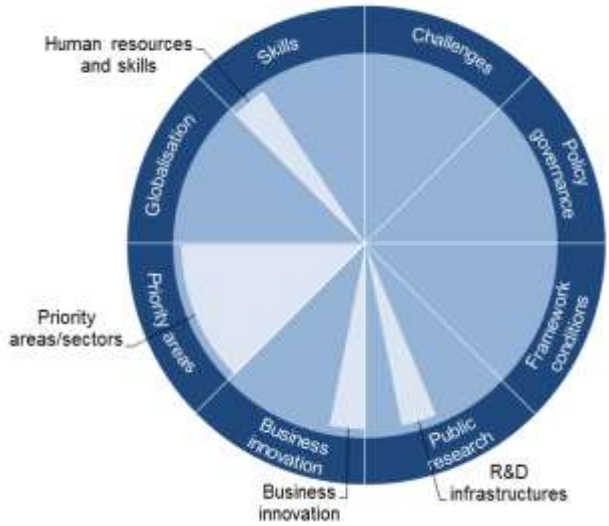
CANADA

Canada is the world's tenth-largest economy, an export-led economy, and a global leader in energy and natural resources markets. Challenging external economic conditions and the decline of global crude oil prices since mid-2014 have weighed on Canada's economic performance and growth prospects. Economic growth is projected to increase gradually in 2016 and 2017 as the natural resources sector slowly regains momentum. However, shifts in the markets for global natural resources and energy call for a diversification of the Canadian economy. In October 2015, the federal government committed to developing an Innovation Agenda that would reshape how Canada supports innovation and growth. Commitments were made to expand support for business innovation networks and clusters, promote the clean technology sector and the adoption of clean technologies, and increase funding to support innovation and growth-oriented firms. In June 2016, the federal government launched a consultation on the development of an Inclusive Innovation Agenda. This engagement focuses on six inter-related action areas: promoting an entrepreneurial and creative society; supporting global science excellence; building world-leading clusters and partnerships; growing companies and accelerating clean growth; competing in a digital world; and improving the ease of doing business.

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

	CAN	OECD
GERD		
USD million PPP, 2014	25 814	1 181 495
As a % of total OECD, 2014	2.2	100
GERD intensity and growth		
As a % of GDP, 2014	1.61	2.38
(annual growth rate, 2009-14)	(-2.2)	(+2.3)
GERD publicly financed		
As a % of GDP, 2014	0.72	0.61
(annual growth rate, 2009-14)	(+0.2)	(+2.5)

Figure 1. Major STI policy priorities, 2016



Hot issues

Encouraging business innovation and innovative entrepreneurship

Canadian BERD as a share of GDP decreased steadily over recent years, from 1.02% in 2009 to 0.80% in 2014, and remains well below the OECD median (figure 5[d]), despite the generous Scientific Research and Experimental Development (SR&ED) tax incentive. The SR&ED tax relief amounted to USD 2.4 billion PPP (3.0 billion Canadian dollars, CAD) in 2014 and accounted for 82% of total public support for business R&D (the figure excludes sub-national R&D tax incentives). This is one of the most generous R&D tax regimes in the world and the most relevant instrument for financing business R&D in the Canadian policy mix (figure 8). Yet, high policy relevance is currently given to direct funding instruments (e.g. competitive grants, debt and equity funding). For example, to increase direct support to small and medium-sized enterprises for industrial R&D, Budget 2016 provided the Industrial Research Assistance Programme with a further USD million PPP (CAD 50 million) in 2016-17. The new budget plan for 2016 announced USD 657 million PPP (CAD 800 million) over four years in support of Canada's new Innovation Agenda. As part of the Innovation Agenda's goals to better coordinate and align support for Canadian innovators, the government announced support for a new initiative to help high-impact firms to scale up and raise their global competitiveness. The government also earmarked USD 3.3 million PPP (CAD 4 million) over two years to renew the Canadian Technology Accelerator Initiative, which provides expertise and assistance to innovative technology firms to access global markets. Furthermore, the government announced it will work with stakeholders to develop a new Performance Measurement Framework for Canadian business accelerators and incubators.

