

SWEDEN

Hot STI issues

- Commercialising research from HEIs.
- Reallocating block grants to HEIs on a performance basis.
- Fostering demand-side innovation policies, e.g. procurement.
- Promoting innovation in the public sector.

General features of the STI system: Following the recession of 2008-09, Sweden's macroeconomy has grown significantly faster than that of the OECD area as a whole. The largest Swedish firms are highly internationalised and conduct increasing amounts of their activities, including R&D, outside of Sweden. BERD is still high at 2.34% of GDP (Panel 1^(d)), though it has fallen slightly in recent years. The proportion of public research funded by industry is close to the OECD median (1^(o)). The small share of patents filed by universities and PRIs (1^(p)) is due to the "professor's privilege" which entitles researchers (instead of institutions) to patent their inventions. International collaboration indicators paint a mixed picture: a high 55% of scientific articles are produced with international co-authorship (1^(q)), while a below OECD average 19% of PCT patent applications are produced with international collaboration (1^(r)). This reflects in part Sweden's industrial structure of large firms which are likely to retain technology development in-house. As for human capital indicators, Sweden has a median tertiary attainment rate of 34% (1^(s)) and median PISA scores in science for 15-year-olds (1^(t)). It has a strong RTA in ICTs but is considerably weaker in biotechnology and nanotechnologies (Panel 3). ICT infrastructures are strong: it has 32 and 94 subscribers, respectively, to broadband and wireless networks per 100 inhabitants (1^{(k)(l)}). Sweden's e-government readiness index is above the OECD median (1⁽ⁿ⁾).

Recent changes in STI expenditures: R&D expenditures increased to around USD 12.5 billion in 2010, a GERD-to-GDP ratio of 3.40%. In 2009, industry funded 59% of total GERD, while government funded 27% and 10% was funded from abroad. This last has grown sharply over the decade as the R&D system has become increasingly internationalised.

Overall STI strategy: The Research and Innovation Bill set the framework and funding for 2009-12. It significantly increased government funding for R&D while introducing a more selective, quality-based approach. It identified 24 strategic areas (with specific budget allocations) under four themes. The Ministry of Education and Research is now working on a plan for the next Research and Innovation Bill, covering 2013-16. In parallel, the Ministry of Enterprise, Energy and Communications is preparing an Innovation Strategy covering the whole innovation system.

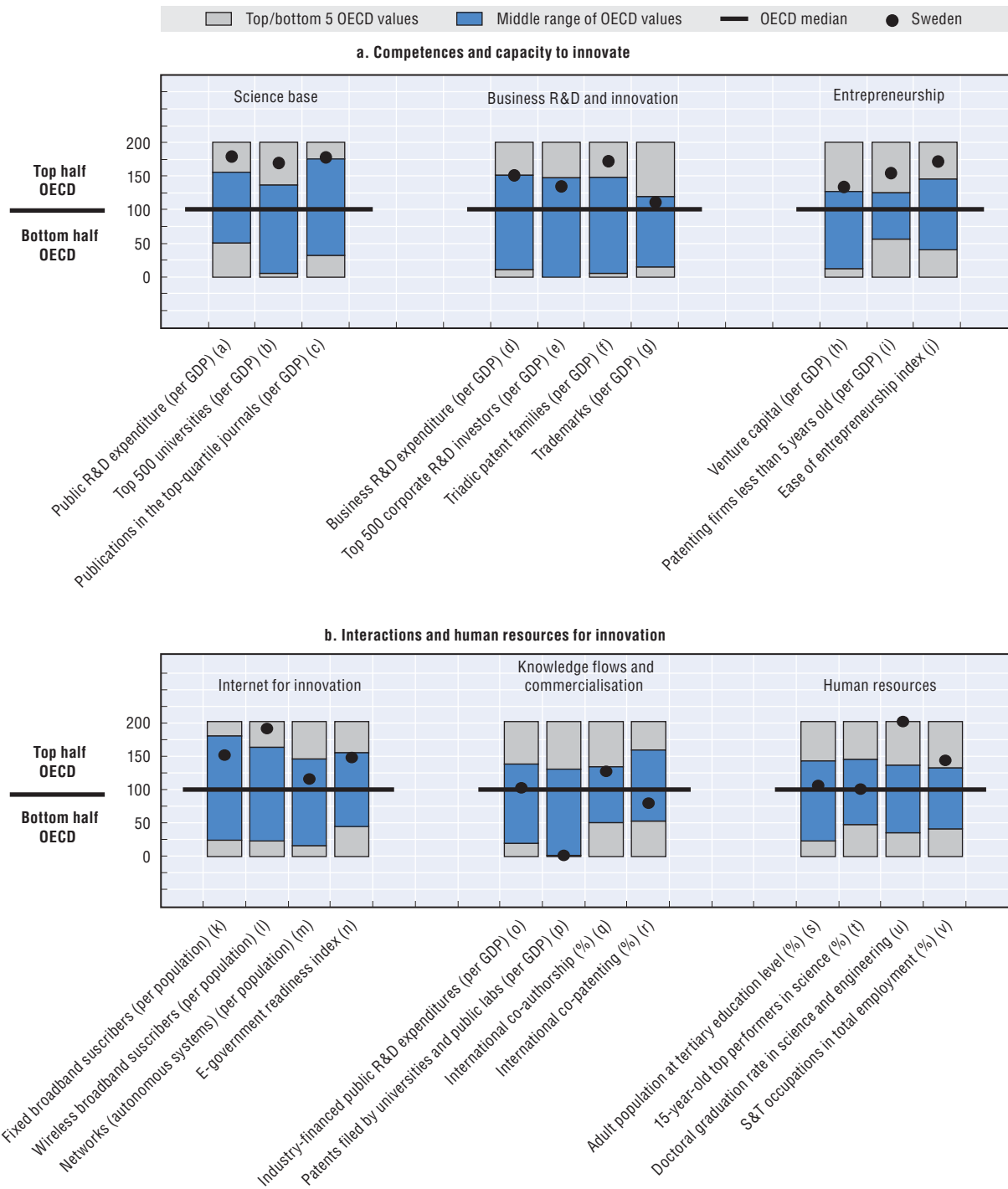
STI policy governance: The Ministry of Education and Research is responsible for research and some innovation policy, while the Ministry of Enterprise, Energy and Communications is responsible for mainstream innovation policy. Swedish ministries are small and set broad policy directions. They depend upon a range of agencies to design and implement policy measures, including the Swedish Research Council (Vetenskapsrådet) and the Swedish Governmental Agency for Innovation Systems (VINNOVA).

