DENMARK

Hot STI issues

- Reversing the trend in labour productivity decline by boosting innovation.
- Supporting innovation in high-growth sectors with new industrial policy measures.
- Improving industry and science linkages and the supply of high-level skills for STI.

General features of the STI system: Denmark is a highly developed economy with a relatively sound fiscal position. However, recent years have seen a decline in labour productivity (by 0.2% over 2005-10) and labour productivity only returned to its 2007 level in 2011. Denmark has strong business innovation, particularly in emerging and renewable energy technologies. BERD stands at 2.08% of GDP (Panel 1[(d)]) and triadic patenting (1[(f)]) is at the top of mid-range in the OECD area. The share of public R&D expenditures financed by industry (1[(o)]) is below the OECD median, whereas the rate of patents filed by universities and PRIs (1[(p)]) is above it. International co-operation in science and innovation is mixed as well: while Denmark is at the top of the mid-range performance in terms of international co-authorship of scientific publications (1[(q)]), international co-applications for PCT patents are below the OECD median (1[(r)]). ICT infrastructures are well developed, and Denmark ranks third in terms of fixed broadband subscribers per 100 inhabitants within the OECD area (1[(k)]). S&T occupations represent 41% of total employment (1[(v)]), but at 34%, the tertiary-qualified adult population is just above the OECD median (1(s)). The supply of the future skilled workforce needs strengthening, as performance in science by students aged 15 is currently weak (1[(t)]), and PhD graduation rates in S&E are rather low (1[(u)]). However, the yearly intake of PhD students has doubled since 2006.

Recent changes in STI expenditures: Danish GERD, at 3.06% of GDP in 2010, is at the top of the mid-range of OECD countries. During 2005-10, GERD increased annually by 4.4%. Further increases in R&D expenditure are expected to come from the business sector. The government aims to encourage private-sector investments in public research and innovation by strengthening the business sector's belief in R&D and innovation as drivers of future economic growth.

Overall STI strategy: A Denmark that Stands Together (October 2011) serves as the vision statement of the present government. It emphasises investment in research and education. A national innovation strategy is to be launched in 2012. Priority issues will include identification of the strengths of public research and business innovation as a basis for the establishment of new public-private partnerships; greater emphasis on higher education; and further internationalisation of the Danish STI system.

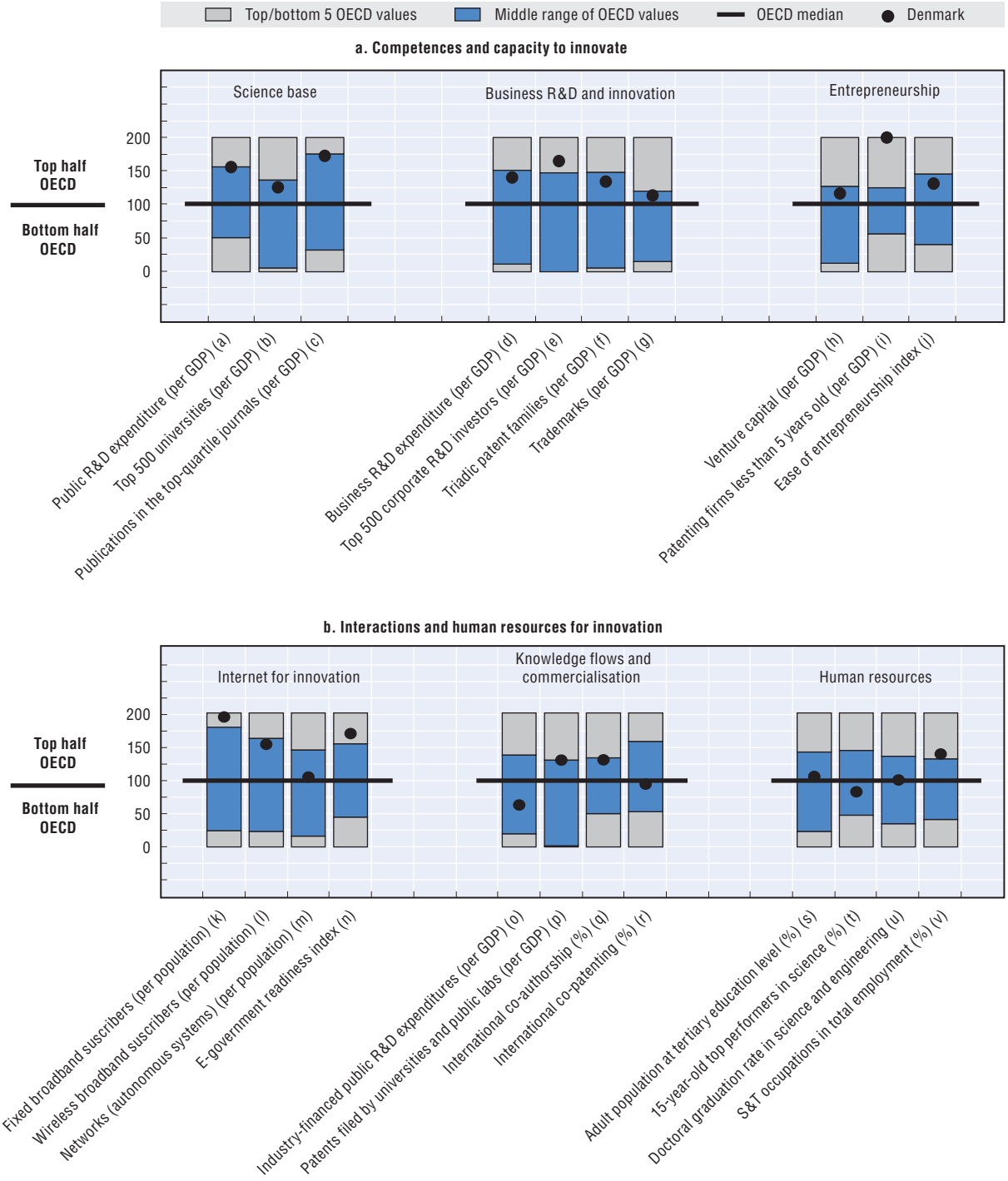
STI policy governance: When the present government took office in 2011, it implemented some changes in STI governance. To underline the central role of higher education in innovation, the Ministry of Science, Technology and Innovation took over all responsibilities for higher education and its name was changed to the Ministry of Science, Innovation and Higher Education. Also, the Ministry of Business and Growth has replaced the Ministry of Economics and Business Affairs. Over the last five years, greater emphasis has been placed on evaluation and impact assessment of innovation policy instruments. In 2011, an evaluation manual set the minimum requirements for data collection and evaluation methods.