Improving overall human resources and skills

Canada enjoys a strong skills foundation and performs well on several skills indicators. The level of adult tertiary educational attainment is among the highest in OECD countries (figure 5[l]). Canadian 15-year-olds and Canada's adult population rank relatively high in the PISA and PIAAC tests in science and problem-solving (figure 5[u,v]). The Youth Employment Strategy (YES) helps Canadian youth between the ages of 15 and 30 years to gain the skills, job experience and abilities needed for a successful transition to the workplace. YES includes three sub-initiatives (Career Focus, Skills Link and Summer Work Experience, which includes Canada Summer Jobs). Each sub-initiative has specific objectives and target groups and is delivered through eleven departments, including the National Research Council (NRC) and its Industrial Research Assistance Programme. Budget 2016 invested an additional USD 136 million PPP (CAD 165.4 million) in YES in 2016–2017. This additional funding is used to: create new green jobs for youth; increase the number of youth who access the Skills Link program (which helps young Canadians, including Indigenous and disabled youth, transition to the workforce); and increase job opportunities for young Canadians in the heritage sector, under the Young Canada Works programme.

Strengthening public R&D capacity and infrastructure

Canada has a strong university-centred research system (figure 8), which performs above the OECD average (figure 5[a,b,c]) and is well linked to industry funding (figure 5[o]). Canada ranks 7th in the OECD (2014 or latest available year) in terms of HERD intensity (higher-education research and development expenditures as a percentage of GDP). Within the next decade, the Canada First Research Excellence Fund will provide USD 1.2 billion PPP (CAD 1.5 billion) to advance the global research leadership of Canadian institutions. Funding is awarded following a competitive peer-reviewed adjudication process involving experts from around the world. Since 2014, the federal government has also continued to make additional new investments in research through its granting councils, including both funding for targeted research and, more recently in Budget 2016, for investigator-led discovery-based research, with USD 78 million PPP (CAD 95 million) support granted annually on an ongoing basis. In addition, the federal government provided up to USD 1.6 billion PPP (CAD 2 billion) over three years for strategic projects to improve the research and innovation infrastructure. In line with the government's commitment to further develop research capacity

in clean technologies and sustainable energy solutions, research chairs in sustainable technologies will be established. To ensure that its support for fundamental research is coherent, effective and agile enough to keep pace with the dynamic nature of contemporary science, on 13 June 2016 the federal government announced an independent review of federal funding for fundamental science. The Panel will report in December to provide the government with advice on how to strengthen Canada's international standing in fundamental science and ensure that Canadian scientists have the tools, training and support needed to excel globally.

