

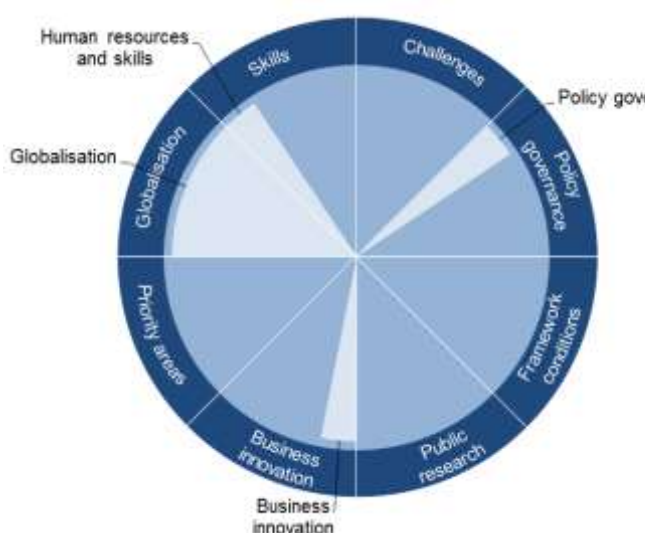
NORWAY

Norway has one of the world's highest incomes per capita, owing to its rich endowment and prudent management of natural resources. However, growth has recently decreased and unemployment has risen since 2014. Driven by low crude oil and gas prices, the energy sector has cut petroleum investments with spillovers on other sectors. Unemployment is low in terms of OECD standards but recently increased and is set to peak in 2016. Since the new government took office in October 2013 it has developed a new strategic framework and, following this guidance, increased public R&D funding and prepared major initiatives to improve research excellence and support the diversification of the industry away from oil and gas. The Long-Term Plan for Research and Higher Education 2015–24, adopted in 2014, has three overarching objectives: enhanced competitiveness and innovation, tackling major social challenges and developing research communities of outstanding quality. The plan also aims to increase public expenditures and private investment in six long-term priority areas. The plan also sets a target for government appropriations for R&D to one per cent of GDP.

Table 1. Gross domestic expenditure on R&D (GERD)

	NOR	OECD
GERD		
USD million PPP, 2014	5 764	1 181 495
As a % of total OECD, 2014	0.5	100
GERD intensity and growth		
As a % of GDP, 2014	1.71	2.38
(annual growth rate, 2009-14)	(+2.3)	(+2.3)
GERD publicly financed		
As a % of GDP, 2013	0.77	0.61
(annual growth rate, 2008-13)	(+2.4)	(+2.5)

Figure 1. Major STI policy priorities, 2016





Hot issues

Encouraging business innovation and innovative entrepreneurship

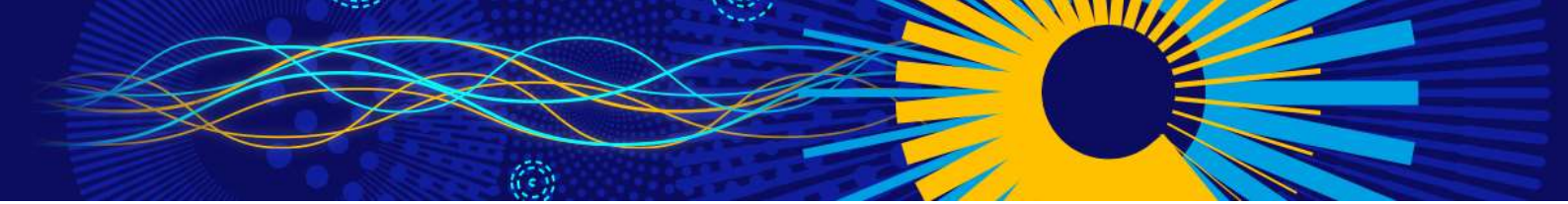
Norway's BERD accounts for 0.92% of GDP in 2014, slightly below the OECD median (figure 5^d), partly owing to structural features of the Norwegian economy. The overall business environment is conducive with young patenting firms per GDP and the ease of entrepreneurship index at the OECD median (figure 5^j). The Research Council of Norway (RCN) and Innovation Norway, together with some other specialised agencies, provide government support for business R&D and innovation. A number of new programmes were developed in 2015-16 in order to finance business innovation in specific technology areas. For example, the TRANSPORT2025 programme supports both basic and applied research with a view to create economically, socially and ecologically sustainable transport system. MILJØFORSK programme was created to streamline knowledge about environmental challenges and values and provide stronger research base for the transition to a greener society. The programme supports mainly applied research, but also basic research and innovation projects (budget for 2016 was estimated at USD 9 million PPP (NOK 89 million). Other programmes cover aquaculture-related research (HAVBRUK2), marine ecosystem research (MARINFORSK) as well as health and treatment services (HELSEVEL, BEHANDLING and BEDREHELSE). Most of these programmes encourage participation in international research cooperation initiatives, i.e. Horizon 2020. Horizontal instruments are also used to foster innovation firms, such as the R&D tax credit 'Skattefunn', which maximum amount for eligible tax deduction was raised in 2014, 2015 and 2016, for R&D carried out in-house or outsourced to higher education institutions and research institutes. The broad-based Programme for User-driven Research-based Innovation (BIA), implemented by the RCN to support companies by providing support for R&D projects based on the companies' own strategies and challenges independent of field or topic, has been strengthened in the period 2014–16..

