programme	Same duration as for new programmes. Accreditation given by responsible Director-General.

Source: MIUR

Research Quality Assessment exercises (VQR)

The National Research Quality Assessment (VQR) plays a pivotal role in strategic planning and in the evaluation of the Italian system of universities and research. The VQR, now carried out every five years, is aimed at evaluating the research outcomes of state and state-recognised universities and public research institutes – as well as those of private institutions that voluntarily submit their research outcomes – in order to promote the improvement of research quality and to allocate the merit-based share of the FFO for state institutions.

For the period 2011-14, the VQR evaluated the research outputs of all permanent scientific staff in state universities, state-recognised universities and in 39 research organisations. More than 60 445 researchers submitted their best publications, for a total of almost 120 000 research outputs submitted and evaluated.

The publications are classified by their authors in 16 research areas and, for each research area, ANVUR appoints a panel of experts. In humanities and social sciences, a pure peer review system is applied with the help of external (national and international) reviewers. In science, technology, engineering and mathematics (STEM), the same procedure is used but, in addition, ANVUR also produces bibliometric indicators to inform the panels. In each exercise, the expert panels recruited about 15 000 external referees.

Also, third mission is formally considered as an institutional responsibility that universities have and as such, the evaluation of third mission activities is part of ANVUR's objectives. Hence, this is included in both the VQRs and in the national system of quality assurance of the universities (*Autovalutazione – Valutazione periodica – Accreditamento*, AVA).

Third mission activities have been divided into two main areas respectively involving the economic valorisation of research, IP, spin-offs, third-party activities and intermediation activities – and the production of public and social goods – management of cultural activities and the cultural heritage, clinical trials, lifelong learning and public engagement. Evaluation is based on peer review, informed by the aforementioned information.

Policy actions promoting value creation and entrepreneurship

Main policy actions promoting value creation through research

The policy actions here reported are aimed at facilitating the creation of value by focusing on concrete opportunities for interactions between universities, research entities, enterprises and other societal actors.

Innovative doctoral programmes

The National Research Programme 2015-20 created innovative doctoral programmes based on the Principles for Innovative Doctoral Training, adopted by the European Commission (2011). The ministerial provision defining innovative PhDs refers to three main principles. Innovative doctoral programmes must be international, inter-sectoral and interdisciplinary.

The network approach

Italian HEIs generate network to improve their capacity and impact in research activities. Examples of HEI networks promoting research activities are the PhDITalents, the "Innovaton Flow" and the FAI Lab. Italian universities have also taken advantage of EU financial support. For instance, they have used the Erasmus Programme to promote knowledge alliances with enterprises and local players. Knowledge alliances are a successful initiative. Between 2014 and 2017, Italy has been the first country in terms of the number of applications, participating organisations and successful applications.

Since July 2015, the CRUI promoted the University Network for Sustainable Development (RUS, in the Italian acronym). The RUS focuses on environmental sustainability and social responsibility and disseminates good practices related to the Agenda 2030 and UN Sustainable Development Goals (SDGs). RUS, in addition, promotes the Italian experience at an international level.

To encourage the development and dissemination of apprenticeship contracts in the Italian university system, the CRUI Observatory has created the network for the promotion of the higher education and research apprenticeship. The network involves universities, companies, institutions, social partners (trade unions and business associations) and has the objective to improve the legislation and overcome the critical issues that are currently

hindering the diffusion of apprenticeship contracts, by sharing information and good practices.

Smart specialisation strategy

The preparatory work for the operational programmes of the European Structural and Investment (ESI) funds 2014-2020 included the elaboration of a smart specialisation strategy aimed at strengthening the innovation ecosystem and focusing innovation efforts on areas and sectors where the growth potential is higher.

The Italian RIS3 national strategy provides a reference framework for national and local innovation initiatives with an inclusive governance model promoting the involvement of local actors. The strategy identified five cross-cutting objectives and five priority sectors:

1. the enhancement, specialisation and organisation of the national public research system
2. the enhancement and strengthening of human capital
3. the implementation of public policies for innovative industries to maximise the impact of research and innovation on competitiveness and on the opportunities for industrialisation and for market investments financed by public resources
4. the implementation of policies for the engagement of industries, the financial system and the research system in large innovation initiatives
5. guidance in the transition towards new organisational models.

Five national thematic areas were identified: Intelligent and sustainable industry, energy and the environment; Health, nutrition, quality of life; Digital agenda, smart communities, intelligent mobility systems; Tourism, cultural heritage and creativity industry; Aerospace and defence. Two strategic planning documents in particular address these goals: the National Research Plan (PNR) and the National Plan for Research Infrastructures (PNIR).

The National Research Plan (PNR)

The strategic planning for research is developed within the framework of the National Research Plan (PNR). Its main goal is to create a national research system comprehensive of policies for human capital, public-private co-operation and strategic research infrastructures. The National Research Plan is adopted by the Interministerial Committee for Economic Planning (CIPE) as part of the economic policy of the country.

