

SWITZERLAND

Hot STI issues

- Strengthening Switzerland's leading position in global research and innovation.
- Maintaining an excellent human resource base for innovation.
- Providing conducive conditions for green innovation.

General features of the STI system: Switzerland is a small, prosperous, open economy, with outstanding strengths in innovation. Swiss GERD was some 2.99% of GDP in 2008, above the OECD median. Most GERD is performed by the business sector with outcomes at or very near the top of the OECD in terms of triadic patents and trademarks per GDP over 2007/09 (Panel 1^{(f)(g)}). BERD was 2.20% of GDP in 2008 (1^(d)), mostly performed by large companies in high-technology (or other knowledge-intensive) manufacturing industries (Panel 2) such as pharmaceuticals. Switzerland has some of the world's top corporate R&D investors. In spite of framework conditions conducive to entrepreneurship (1^(j)), young firms contributed little to patenting over 2007-09 (1⁽ⁱ⁾). Universities are internationally attractive (1^(b)), and the science base is very efficient: public R&D expenditures were 0.83% of GDP in 2010 (1^(a)), and publications in scientific journals led OECD countries in 2009 (1^(c)). The share of public research financed by industry was at the top of OECD middle range (1^(o)). The patenting rate of universities and PRIs per GDP in 2005-09 is only at the median (1^(p)) (partly owing to the fact that patents are often left to inventors and/or partner companies). Human resources are highly skilled: graduates in S&E at doctoral level ranked second among OECD countries in 2009 (1^(u)), and 35% of the adult population is tertiary-qualified (1^(s)). Researchers are well integrated in international networks: 43% of PCT patent applications over 2007-09 were international co-inventions (1^(v)). The fixed broadband penetration

rate leads among OECD countries (1^(k)), and other Internet-related indicators are slightly above the OECD median (1^{(l)(m)(n)}).

Recent changes in STI expenditures: GERD increased by 3.8% annually over 2004-08. The Education, Research and Innovation (ERI) Message 2008-11 had set a target of 6% annual growth in public R&D expenditures. However, some cuts were decided in 2011, and a special ERI Message 2012 temporarily froze public investments. The new ERI Message 2013-16 foresees annual growth in public R&D expenditures of 3.7%, i.e. a return to the situation prior to the global financial crisis.

Overall STI strategy: The federal government's strategic planning document, the ERI Message, is released every four years to provide a general framework for education, research and innovation policy. The ERI Message 2012 mainly maintained previously set objectives. The ERI Message 2013-16 has three policy guidelines: to ensure that the education system provides skills that match market demand; to strengthen (competitive) funding and increase R&D and innovation capabilities; and to build research and economic activities on the "principles of equal opportunity, sustainability and competitiveness".

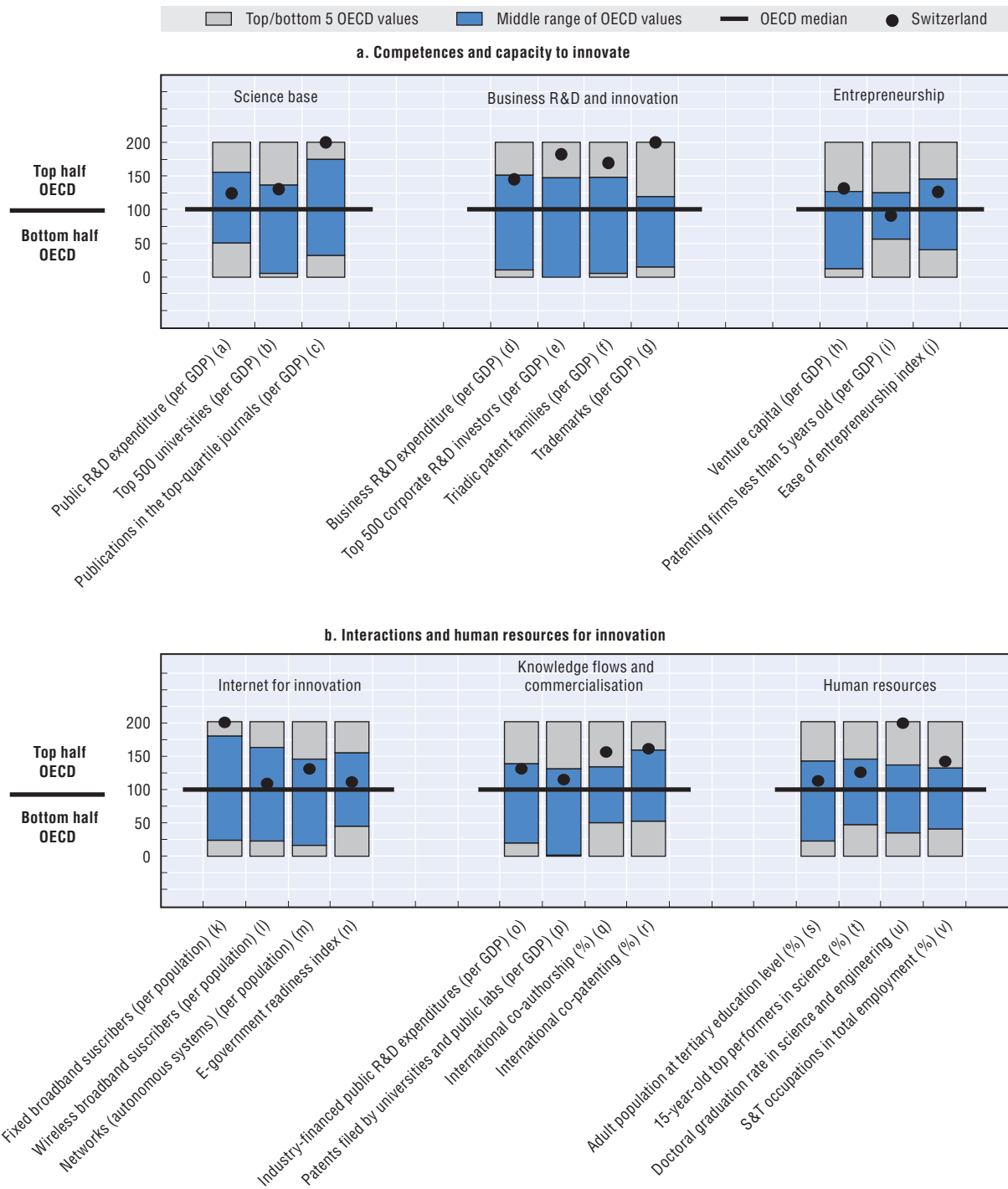
STI policy governance: The main Swiss governance features involve reliance on bottom-up processes and federalism, with the Confederation and cantons sharing responsibility for research and higher education policy. In 2013 the competences of the