Improving overall human resources and skills

Norway has a well-educated workforce, a relatively high share of the adult population with tertiary education, quite a high percentage of doctoral graduates in science and engineering, and the ratio of higher education expenditure to GDP is above the OECD median (figure 5^{s,t,w}). The Long-Term Plan programmed 500 new positions during the period from 2015 to 2018 in order to strengthen the scientific base. A tenure track positions system was piloted in 2015 with the objective of contributing to the recruitment of talented PhD graduates. The tenure track provide for more attractive conditions and a more predictable career development. It will allow developing the candidate's skills in teaching, research, communication and innovation. Since 2014, the Public Sector PhD scheme provides financial support to public sector institutions who allow their employees to take a PhD degree relevant in their area of responsibilities. The public servants formally admitted to a PhD programme may apply for a grant from the RCN to cover their salary and other expenses. The grant is up to 50% of the applicable rate for doctoral research, and remaining costs are paid by the employer (total budget in 2014 was USD 0.4 million PPP (NOK 4 million).

Improving the governance of innovation system and policy

With public R&D expenditure above the OECD median, Norway's public research performs reasonably well in terms of numbers of world class universities and academic publications, but less so in patenting (figure 5^{b,c,p}). To increase the effectiveness and efficiency of public research, several reforms have been initiated in the framework of the Long-Term Plan's objective to develop research communities of outstanding quality. A reform of higher education institutions, initiated in 2014, resulted in the merger of several higher education institutions. This reform was prepared and implemented in close cooperation with the HEIs, which were invited in 2014 by the Ministry of Education and Research to submit strategic plans in a 'consolidated higher education landscape'. On 1 January 2017 the number of public HEIs will have been reduced from 33 to 21 through seven mergers. Four private HEIs have also merged. The system of funding of HEIs has evolved significantly in recent years. An expert commission delivered a report in 2014 with recommendations in favour of institutional performance contracts, with direct effect on a portion of the block funding.



Performance contracts are currently being piloted in some institutions, prior to potential gradual extension. The indicators of the block grant funding system of higher education institutions, first introduced in 2002, were also revised in 2015 on the basis of the report, in particular to reflect a wider range of third party funding types and induce a more strategic approach within HEIs. Since 2016, university accreditation was subject to stricter requirements in order to improve the quality of HEIs' research and higher education activities. Requirements focus mainly on the nature and size of PhD programmes (critical mass of PhD students, relevance to regional business community, etc.).

Addressing challenges of STI globalisation and increasing international cooperation.