Key figures

Labour productivity, GDP per hour worked in USD, 2010	49.9	GERD, as % of GDP, 2010	3.40
(annual growth rate, 2005-10)	(+0.4)	(annual growth rate, 2005-10)	(+0.6)
Environmental productivity, GDP per unit of CO₂ emitted in USD, 2009	8.27	GERD publicly financed, as % of GDP, 2009	1.01
(annual growth rate, 2005-09)	(+4.7)	(annual growth rate, 2005-09)	(+3.6)

Figure 10.39. Science and innovation in Sweden

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



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

Science base: Public funding for R&D is strong (1^(a)), with the vast majority going to universities, some of which feature strongly in global rankings (1^(b)). Levels of HERD, at 0.90% of GDP in 2010, are the highest in the OECD. Much of this funding is directed at basic research. A bill on greater autonomy for HEIs came into effect in 2011, giving them greater freedom to reorganise, and proposals for greater accountability through research assessment are being discussed. In comparison to HEIs, the PRI sector is relatively small (Panel 4) and focuses largely on serving the R&D needs of SMEs.

Business R&D and innovation: R&D investments by industry are concentrated in large firms. Sweden is one of the few OECD countries – with Germany and Finland – that does not operate an R&D tax credit scheme. Historically, public procurement has played a significant role in the development of a number of Sweden’s largest and most innovative companies but state aid rules now prohibit many earlier practices. To date, initiatives to promote new-generation innovation-oriented procurement largely constitute preparatory work. For example, the 2011 Innovation Procurement Inquiry proposes the introduction of a new law on pre-commercial procurement, which facilitates multi-stage competitive procurement, and the creation of a national database for pre-commercial procurement.

Entrepreneurship: While the value of venture capital investment as a share of GDP is one of the highest in the OECD area (1^(h)), the supply of business angel and early-stage VC activity is small and policy responses have been fragmented. To address this, a restructuring of Innovationsbron (which provides seed funding, soft loans and equity, and incubators) and ALMI (which provides advice, business development services and supplementary financing) was initiated in 2011, to create a single structure more clearly focused on early-stage funding.

ICT and scientific infrastructures: Preparations for the construction of the European Spallation Source (ESS) are now under way in Lund. The Max IV facility for a new generation synchrotron radiation

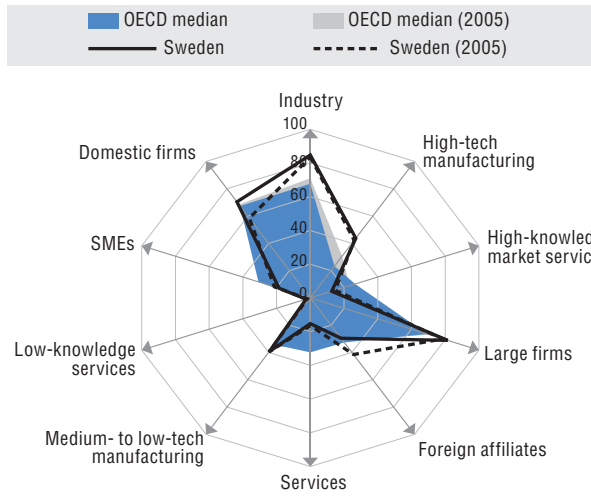
light source is also under construction in Lund. The national resource centre for molecular life sciences and medicine – the Science for Life Laboratory (SciLifeLab) – was inaugurated in 2010 in the Stockholm and Uppsala regions. “ICT for Everyone – A Digital Agenda for Sweden” was published in 2011. It sets an ICT policy goal for Sweden to become the world’s leading economy in exploiting the opportunities of digitisation.

