

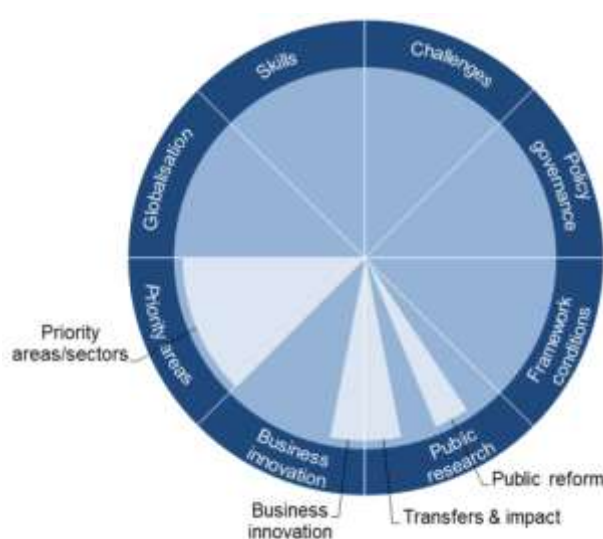
ESTONIA

Estonia is a small European economy, which has experienced turbulence since 2009 from severe contraction in the course of the global financial crisis. While economic growth was 1.6% in 2013, private consumption has boosted it back to a level of 1.9% in 2016 with a projection of 2.4% for 2017. Following the Knowledge-based Estonia II Research and Development and Innovation (RDI) Strategy (2007-13), the government has created two medium-term strategies: the Estonian RDI Strategy (Knowledge-based Estonia, 2014-20) and the Estonian Entrepreneurship Growth Strategy (2014-20). The overall aim of the development of RDI is to create favourable conditions for an increase in productivity and in the standard of living, for good-quality education and culture, and for the country's overall development. The Strategy for R&D and Innovation targets GERD at 3% of GDP and BERD at 2% of GDP by 2020.

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

	EST	OECD
GERD		
USD million PPP, 2014	531	1 181 495
As a % of total OECD, 2014	0.0	100
GERD intensity and growth		
As a % of GDP, 2014	1.43	2.38
(annual growth rate, 2009-14)	(+4.5)	(+2.3)
GERD publicly financed		
As a % of GDP, 2014	0.72	0.61
(annual growth rate, 2009-14)	(+4.3)	(+2.5)

Figure 1. Major STI policy priorities, 2016



Hot issues

Encouraging business innovation and innovative entrepreneurship

During the decade ending in 2014, BERD as a percentage of GDP grew faster than in most OECD countries and has reached 0.63%, a value still below the OECD median (figure 5^d). Estonia has a conducive business environment, and a slightly below average supply of venture capital (figure 5^{j,n}). Innovation performance, however, has yet to reach OECD levels (figure 5^{e,g}). BERD is concentrated in medium-high to low-technology manufacturing and services (figure 6) and in a small number of firms. Productivity growth and greater employment through capital-deepening and structural change to high-added-value activities are central objectives of the government's economic policy. The official aim is to lift the share of employment in high and medium-high technology sectors in total employment from 3.6% in 2015 to 9% by 2020. Innovation is



considered essential to achieving these goals, and the government is committed to stimulating business R&D and innovation through direct funding and non-financial measures, with a combined budget of USD 260 million PPP (EUR 140 million) over 2014-20. According to the Estonian Development Fund (EDF), around 350 start-ups are currently located in Estonia. The government aims to increase this number up to 1 000 by 2020. The Start-Up Estonia 2014-20 initiative, managed by the EDF and financed by the European Regional Development Fund, offers training programmes, such as the Estonian Chapter of Founder Institute (established in 2014). In 2015, marketing training programmes and the innovation platform EngageEstonia were added to the initiative. **The Entrepreneurs' Development Programme** was implemented in 2013 to increase the international competitiveness of Estonian firms through better strategic planning, R&D and skills development. Launched in 2014, the aforementioned Entrepreneurship Growth Strategy 2014-20 enhances public-sector capacity, the design of public services, innovative procurement, **enterprises'** development activities, public-private partnerships, demonstration projects, as well as infrastructure and information technology solutions. **Estonia's Innovation voucher** scheme went through a substantial revision in 2014. The total budget for 2014-20 has been raised to USD 19 million PPP (EUR 10 million). The voucher itself is now two-fold: Support is given in the form of grants with a maximum of either USD 7 000 PPP (EUR 4 000) per applicant, from which 20% has to be co-financed by the company, or of USD 37 000 PPP (EUR 20 000), with company co-financing of 30%.