Internationalisation remains an overall priority of the government's research and innovation policy. Norway is better integrated in the international network in scientific research than in innovation (figure 5⁹). A strategy that identifies clear objectives and priorities for research co-operation in the context of Horizon 2020 and the European Research Area was adopted in 2014. This strategy formulates four objectives for Norway's participation in Horizon 2020 and ERA: research and innovation quality; innovation capacity, value creation and sustainable economic development; social welfare and more sustainable social development; development of Norway's research and innovation sector, STI policies, and patterns of co-operation. Furthermore, the government has set the target that two per cent of the competitive funds in Horizon 2020 shall go to Norwegian actors. The aforementioned Long-Term Plan for Research and Higher Education reiterated the importance of the cooperation of Norwegian actors in EU programmes and ERA activities by raising appropriations by USD 44 million PPP (NOK 400 million) programmes that stimulate good Norwegian participation in the EU Horizon 2020 programme. The budget of the STIM-EU Programme of the RCN that support the participation of Norwegian PRIs in the EU Framework Programme was increased in 2015, with a budget of USD 15.5 million PPP (NOK 140 million).



Some key STI performance indicators

Figure 2. Economic performance

Labour productivity, GDP per hour worked,
index 2005=100

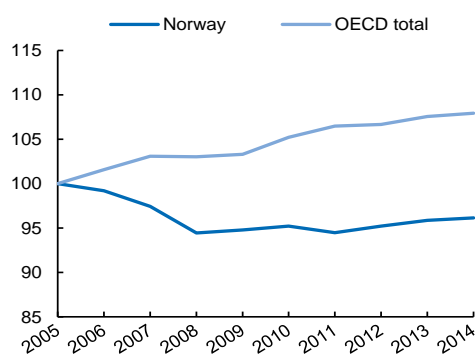


Figure 3. Environmental performance

Green productivity, GDP per unit of CO₂
emitted, index 2005=100

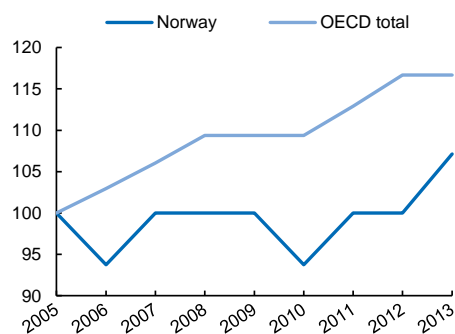
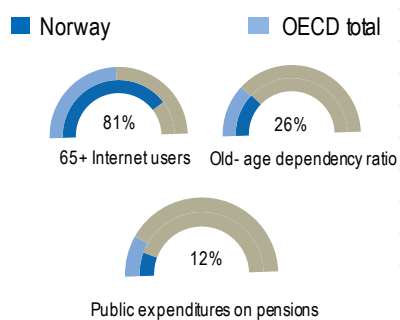