Targeting priority areas/sectors

Canada has a strong relative specialisation in biotechnology and ICT, but its RTA index in environment-related technologies is lower than the OECD median and has decreased significantly in past years (figure 7). Recently, Canada has joined Mission Innovation, which is a global partnership, announced at the United Nations 2015 Climate Change Conference, aimed at doubling government investment in clean energy innovation over five years, while encouraging private-sector leadership in clean energy. The Mission Innovation initiative also seeks to better coordinate and report on clean energy efforts. In addition, health-related research has been a focus of recent budgets. To fully reap the benefits of public investment in health research conducted in Canadian universities, and to advance the development of high-value therapies, the government will provide up to: 1) USD 26.3 million PPP (CAD 32 million) over two years, starting in 2017-18, to fuel the growth of the Centre for Drug Research; 2) USD 16.4 million PPP (CAD 20 million) over three years to the Brain Canada Foundation for its Canada Brain Research Fund; and 3) USD 10 million PPP (CAD 12 million) over two years to support the Stem Cell Network's research, training and outreach activities to further Canada's longstanding leadership in this research field. The Technology Demonstration Programme, launched in 2013, provides non-repayable contributions to support large-scale collaborative R&D projects and ensure a concentration of technology development in priority areas (e.g., aerospace, defence, space, and security) that show significant potential for broad-based and long-term economic benefits and in the next-generation of manufacturing, technical capabilities and services. The latest federal budget announced the extension of the Automotive Innovation Fund (currently scheduled to sunset at the end of 2017-18) through to the end of 2020-21. The government will also examine approaches that will allow it to maximize the impact of federal support offered to the automotive sector. Opportunities for the space industry sector have also been created, with USD 311 million PPP (CAD 379 million) over eight years provided to the Canadian Space Agency so as to extend the country's participation in the International Space Station to 2024. In addition, the federal government is supporting the transformation of the agriculture and forestry sectors. USD 71 million PPP (CAD 86 million) have been provided over two years, starting in 2016–17, to extend the Forest Innovation Programme and the Expanding Market Opportunities Programme and encourage R&D and technology transfer. Likewise, Budget 2016 provided USD 25 million PPP (CAD 30 million) over six years, starting in 2016-17, to Agriculture and Agri-Food Canada to support agricultural research in genomics.

Some key STI performance indicators

Figure 2. Economic performance

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

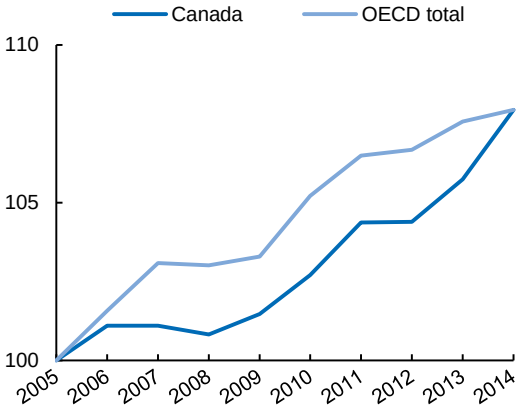


Figure 3. Environmental performance

Green productivity, GDP per unit of CO_2 emitted, index 2005=100

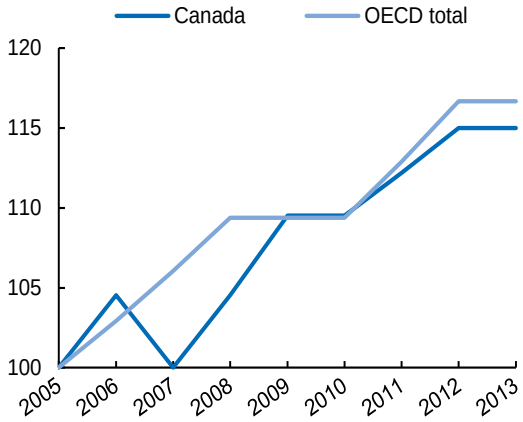
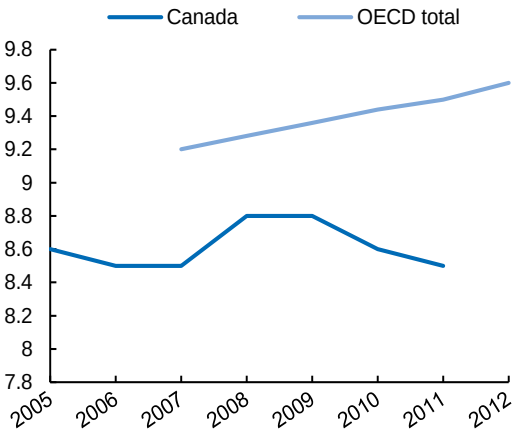