A special chapter of the National Research Plan is the National Plan for Research Infrastructures (PNIR), coherent with the guidelines of the European Strategy Forum for Research Infrastructures (ESFRI). These guidelines define the role of the ministry and the mission of the new National Operative Programme for Research and Innovation 2014-20 (NOP-R&I). The NOP 2014-20 is strictly related to the national RIS3 through the development of research infrastructures, the consolidation of technological clusters, the challenge brought by key enabling technologies (KETs) and the growth of human capital and competencies.

Innovative doctorates with industrial characterisation are part of the strategy, aiming at increasing the attractiveness of PhD programmes, experimenting a new way of collaboration with the business world and taking into account the development trajectories identified within RIS3.

The PNR also includes a researchers mobility initiative, consisting of two lines: researcher mobility (i.e. support in contracting young PhDs graduates to benefit from international mobility) and researcher attraction (i.e. support in contracting young PhDs graduates located outside the target regions of the NOP-R&I 2014-20).

Main policy action supporting entrepreneurship in and through higher education

The policy actions here reported are aimed at improving the entrepreneurship-related skills and competencies achieved by students and, more generally, at increasing participation and successful completion of higher education. These actions are targeted mainly at students but teachers are increasingly involved as well.

Professional bachelor's programmes

Starting in 2018, Italy has introduced professional degree programmes to reduce skills mismatches (OECD, 2017c). Universities can create professional bachelor's programmes, *lauree professionalizzanti* in Italian, tailoring teaching and learning activities to skills needs in labour markets and ecosystems. Professional bachelor's programmes allocate about 50 ECTS to "on-the-job" activities. This share is much higher than the majority of first-cycle programmes (typically limited to 12 ECTS). During this piloting period, each university is allowed to activate only 1 professional programme, enrolling a maximum of 50 students. As of academic year 2018/19, there are 14 accredited professional bachelor's programmes. These require collaboration between HEIs and businesses. Programmes are designed to provide students with a professional qualification, which can be easily identified by employers. This is possible because programmes are designed in collaboration with business associations. In addition, some HEIs have established a collaboration with individual firms.

While professional bachelor's programmes are important to reduce the skills gap in the country, they may overlap with similar initiatives, such as ISCED level-5 technical institutes (*Istituti Tecnici Superiori*) (OECD, 2017c). Italy introduced ITS in 2010 based on the same rationale that generated professional bachelor's degrees. Given the vast demand for technical skills in the country, MIUR and the CRUI are assessing solutions to integrate the two pathways, e.g. by asking universities to recognise exams taken in ITS.

Scientific degrees, tutoring and carrier guidance

MIUR, in co-operation with science departments and the Italian industrialist association created a plan for scientific degrees (*Piano Lauree Scientifiche*, PLS) in 2004. The PLS aims to ensure that students achieve the scientific competencies required to enter the labour market and contribute to sustainable socio-economic development. The plan started focussing on the "core" scientific disciplines – mathematics, physics and chemistry – but was recently extended to other STEM disciplines (except engineering). The PLS helps students develop their own academic path and promote enrolment in scientific programmes, often considered too challenging.

To achieve these goals, HEIs co-operate in national networks, organised by discipline, to:

- involve secondary school students in targeted, students-centred, learning activities to experience learning at tertiary level
- organise self-assessment exercises for students, to raise their awareness concerning their disciplinary and transversal competencies
- help secondary school teachers upgrade their skills and knowledge
- support university students in their first years of study, to reduce dropout.

As female participation in scientific disciplines is often low, project promoters are asked to implement targeted measures to enrol more women.

Since the academic year 2017/18, the government has adopted a similar approach to humanities and non-STEM disciplines. Drawing on the experience of the PLS, the ministry created a plan for tutoring and carrier guidance (*Piano Orientamento e Tutoraggio*, POT) in law, economics and management, pharmacy, engineering, architecture and industrial design, cultural heritage and humanities, arts, languages, pedagogy, social sciences, sports, and agricultural and food sciences.

Entrepreneurship and transversal skills

In the strategic planning of the university system, the ministry encouraged institutions to develop action plans to increase and strengthen transversal competencies achieved by students. Twenty universities presented strategic development projects, which explicitly included an action plan on the topic, also providing support to academics to innovate in their teaching methodologies.

In this respect, the assessments of competences (*test delle competenze,* TECO and TECON) promoted by ANVUR have certainly pressured universities to take into consideration the impact of programmes in the additional development of not strictly subject-related competencies.

In the national debate, the acquisition and valorisation of digital competencies and the promotion of training activities for teachers in teaching and learning innovation have not been forgotten. In consideration of these critical issues and promising areas of development, the CRUI Observatory (CRUI, 2018) made some proposals to be translated into operational actions, including the development of digital certificates such as OpenBadges (see Chapter 5 on digital transformation).