Key figures

Labour productivity, GDP per hour worked in USD, 2010	**51.3**	**GERD, as % of GDP, 2010**	**3.06**
(annual growth rate, 2005-10)	(–0.2)	(annual growth rate, 2005-10)	(+4.4)
Environmental productivity, GDP per unit of CO_2 emitted in USD, 2009	**4.50**	**GERD publicly financed, as % of GDP, 2010**	**0.85**
(annual growth rate, 2005-09)	(+0.0)	(annual growth rate, 2005-10)	(+4.5)

Figure 10.11. **Science and innovation in Denmark**

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: Denmark has a strong science base which has been dominated by universities over the past five years (Panel 4). Public expenditures on R&D were 0.96% of GDP in 2010 (1[(a)]), among the top five OECD countries. Danish scientists perform respectably in terms of publication in top international scientific journals (1[(c)]). University funding is a balance of the traditional allocation of block funding and a performance-based allocation mechanism, which has been reformed through the progressive introduction of bibliometric indicators.

Business R&D and innovation: Existing schemes have received additional public funding to accelerate R&D and innovation in the business sector. The Business Innovation Fund, with a budget of USD 97 million for 2010-12, supports innovation and market maturity in green and welfare areas. The report, *Strengthened Innovation in Business*, presented in August 2010, identified barriers to business innovation and recommended measures, including easing of administrative burdens, to address them.

Entrepreneurship: Danish young patenting firms have the highest share per GDP among OECD countries (1[(i)]).The government has launched initiatives to improve the entrepreneurial climate: the USD 1.3 billion Danish Growth Capital aims to strengthen the market for equity and venture capital, and the Vækstfonden's loan guarantee scheme was boosted to USD 570 million. The government has also developed an entrepreneurship education strategy.

Public-sector innovation: *Strengthened Innovation in Business* also underlines the importance for private-sector innovation of innovation in public services. To further simplify administrative procedures for business, more public services have been digitised. In May 2011 a new public procurement scheme was launched to improve the efficiency and quality of public procurement with a view to encouraging innovation in the private sector.

ICT and scientific infrastructures: Within the general trend among EU countries towards greater emphasis on the development of research structures, the *Danish Roadmap for Research Infrastructures*, published in September 2011, includes 19 proposals for high-priority projects and initiatives. Denmark will also host the European Spallation Source (ESS) in the Dano-Swedish Øresund region.

Clusters and regional policies: In 2010, the Strategic Platforms for Innovation and Research were established as a new model of collaboration between public research and industry through which private actors can be more involved in the planning and performance of public research and innovation.

Knowledge flows and commercialisation: The National Reform Programme 2011 recommends accelerating the commercialisation of research outcomes. In addition to the promotion of collaborative research the government encourages the use and trade of IPRs.