Figure 4. Ageing

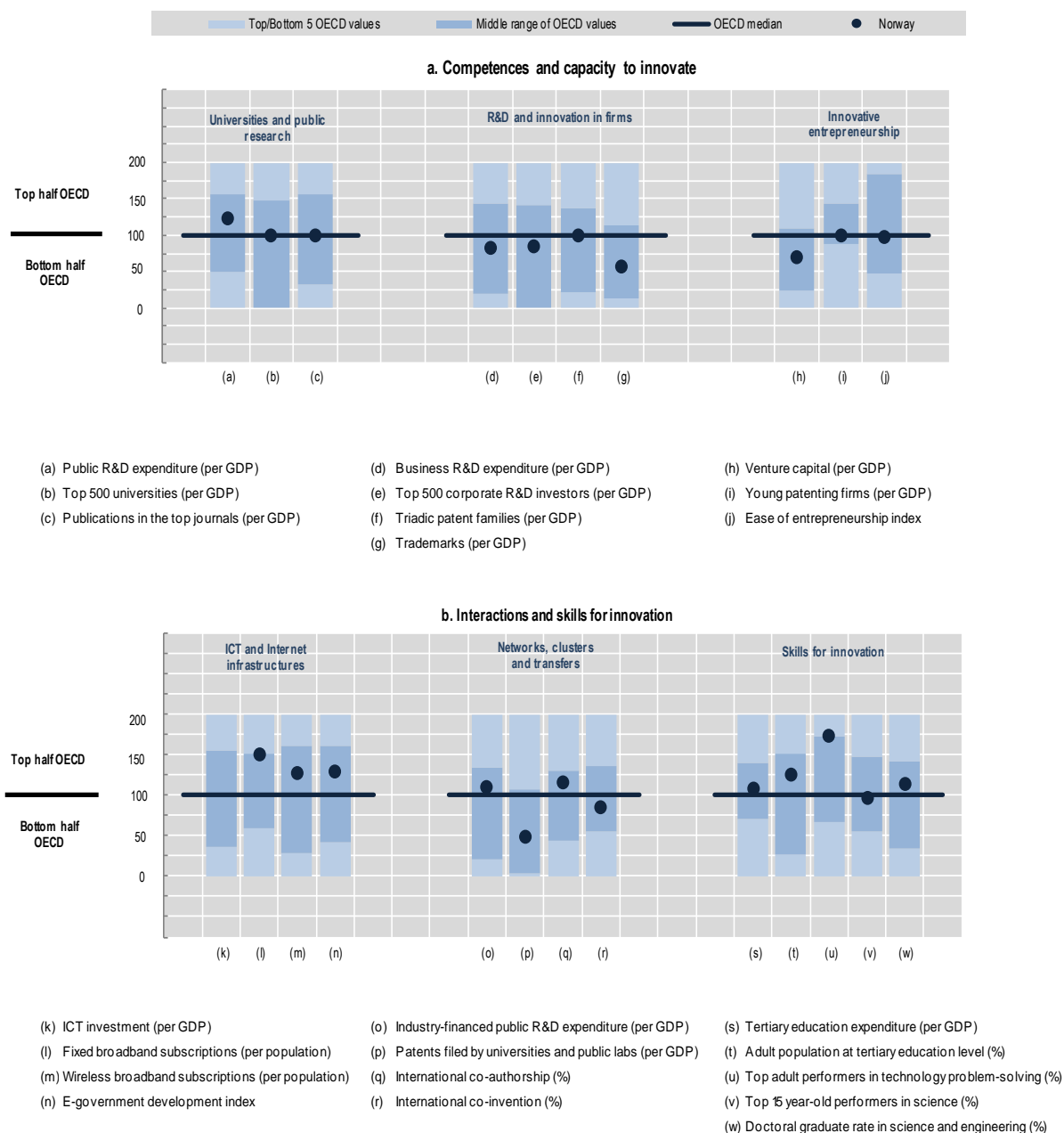
2015 or latest available, percentages



Benchmarking national STI systems

Figure 5. Science and Innovation in Norway

Comparative performance of national science and innovation systems, 2016



Note: Normalised index of performance relative to the median values in the OECD area (Index median=100).



Highlights of the Norwegian STI system

STI policy governance

A White Paper 'Long-Term Perspectives – Knowledge Provides Opportunity (2012-13)' proposed a new approach to the formulation of national research policy to ensure clear priorities for long-term co-ordinated public investments in research and higher education. On this basis, the new government has adopted in 2014 the Long-Term Plan for Research and Higher Education 2015–2024. In accordance with the commitment to update it every four years, the plan will be revised in 2018 following a comprehensive assessment of progress in achieving its objectives by the OECD. Beside the three overarching objectives, the Long-Term Plan for Research and Higher Education 2015–2024 defines six long-term priority areas, including four thematic ones: seas and ocean; climate, environment and clean energy; public sector renewal, better and more effective welfare, health and care services; enabling technologies. Several sectors, most often directly related to the above-mentioned priority areas, had already adopted specific research and innovation strategies under the label of “21-Strategies” (Energi21, Klima21, Maritim21, etc.) since 2001. New strategies have been adopted in recent years. Following an inclusive process, the development of these strategies is led by a committee with representatives from all concerned parties. Although most of these are one-off strategic initiatives, in a few cases they have transformed into dedicated platforms to improve cooperation between the various actors, including public authorities, in corresponding areas. For instance, the Health&Care21 initiative, signed in 2014, aims to promote evidence-based health and care services characterised by high quality, patient safety and efficiency. It was designed by a dedicated strategy committee composed of representatives from industry, higher education, hospitals, regional health authorities, user organizations, and government agencies. An advisory board with broad representation has been appointed by the Ministry of Health and Care Services to serve as a permanent dialogue forum with responsibility for follow-up of the strategy. The implementation of the government's strategy is guided by a specific action plan for the period 2015–2018 which contains a list of 40 actions within the areas identified in the strategy.