Key figures

Labour productivity, GDP per hour worked in USD, 2010 (annual growth rate, 2005-10)	48.3 (+0.6)	GERD, as % of GDP, 2008 (annual growth rate, 2004-08)	2.99 (+3.8)
Environmental productivity, GDP per unit of CO₂ emitted in USD, 2009 (annual growth rate, 2005-09)	8.32 (+3.0)	GERD publicly financed, as % of GDP, 2008 (annual growth rate, 2004-08)	0.75 (+4.8)

Figure 10.40. Science and innovation in Switzerland

Panel 1. Comparative performance of national science and innovation systems, 2011



Federal Department of Economic Affairs will be expanded to include education, research and innovation. The Commission for Technology and Innovation (CTI) became an independent decision-making body within the federal administration.

Science base: Public research funding mechanisms have changed following reforms of the Swiss National Science Foundation (SNSF), the main basic research funding agency. Since 2009, overhead costs are paid to institutions hosting funded research projects. Selection procedures have moved towards harmonisation of processes, better provision of information to applicants, the creation of expert panels, and the launch of an electronic application procedure.

Business R&D and innovation: A large part of the business sector engages in R&D and innovation although Switzerland is among the OECD countries with the smallest share of BERD financed by government (Panel 4). Switzerland traditionally refrains from granting R&D subsidies to business firms. CTI, the main Swiss innovation promotion agency, supports market-oriented R&D projects, development of start-up companies and knowledge and technology transfer in various other ways.

ICT and scientific infrastructures: The Swiss innovation system benefits from modern, high-quality research infrastructures. In addition to the action lines dedicated to their development in the latest ERI Messages, the State Secretariat for Research and Education issued a roadmap for research infrastructures, the CH-Roadmap, in 2011. It maps planned investment in strategic areas and includes proposals for participation in international research infrastructures.

Knowledge flows and commercialisation: CTI aims at encouraging higher education and PRIs to collaborate with business. Most of its programmes provide support rather than funding. They include CTI Start-Up (mentoring and networking services for young entrepreneurs), CTI Invest (a venture platform), Venturelab (diffusion of entrepreneurship skills), or Diversity@CTI (promotion of female entrepreneurs). As part of the 2009 stimulus package, CTI also provides SMEs without their own

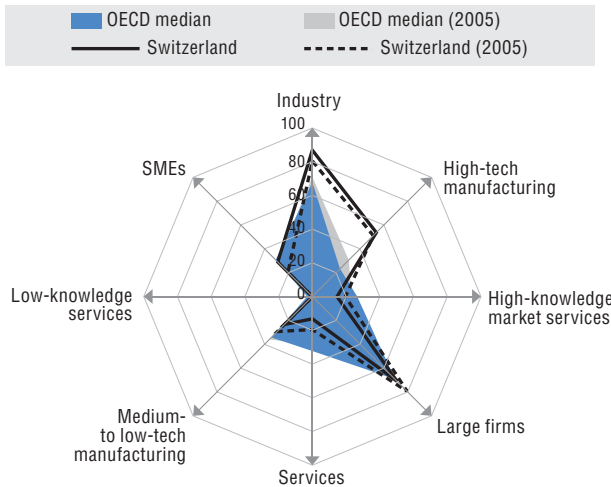
R&D personnel with an innovation cheque to purchase services at universities or PRIs.