Figure 4. Income inequality

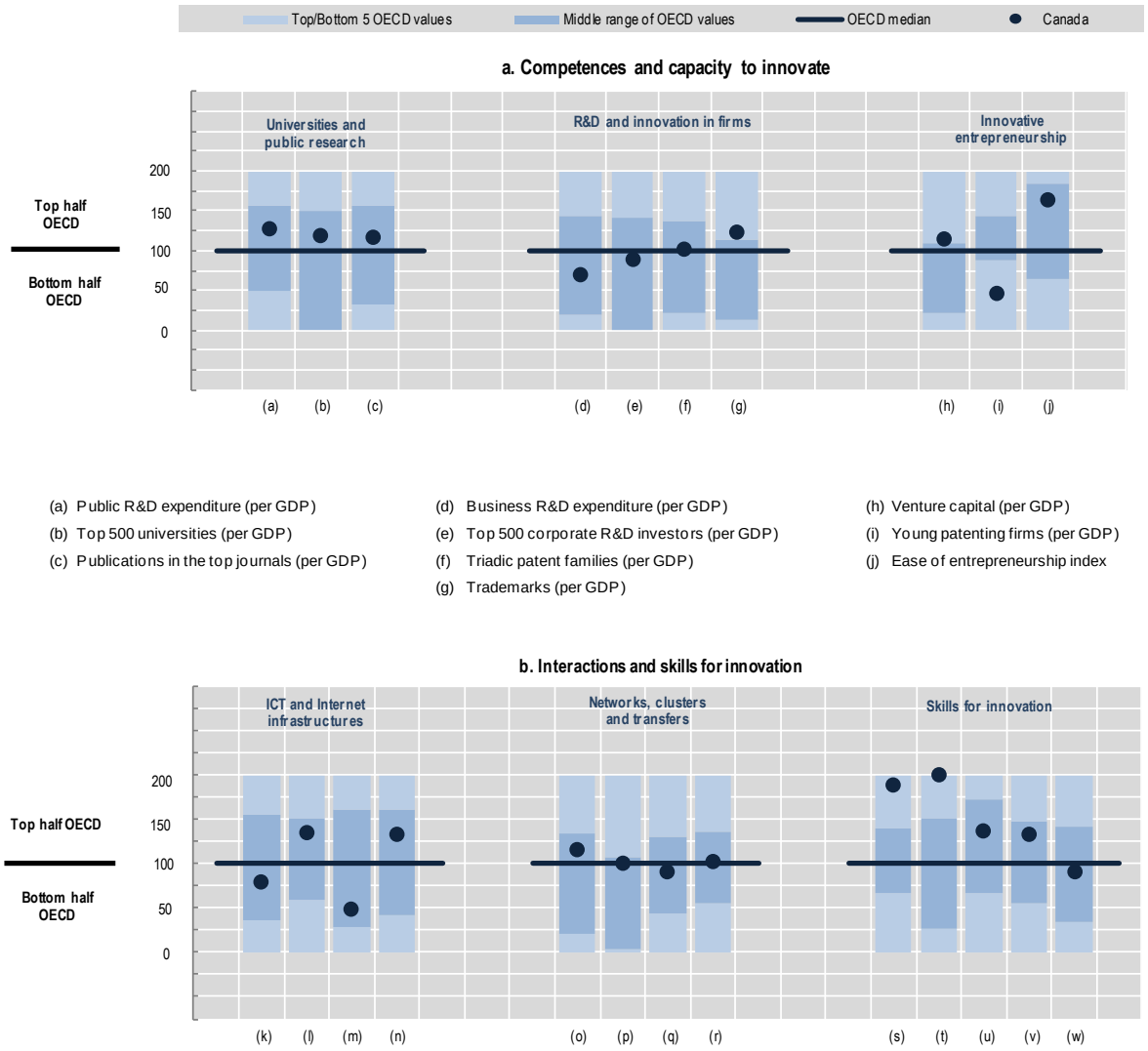
Ratio top decile/first decile of real household net disposable income