Policy design and implementation

The Research and Innovation Policy Monitoring Programme (TIPS Programme), implemented by the University of Tartu in 2011, has been revised in 2015 and fosters co-operation between government offices, universities and the private sector and increases the role of science and research as a support for the Estonian economy. USD 2.4 million PPP (EUR 1.3 million) are allocated along seven work packages: 1) intellectual property rights in research and development; 2) public funding of research activities in Estonia; 3) leadership and management models of Estonian research and development institutions; 4) management of co-operation between higher education institutions and industry; 5) complex analysis of research, development and innovation policy; 6) internationalisation of research, development and innovation activities; 7) and designing the Estonian research, development and innovation strategy for 2014-20.

Targeting priority areas/sectors

Investing in smart specialisation high-growth areas to increase the return on public investment in R&D is the guiding principle for targeting priority areas. The new RDI Strategy (Knowledge-based Estonia, 2014-20) prioritises RDI investments selected and managed by the smart specialisation method to foster faster growth in the selected fields. These are: ICT, including the use of ICT in industry and other sectors, cyber-security and software development; health technologies and services, including biotechnology and e-health (IT use in the development of medical services and products); and more effective use of resources, including materials science and industry and innovative construction, i.e. **"smart houses"**, **health-promoting foods**, chemical industry (more effective use of oil shale). A Green Book of New Industrial Policy was adopted in 2016 that **upgrades the role of Estonia's industrial sector** in global value chains through R&I. Moreover, energy, sustainable development and environmental issues are increasingly important government priorities. The centres of excellence and the competence centres also target ICTs, the environment, new materials, health care and medicine.

Reforming public research (including university research)

Public research has improved significantly over more than a decade. Today, Estonia has a relatively strong public research system, with a high level of public R&D expenditures and strong performance in terms of international scientific publications (figure 5^{a,c}). The system maintains a balance between basic and applied research (figure 7) and is quite well connected to global knowledge and innovation networks (figure 5^{a,r}). In 2014, the government adopted an institutional package to boost the competitiveness and increase the efficiency of higher education and R&D institutions, with a budget of USD 241 million PPP (EUR 129 million).



USD 230 million PPP (EUR 123 million) of this is a financial contribution to support institutions' comprehensive development plans, structural changes and mergers in higher education and R&D institutions, as well as measures to strengthen academic and research quality. In 2014, the government revised its Research Infrastructures Roadmap for upgrading existing research infrastructures and creating new ones. It classifies 18 research infrastructures as having national importance, including the European Strategy Forum on Research Infrastructures (ESFRI) projects, to guide public investment in R&D infrastructure over the next 10-20 years. By continuing to modernise R&D infrastructures, the government's priorities are to achieve the sustainable funding and maintenance of R&D infrastructures and to support their effective use and sharing.