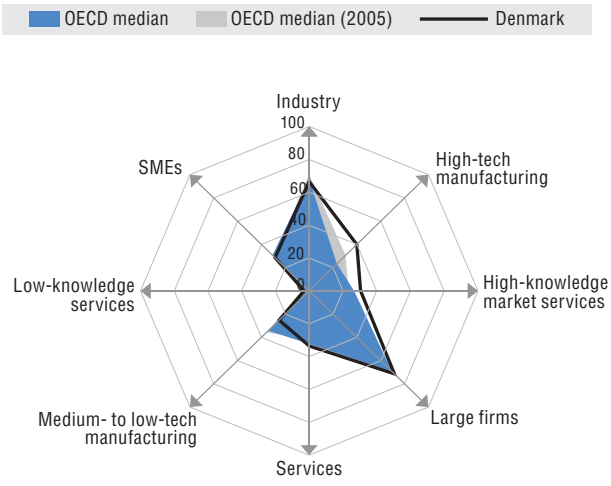
Globalisation: The present Danish government emphasises the internationalisation of Danish STI systems. It has made the greater mobility of Danish students and the influx and retention of foreign investment and international talents a priority. As part of the objective to increase exports, especially to BRIICS countries, the export loan facility scheme under the official export credit agency EKF will be boosted to USD 4.5 billion.

Human resources: Education is central in the present government platform for addressing the decline in labour productivity. Quantitative targets have been set to increase the share of youth with higher education attainment. The Globalisation Fund has allocated around USD 1.9 billion for 2007-12 to strengthen upper secondary education, higher education, and adult and lifelong learning, through a broad range of initiatives (*e.g.* the talent programme, quality enhancement, vocational education and training, and research infrastructure).

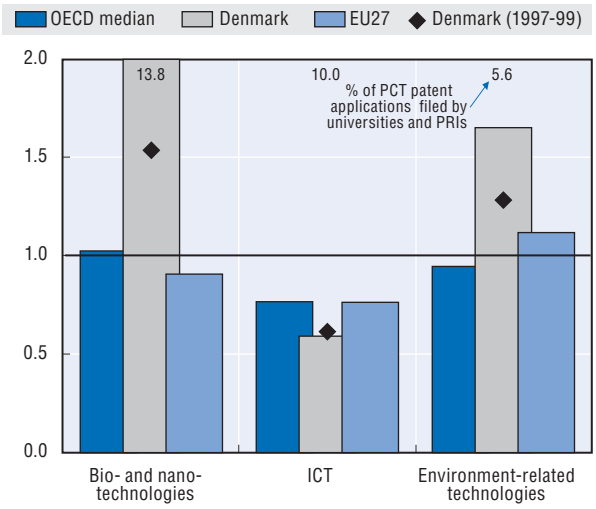
Emerging technologies: Denmark is the leading OECD country in terms of RTA in bio- and nano-technologies as well as in environmental technologies (Panel 3). A Denmark that Stands Together sets the vision for the transition towards a green economy, by developing new environmental and energy-related technologies as well as biotechnology.

Green innovation: A broad political agreement on energy was reached in 2012, including the target of a carbon-neutral economy in 2050, to be achieved by a continued high level of funding for related R&D and demonstration. A framework for the climate and energy policy to 2020 has since been adopted.

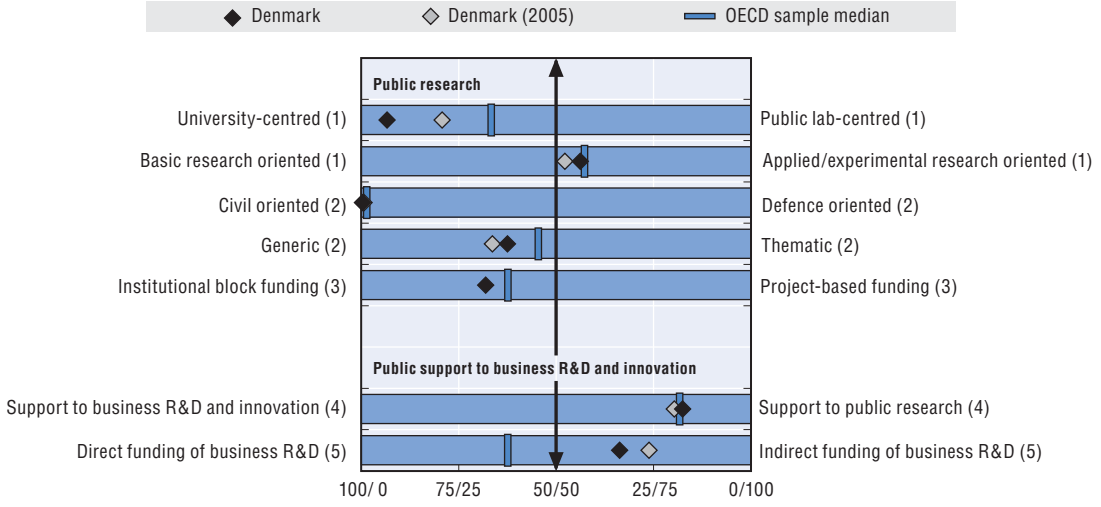
Panel 2. Structural composition of BERD, 2009
As a % of total BERD



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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