Benchmarking national STI systems

Figure 5. Science and Innovation in Canada

Comparative performance of national science and innovation systems, 2016



(a) Public R&D expenditure (per GDP)
(b) Top 500 universities (per GDP)
(c) Publications in the top journals (per GDP)
(d) Business R&D expenditure (per GDP)
(e) Top 500 corporate R&D investors (per GDP)
(f) Triadic patent families (per GDP)
(g) Trademarks (per GDP)
(h) Venture capital (per GDP)
(i) Young patenting firms (per GDP)
(j) Ease of entrepreneurship index

(k) ICT investment (per GDP)
(l) Fixed broadband subscriptions (per population)
(m) Wireless broadband subscriptions (per population)
(n) E-government development index
(o) Industry-financed public R&D expenditure (per GDP)
(p) Patents filed by universities and public labs (per GDP)
(q) International co-authorship (%)
(r) International co-invention (%)
(s) Tertiary education expenditure (per GDP)
(t) Adult population at tertiary education level (%)
(u) Top adult performers in technology problem-solving (%)
(v) Top 15 year-old performers in science (%)
(w) Doctoral graduate rate in science and engineering (%)

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

Highlights of the Canadian STI system

New challenges

To support the global development and demonstration of new clean technologies, USD 2.1 billion PPP (CAD 2.6 billion) have been appropriated over the next five years to help developing countries tackle climate change. This contribution will support the transition to sustainable and more resilient low-carbon economies. The government is committed to investing USD 82 million PPP (CAD 100 million) in clean technology producers each year over five years to tackle Canada's most pressing environmental challenges. It will also invest USD 164 million PPP (CAD 200 million) each year over five years to support innovation and the use of clean technologies in the natural resources sector.

STI policy governance

Acknowledging the contribution of science to sustainable economic growth, the government has committed to create a Chief Science Officer (CSO) position. The CSO will be mandated to ensure that publicly-funded science is fully available to the public, that scientists are able to speak freely about their work, and that scientific analyses are considered when the government makes decisions.

ICT and Internet infrastructures

Canada is developing a strategy for its digital research infrastructure that will enhance the country's capacity for world-class research and enrich the research landscape. Through Budget 2015, the federal government renewed support for the digital research infrastructure by providing USD 86 million PPP (CAD 105 million) over five years to CANARIE for its high-speed research and education network (NREN) and USD 82 million PPP (CAD 100 million), through the Canada Foundation for Innovation (CFI), to support access to high-performance computing resources.

Technology transfer and commercialisation

Industry-science linkages are well developed in Canada, as measured by industry funding of public research, but less well developed as regards patenting activities by universities and PRIs (figure 5[o,p]). The recent trend towards funding industry-academic partnerships allows for a problem-based approach to defining applied research agendas and affords generally greater scope for multidisciplinary research initiatives. This involves programmes such as the Business-Led Networks of Centres of Excellence and Centres of Excellence for Commercialisation and Research, as well as investments in tri-council programmes (i.e. programmes jointly administered by the three Granting Councils) such as the Networks of Centres of Excellence, Canada First Research Excellence Fund and the Canada Excellence Research Chairs.

Clusters and regional policies

To further build on existing cluster strengths and help businesses, post-secondary institutions, governments and other innovation stakeholders work together more strategically, the government will make available USD 657 million PPP (CAD 800 million) over four years, starting in 2017 18, to innovation networks and clusters. This is also expected to help accelerate economic growth.

Globalisation

Canada's integration in international knowledge networks as measured by international co-authorship and co-patenting is on a par with the OECD median (figure 5[q,r]). The Canadian International Innovation Program (CIIP) supports industrial R&D partnerships and matchmaking activities between Canadian companies and foreign partners with a view to accelerating commercialisation and facilitating market access. The CIIP aims to enable better collaboration with several STI partner countries, namely Brazil, China, India, Israel and soon Korea. In addition, the new federal government's 2016 budget also provided USD 11.5 million PPP (CAD 14 million) over two years to continue Mitacs' Globalink Program to help Canadian universities attract more

top international students and to enable Canadian students to take advantage of training opportunities abroad.