Some key STI performance indicators

Figure 2. Economic performance

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

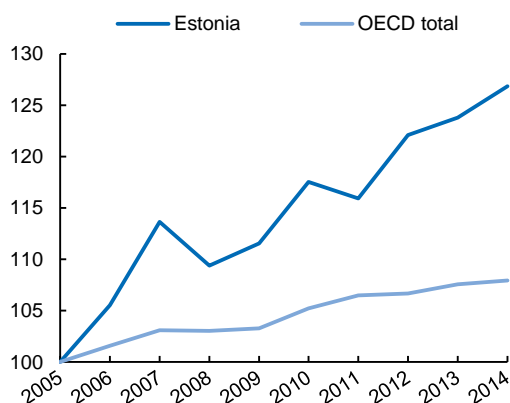


Figure 3. Environmental performance

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

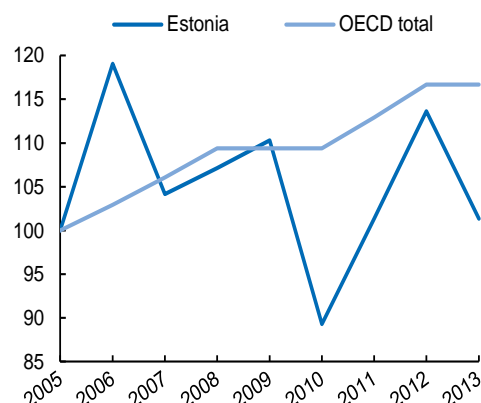
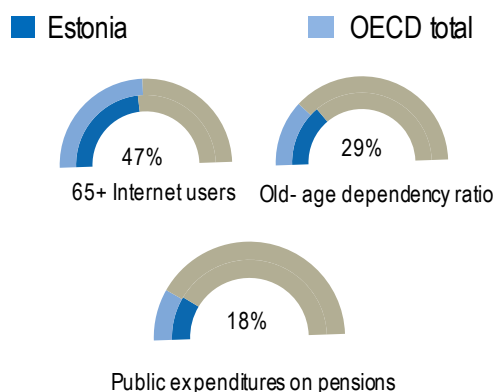