National awards promoting entrepreneurship teaching and learning

A great stimulus for entrepreneurship comes from a national prize, *Premio Nazionale Innovazione* (PNI), promoted by the national association of incubators, PNICube, since 2003. The PNI rewards the best projects in the development of technology-intensive enterprises resulting from research activities and the winners of regional business plan competitions, better known as the Start-Cup. To evaluate the projects, PNICube involves a jury of experts from the private sector. In 2014, a special award for the best social innovation project was created. Since 2015, another special award is devoted to equal opportunities.

In addition to the National Award for Innovation and since 2007, PNICube has been promoting the Italian Master Start-up Award, a unique event at the national level rewarding the start-up which achieves the best economic and commercial performances within 3 years from its foundation.

Between 2003 and 2016, as many as 700 ideas for enterprises made it to the final phase of the National Award for Innovation. Out of these, 337 are now active start-ups with an average budget of EUR 260 000, 5% of them with more than EUR 1 million.

Notes

[1] The law reform was n. 240/2010.

[2] "Ecosystem" is often used as synonymous with "territory" or "region"; however, the word has an ample meaning. An ecosystem may encompass activities and agents that are not located in the core territory but have great influence on what happens in the core. In the same vein, thriving ecosystems are part of extended networks that involve other ecosystems (ecosystem of ecosystems), while lagging behind regions are small ecosystems (like small ponds, for example).

[3] As in most OECD countries, tertiary educational attainment is higher for women than men in Italy: in 2017, 20% of men and 33% of women aged 25-34 had a tertiary education compared to the OECD averages of 38% and 50%. The gap is similar for recent graduates: based on 2016 data, 25% of today's young men (under 30) and 37% of young women in Italy can expect to graduate from tertiary education at least once in their lifetime.

[4] Italian HEIs operating in these four areas generate more than 80% of academic patents. This proves the actual concentration of the system in a few HEI poles.

[5] Nevertheless, in Italy, start-ups are more likely to survive than start-ups in other countries and tend to grow in their first three years at roughly the same rate as their counterparts located in other countries (Calvino, Criscuolo and Menon, 2015).

[6] Further information on the structure of qualifications in the Italian higher education system can be found in the Italian Qualifications Framework for higher education (www.quadrodeititoli.it).

[7] Scuola Normale Superiore (Pisa), Scuola Superiore S. Anna (Pisa), Scuola Internazionale Superiore di Studi Avanzati (Tri-este), Istituto Universitario di Studi Superiori (Pavia), Scuola di Alti Studi "Istituzioni, Mercati, Tecnologie" (Lucca), Gran Sasso Science Institute (L'Aquila). The two institutions based in Pisa and the one based in Pavia are also awarding second-cycle qualifications, in co-operation with partner universities.

[8] Data for academic year 2016/17.

[9] This is the legal form chosen for this type of institution.

[10] Typically the fashion industry, the construction sector and the manufacturing of machinery tools.

[11] The detailed list can be found at: https://www.miur.gov.it/enti-pubblici-di-ricerca1.

[12] These are: CREA (Council for Agricultural Research and Economics), supervised by the Ministry of Agriculture, Food and Forestry; ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), supervised by the Ministry of Economic Development; INAPP (National Institute for Public Policy Analysis, formerly ISFOL), supervised by the Ministry of Labour and Social Policy; ISTAT (National Institute of Statistics), supervised by the Prime Minister's Office; ISS (Higher Institute of Health), supervised by the Ministry of Health; ISPRA (National Institute for Environmental Protection and Research), supervised by the Ministry of the Environment.

[13] The Italian framework for strategic planning is very similar to the one used in Austria. Also in that case, universities negotiate with the ministry the strategic priorities of the system on a three-year basis and report the results of the period to parliament. In Austria, however, universities also negotiate with the ministry their individual strategic priorities, instead of presenting projects to obtain co-funding.

[14] The University of Trento was founded in 1962 as a private institution. In 1982, the university (until then private) became public, with a statute that guaranteed self-government. The Milan Agreement of 2009 provided the Autonomous Province of Trento more power over the university.

[15] The initiatives that can be covered through FIRST are: support to basic and industrial research, including pilot projects to foster specialisation; procurement contracts for R&D, in connection with relevant social challenges (e.g. environmental sustainability, technological innovation); social innovation actions; infrastructural investments, financial support to advanced training, technology transfer centres and spin-offs for the development of technological clusters in public-private partnership; national projects on basic and industrial research, included in EU and international programmes; projects for the use of research results in an industrial context.

[16] This maximum cap excludes fees from non-EU students and from students exceeding the normal duration of study programmes.

[17] The higher the share of funding taken up by regions, the higher the allocation from the government.

[18] The set of indicators has been revised with the adoption of the ministerial decree on strategic planning for the period 2019-21. The new indicators will be progressively included into the monitoring and evaluation system.

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