Clusters and regional policies: Regional innovation policy is mixed, with strong capabilities and programmes in southern and western regions but weaker initiatives elsewhere. Several national organisations actively promote innovation in the regions, particularly the Swedish Agency for Economic and Regional Growth and the KK Foundation. A regional venture capital firm, Inlandsinnovation AB, was established in 2011 to facilitate growth and innovation in enterprises in Sweden’s northwest regions. It has capital of around USD 225 million. At the same time, the motor vehicle industry, which has been negatively affected by the economic crisis, has been singled out to benefit from another new venture capital firm, Fouriertransform AB. The fund has around USD 335 million to support the vehicle cluster.

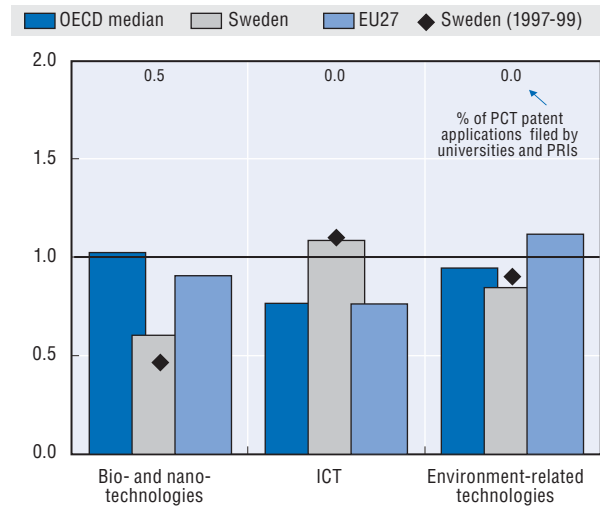
Knowledge flows and commercialisation: The so-called “professor’s privilege” means HEIs have relatively weak infrastructures for commercialising their R&D and weak patenting performance (1^(p)). Newly established innovation offices support researchers who wish to commercialise their research results and to establish spin-off companies.

Human resources: Several initiatives support research skills development. For example, VINNOVA has launched its VINNMER scheme to improve the outlook for women as future leaders of R&D institutes. It has also introduced the VINNPRO scheme to establish graduate schools with sustainable links to business. In addition, Sweden introduced tuition fees for students from outside the EEA in 2011. In the new school curricula, entrepreneurship is mandatory. Finally, the tax exemption rules for foreign experts and the highly qualified have been simplified.

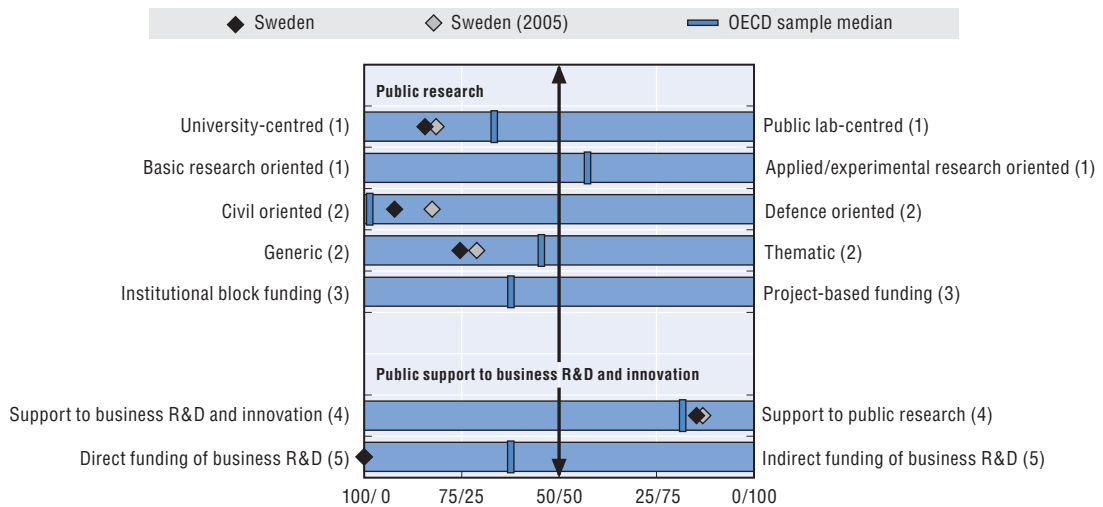
Panel 2. Structural composition of BERD, 2009
As a % of total BERD



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.

StatLink <http://dx.doi.org/10.1787/888932690871>