Figure 4. Ageing

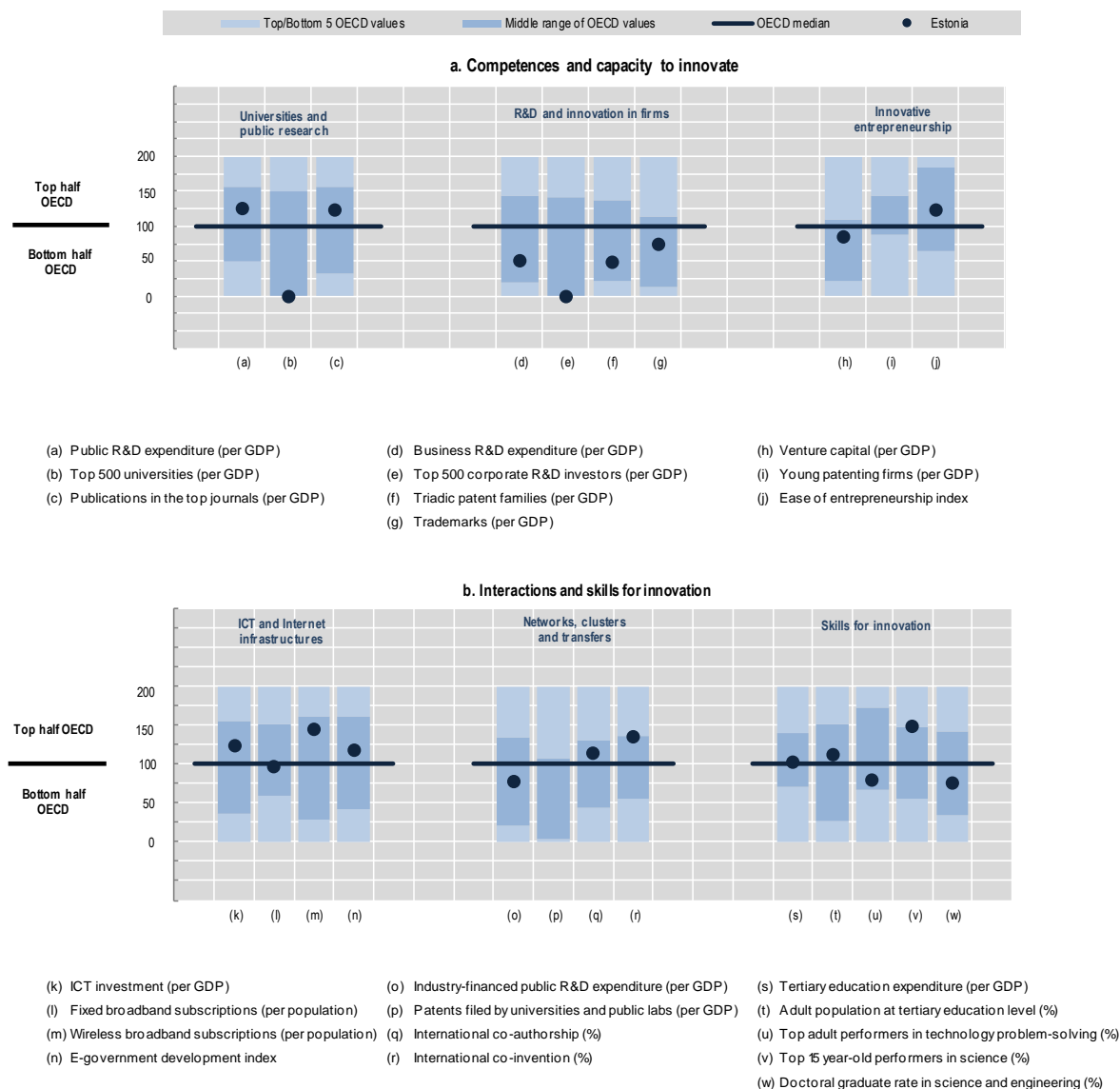
2015 or latest year available



Benchmarking national STI systems

Figure 5. Science and Innovation in Estonia

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 Estonian STI system

New challenges

Estonia intends to use research results for solving socio-economic challenges in different policy fields. A programme addressing socio-economic challenges through R&D is currently in preparation. One of those challenges is Estonia's shrinking and ageing population. Labour force statistics show that the population declined continuously between 2005 and 2014. Public expenditure on pensions amounted to 18% in 2015 (4). This has resulted in growing demands and expectations concerning the quality of the health care system. In this context, the new R&D and Innovation Strategy for the Estonian Health System was designed by the Ministry of Social Affairs and launched in 2015. This initiative aims at renewing the health system by facilitating research and partnerships with research institutions and health technology businesses. Similarly, Estonia's e-Health Strategic Plan 2015-20 addresses the quality and infrastructure of health data, personalised e-services and personal medicine, comprehensive case handling and integrated services, as well as monitoring and analysis of the performance of health services. Another challenge is to increase the participation of women in the higher education system. Although female researchers are relatively well represented in science and research, especially in engineering, manufacturing and construction, the number of women in higher executive positions in R&D remains modest. The country's authorities intend to address this imbalance with new initiatives.

STI policy governance

The two new medium-term strategies mentioned above were prepared together in a co-ordinated process. Based on the 2011 amendments of the Organisation of Research and Development Act (ORDA), several changes in governance have been made since 2012. The Estonian Research Council was established in March 2012 and combines the functions of several previous bodies (the Estonian Science Foundation, the Research Competence Council and the Department of International Co-operation of the Archimedes Foundation). A strategic aim of the Estonian R&D and Innovation Strategy (2014-20) is to strengthen the role of branch ministries in supporting R&D in socio-economically important areas. Representatives of these ministries are being invited to the advisory bodies of the Ministry of Research and the Ministry of Economic Affairs and Communication (MEAC) and are involved in preparations to join international research networks (such as joint programming initiatives).

ICT and Internet infrastructures

Estonia's wireless subscription rate is well above the OECD median (figure 5^m), and the ICT investment rate as a percentage of GDP increased from 2.1% in 2007 to 2.8% in 2013 (figure 5^k). The EDF identified ICT as one of the major fields of growth.

Technology transfer and commercialisation

Industry-science linkages are not strongly developed (figure 5^b). However, efforts have been made to strengthen interactions between the scientific and business communities. For example, Estonia's Smart Specialisation Strategy 2014-20 and the Work Practice System 2015-20 bind education and training more efficiently to labour-market needs and facilitate co-operation between enterprises and educational institutions to increase the economic impact of R&D. The European Social Fund allocates USD 55.7 million PPP (EUR 30 million) to the latter.

Clusters and regional policies

The number of regional policy initiatives remains limited. The Smart Specialisation Strategy serves as the overall theme of several government policies. The authorities aim to harmonise the priorities of R&D, higher education and enterprise policies through this strategy. Instruments to support smart specialisation include





co-operation schemes such as competence centres and clusters and demand-side measures. The technology competence centres, part of a programme with the same title, were launched in 2014 and are knowledge-based organisations that focus on long-term co-operation between universities and businesses; they are created with the help of the public sector. The aim of the programme is to develop technology-based products and services to increase international competitiveness and smart specialisation. During 2014-20, six state-financed competence centres will operate in Estonia. Similarly, the objective of the Cluster Development Programme (2015-20) is to increase: 1) the added value of participating companies; 2) the sales volumes of their products, and 3) co-operation between the companies and research establishments.