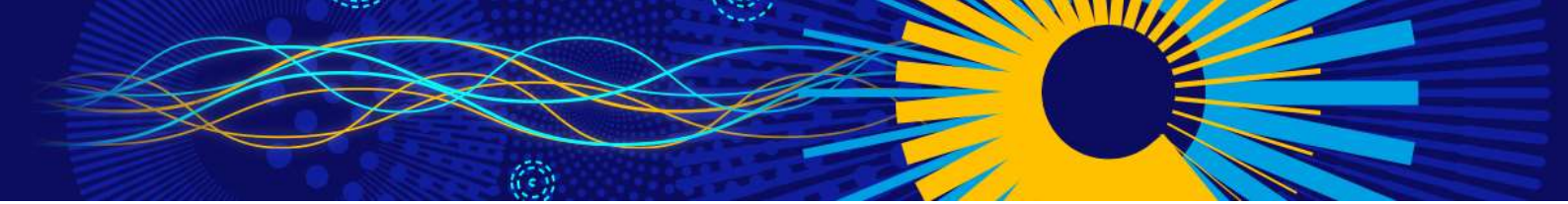
Universities and public research

Since 2013, measures have been taken to encourage and promote open access to results of publicly funded research, including promoting open-access publications with funding support. The new government has engaged in additional actions to make the results of wholly or partially government-funded research publicly available for the benefit of both the research community and society. The policy on open access of the Research Council of Norway, introduced in 2009, was revised in 2014. It requires RCN grants beneficiaries to make their scientific publications resulting from funded research available in open access repositories. It is planned that from 2019 there will be no more targeted financial support for open access publishing from the RCN as publishing costs will be included among the indirect costs in applications. An open access policy framework was introduced in the 2013 White Paper on research (Long-term perspectives – knowledge provides opportunity). In 2016, the Ministry of Education and Research established a working group that proposed a set of National guidelines for Open Access to Research results in line with the EU Competitiveness Council decision in May 2016 that all scientific papers should be freely available by 2020. The National Financing Initiative for Research Infrastructure (INFRASTRUKTUR) supports infrastructures that give open access to research data. A call for proposals launched in 2014 gave priority to infrastructures that facilitate open access to publicly funded research data and safeguard important Norwegian data series. Those infrastructures are required to comply with the principles and guidelines set out in the RCN's policy for open access to research data.

Technology transfer and commercialisation

An evaluation of the schemes for commercialisation of public research concluded in August 2015 that the support to research commercialization has become more efficient; but that there is a lack of coordination between the different agencies. The evaluation could not find evidence that the new rules regarding the establishment of companies introduced in 2013 have led to a significant increase in companies established,





technology sales or patents submitted by the universities. Technology Transfer Offices (TTOs) that are totally or partly owned by the universities play a key role in the knowledge transfer and commercialisation activities by the HEIs in Norway. The TTOs are partly financed by Commercialising R&D results programme (FORNY-2020, budget of USD 28 million PPP (NOK 262 million) in 2016). FORNY-2020 enables TTOs to develop research-based business ideas into viable companies and licensing deals. The programme also funds projects in need of proof-of-concept within the portfolio of TTOs. The aforementioned evaluation found that although the commercialisation of research results has increased, it has not been the case of the number of patents or cooperation with the business sector in recent years. Administered by Innovation Norway, the Pre-seed Aid Scheme for TTOs and incubators introduced in 2015 aims to contribute to the growth of promising start-ups by matching the amount of capital provided by investors (USD 0.3 million PPP (NOK 3 million) per enterprise, but not more than 50% of the total investment). The capital is provided as interest-free loans to TTOs/incubators or business angel networks, for investments in innovative, R&D-intensive start-ups.