Structural aspects and specialization

Figure 6. Structural composition of BERD, 2013 or latest year available

As a % of total BERD or sub-parts of BERD

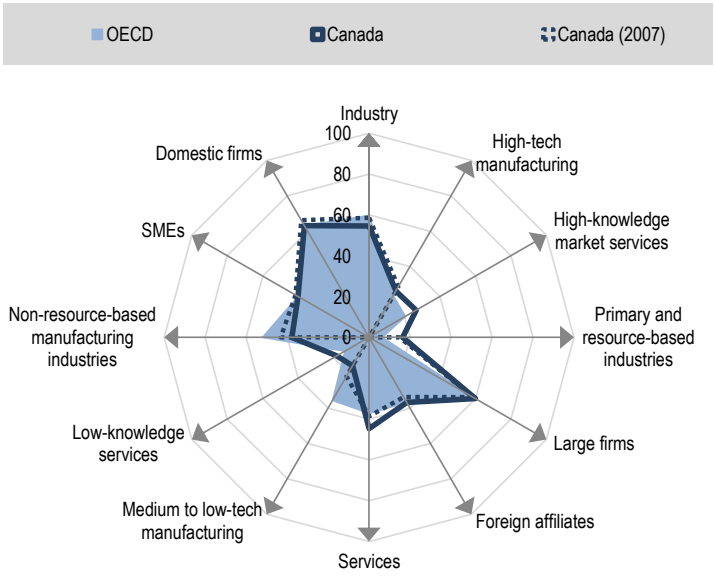
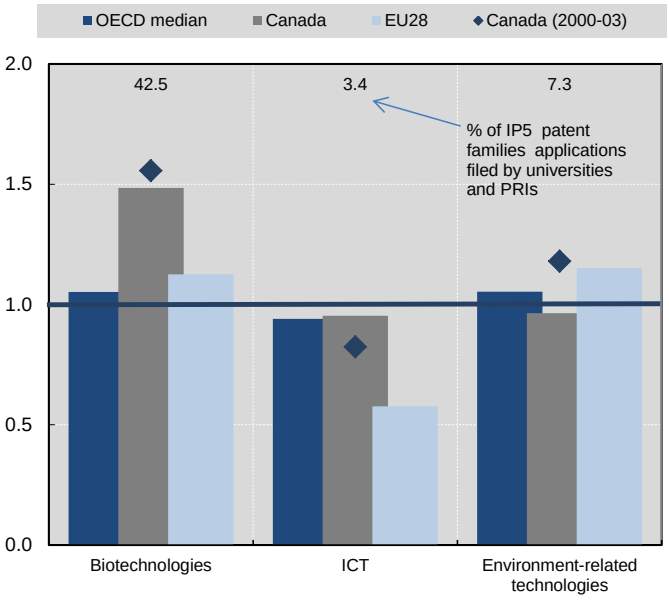