Globalisation

Research in Estonia has international visibility and covers the main fields of higher education and culture. Estonia is strongly integrated into international knowledge networks as measured by its excellent performance in international co-authorship and co-patenting (figure 5^q). Estonia participates in the Enterprise Europe Network to increase the international competitiveness of its SMEs, with a particular focus on cross-border R&D and innovation. The Estonian Euraxess Services Network provides information services and customised assistance to promote the inward and outward mobility of foreign and Estonian highly-skilled people.

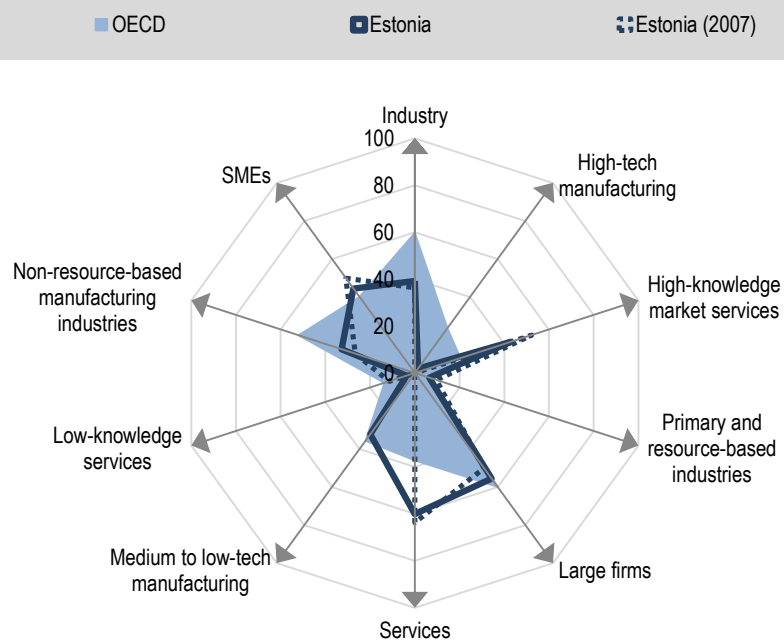
Skills for innovation

Estonia already has a good skills base, and its 15-year-olds perform well in science (figure 5^{s,t,v}). It is an attractive place for R&D, and a researcher career is relatively popular. With regard to skills development, the **government's priorities are to continue to develop human resources** with a focus on engineers and to turn the brain drain into balanced brain circulation. To address the below-average rate of doctoral graduates in S&E (figure 5^w), several public initiatives aim to raise young **people's** interest in S&T careers. One of the main pillars of the Lifelong Learning strategy 2020 document is to foster systematic development of creativity and entrepreneurship at all levels and in all types of education. Since 2016, ministries, universities, business unions, schools and different agencies such as the Foundation INNOVE and Enterprise Estonia Foundation (EAS) have been developing an entrepreneurship education methodology and teaching materials and providing in-service education for teachers. Similarly, the Innovation and Entrepreneurship Awareness Programme (2014-20) provides advice in regional development centres and organises an entrepreneurship week and competitions to raise awareness. As a guiding principle, entrepreneurship education will not only train future entrepreneurs but also address all engaged citizens with a view to fostering a broad innovation culture. The R&D and Innovation Strategy aims for 300 PhD graduates a year by 2020.