Structural aspects and specialisation

Figure 6. Structural composition of BERD, 2013 or latest year available
As a % of total BERD or sub-parts of BERD

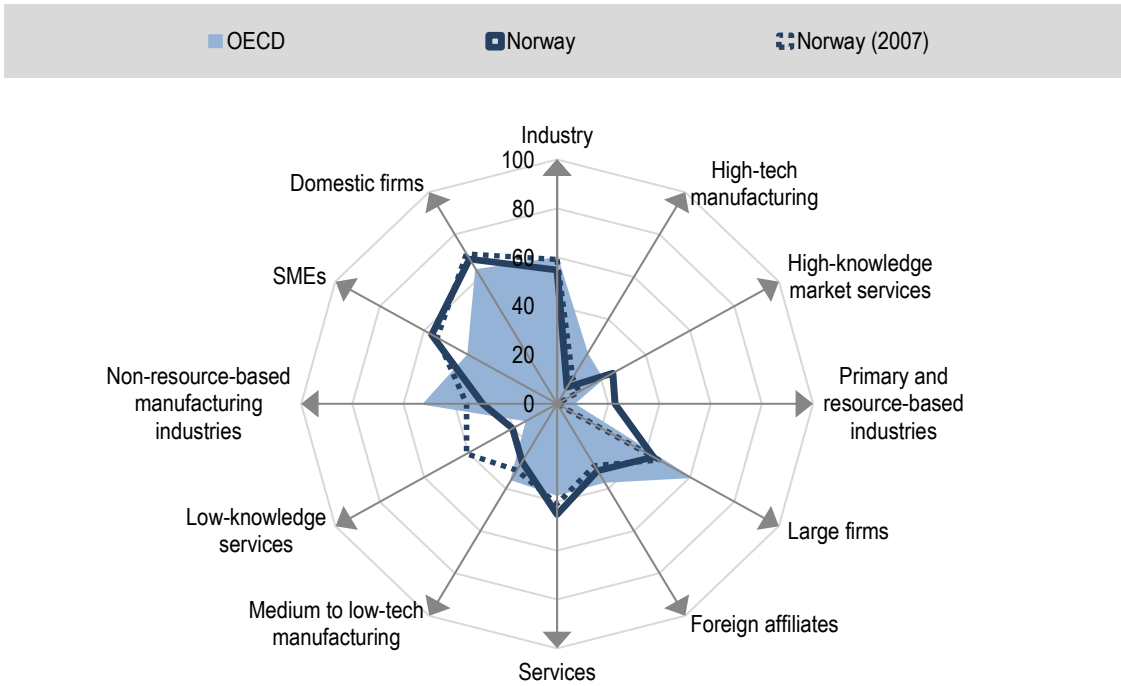
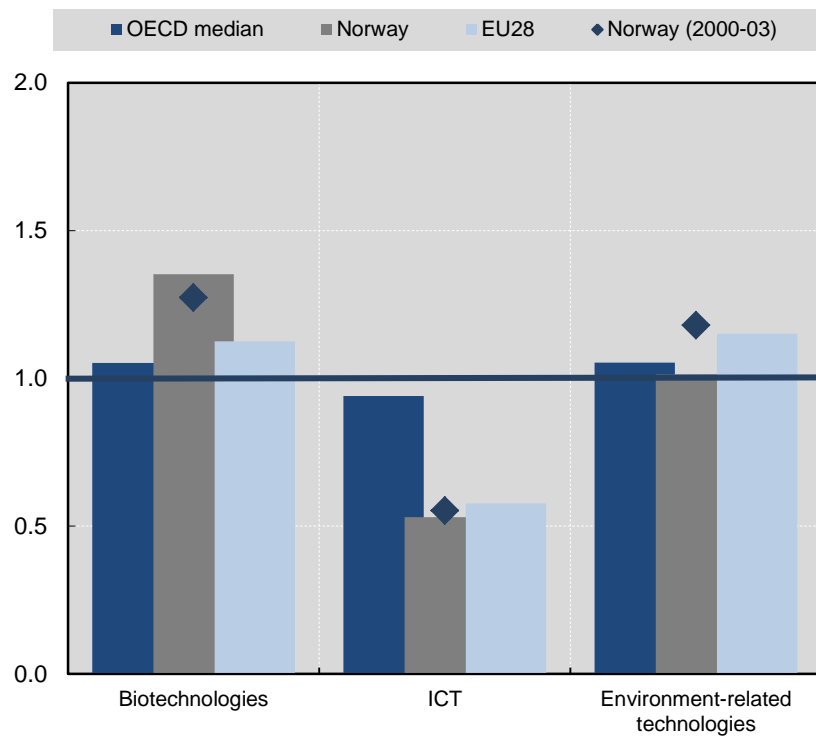
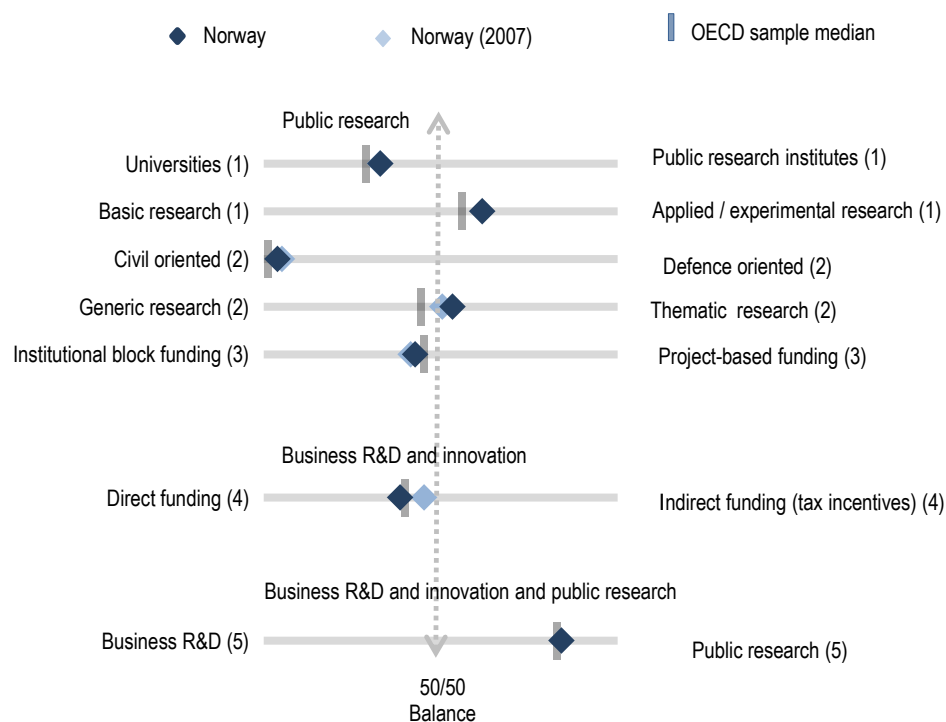