Figure 7. Revealed technology advantage in selected fields, 2011-13

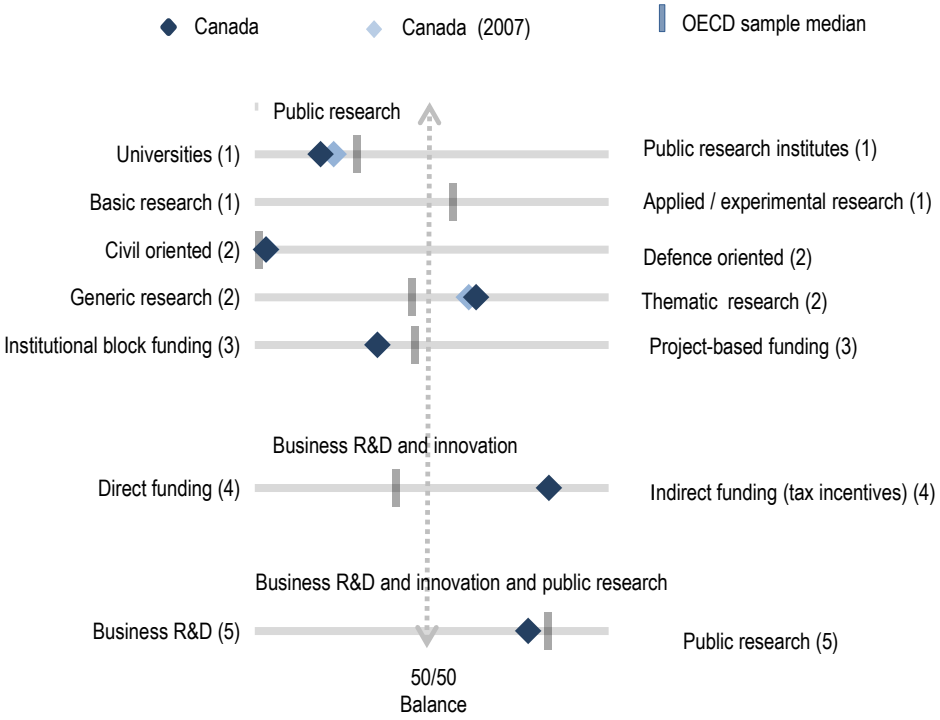
Index based on IP5 patent families applications



National STI policy mix

Figure 8. Allocation of public funds to R&D, 2014 or latest year available

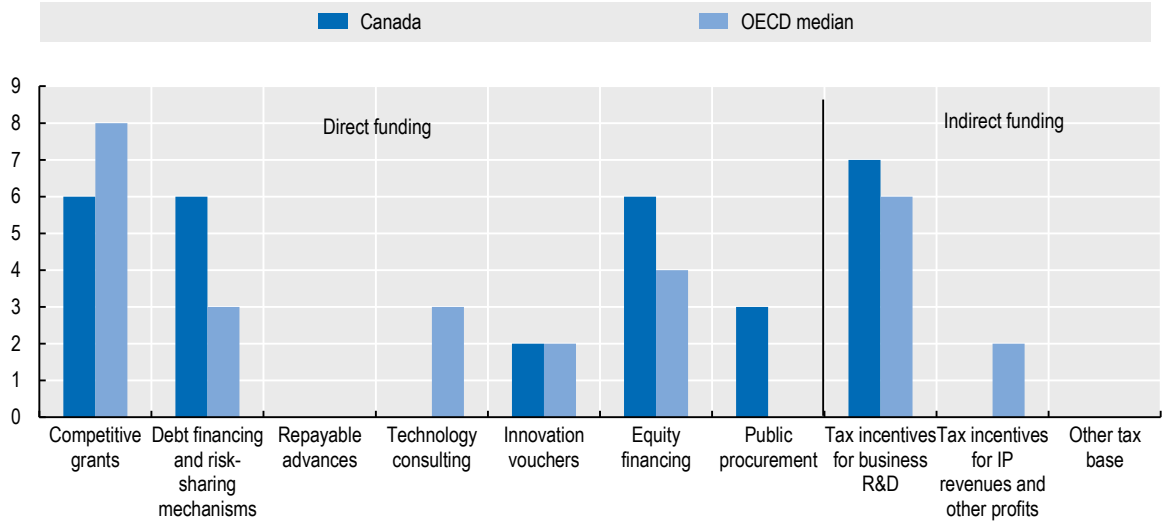
By sector, type of R&D and mode of funding



(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: Policy information comes from country responses to the *OECD STI Outlook* policy questionnaires 2016 and 2014. Canada's responses are available in the EC/OECD STI Policy Database, edition 2016 at http://qdd.oecd.org/DATA/STIPSurvey/CAN...STIO_2016.

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

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