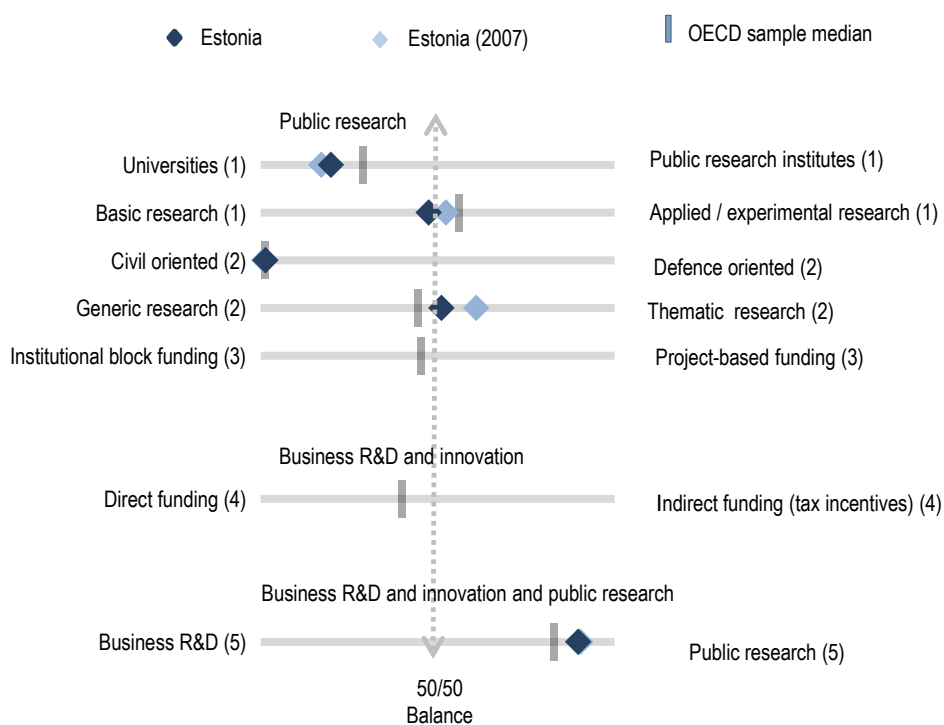
Structural aspects and specialisation

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



National STI policy mix

Figure 7. 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.

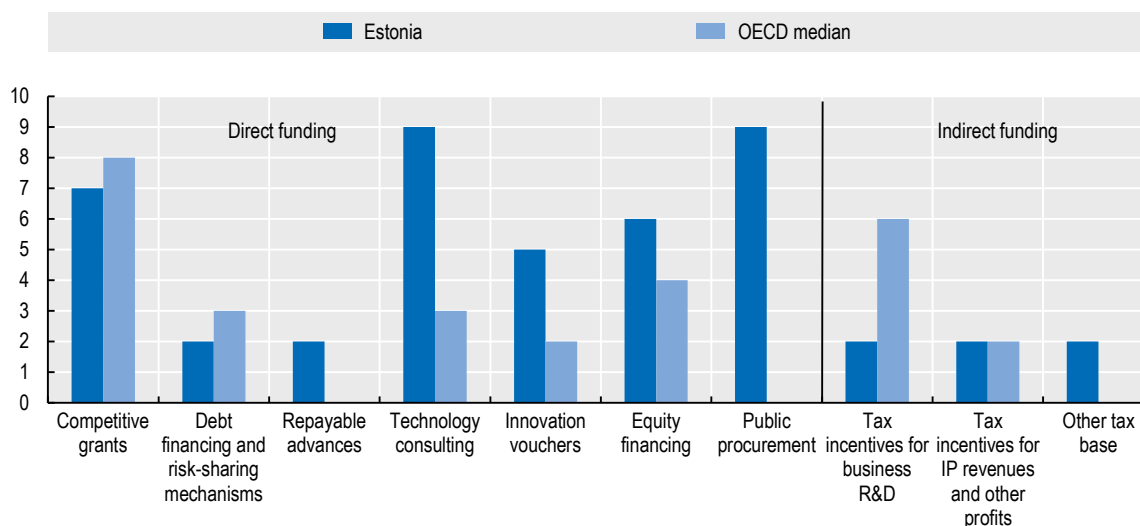
(2). Balance as a share of total government budget appropriations and outlays for R&D (GBAORD).

(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 8. 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: Policy information comes from country responses to the EC/OECD International Survey on STI Policies (STIP) 2016 and 2014. Estonia's responses are available in the EC/OECD International Database on STI Policies, edition 2016 at http://qdd.oecd.org/DATA/STIPSurvey/EST...STIO_2016.

Source: See the reader's guide and methodological annex.

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