Figure 7. Revealed technology advantage in selected fields, 2011-13
Index based on IP5 patent families applications



National STI policy mix

Figure 8. Allocation of public funds to R&D, 2014 or latest year available
By sector, type of R&D and mode of funding



(1). Balance as a share of both higher education (HERD) and government (GOVERD) R&D expenditure.

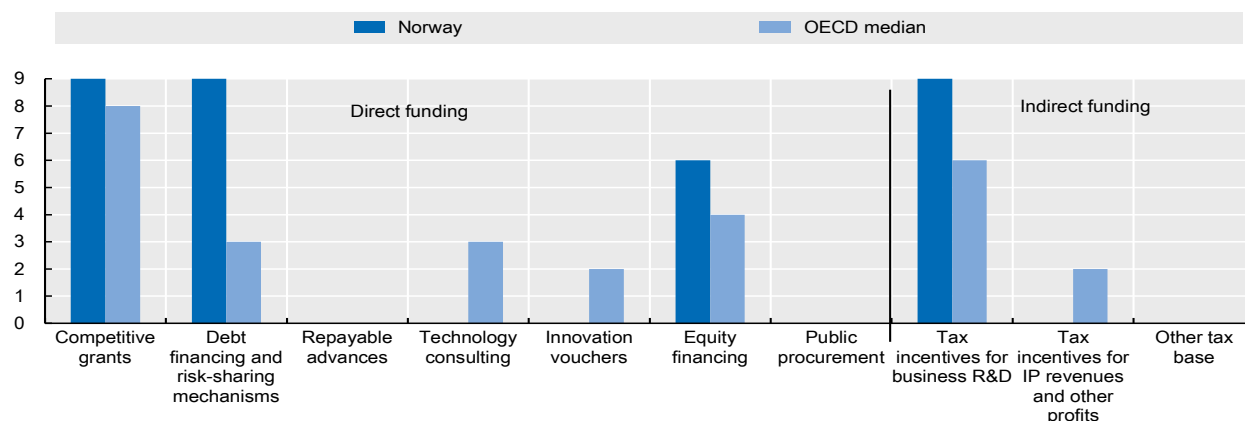
(2). Balance as a share of total government budget appropriations and outlays for R&D (GBAORD).