Globalisation: Swiss research and innovation has strong international links ($1^{(q)(r)}$) and favourable framework conditions for attracting FDI and human resources both in businesses and universities. Swiss multinationals are closely linked to global research and innovation hubs. A federal strategy for the internationalisation of education, research and innovation was adopted in 2010. In addition to bilateral research agreements or cross-border co-operation (e.g. the Lead-Agency process with Germany, Austria and Luxembourg to co-ordinate funding decisions), the Confederation participates in EU programmes (e.g. Research Framework Programme FP, COST, EUREKA and the Lifelong Learning Programme since 2011), including those targeting student and researcher mobility.

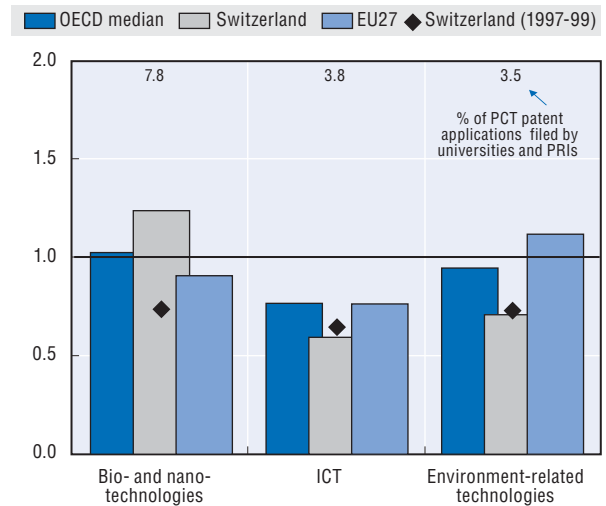
Human resources: The current strategy specifically addresses education issues to strengthen the provision of high-level skills to match market needs. In 2011 the FDEA launched the Specialists Initiative to curb the growing scarcity of this category of human resources through increased labour market participation and access to advanced qualifications. A major issue for the Swiss education system is the compartmentalisation of its different education institutions, which affects internal mobility and access to higher education. The 2011 *Law for the Support and Co-ordination of Universities* aims to improve co-ordination between the Confederation and cantons, which are responsible for the quality and permeability of the higher education system. It also introduced an independent accreditation agency. Moreover, most cantons have postponed tracking of pupils to age 13.

Green innovation: The Federal Council decided to phase out nuclear energy production and emphasised, in its Energy Strategy 2050, energy efficiency and the expansion of hydropower and new renewable energy. The Cleantech Masterplan provides a framework (but no funding) for joint actions (including R&D and knowledge transfer) by stakeholders in order to improve resource efficiency and the development of renewable energy.

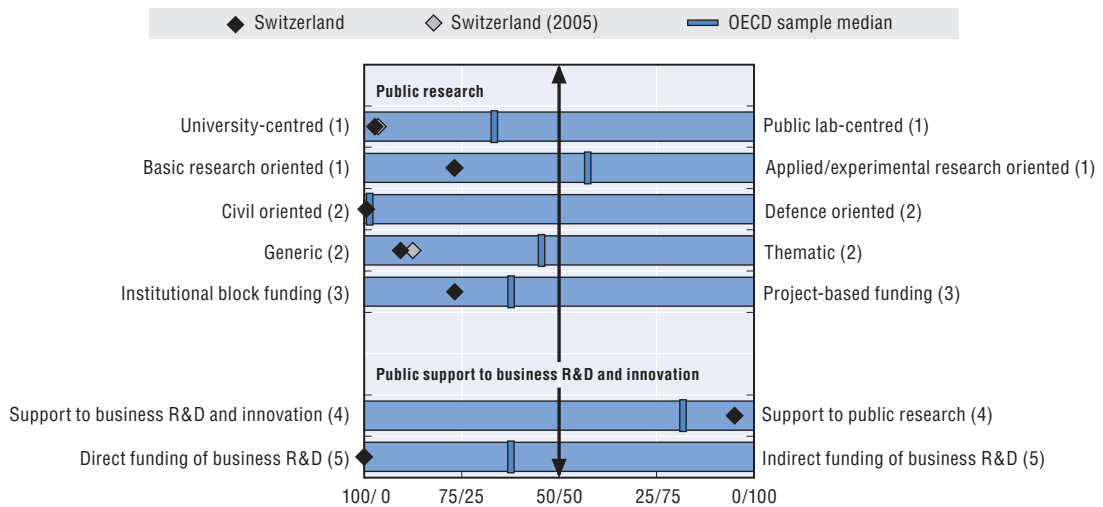
Panel 2. Structural composition of BERD, 2009
As a % of total BERD



Panel 3. Revealed technology advantage in selected fields, 2007-09
Index based on PCT patent applications



Panel 4. Overview of national innovation policy mix, 2010



1. Balance as a percentage of the sum of HERD and GOVERD.
2. Balance as a percentage of total GBAORD.
3. Balance as a percentage of total funding to national performers.
4. Balance as a percentage of the sum of HERD and GOVERD funded by government and higher education and components of (5).
5. Balance as a percentage of the sum of indirect funding of business R&D and innovation through R&D tax incentives and direct funding of BERD through grants, contracts and loans.

Source: See reader's guide and methodological annex.

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