(3). Balance as a share of total funding to national performers.

(4). Balance as a share of both indirect funding (through R&D tax incentives) and direct funding (through grants, procurement, loans, etc.).

(5). Balance as a share of publicly-funded HERD and GOVERD and components of (4).

Figure 9. Most relevant policy instruments of funding for business R&D, 2016
Country self-assessment, index (9 = high and increasing relevance to 0 = not used)



Note: Note: Policy information comes from country responses to the EC/OECD STI Policy Survey 2016 and 2014. Norway's responses are available in the EC/OECD STI Policy Database, edition 2016 at http://qdd.oecd.org/DATA/STIPSurvey/NOR...STIO_2016.

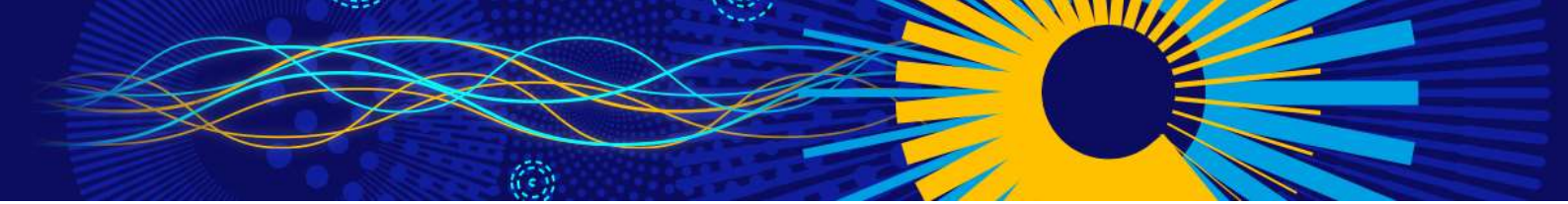
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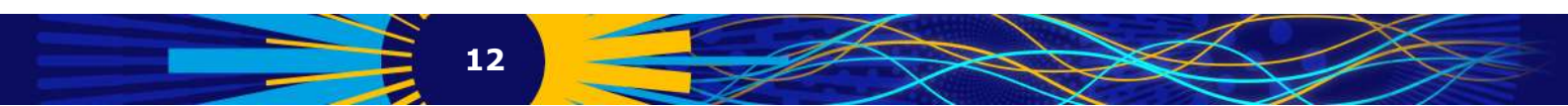
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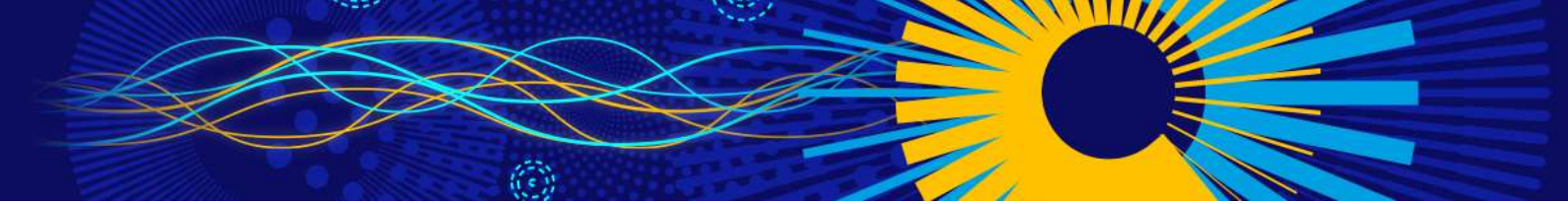
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