FRANCE

Hot STI issues

- Pooling research resources and activities to strengthen the system's international visibility.
- Accelerating leverage of public research and strengthening presence in IP markets.
- Supporting re-industrialisation and structuring industrial sectors through a public investment programme (PIA) and geographical clusters.
- Expanding and improving the assessment of public initiatives, including the PIA.

General features of the STI system: France is one of the world's top five economies as measured by GDP, owing to several knowledge-intensive sectors (high- and medium-high-technology manufactures, defence and financial services), the agri-food industry and tourism. The French innovation system is the second largest in Europe after Germany's with about 5% of OECD GERD, patents and publications. It is marked by the industrial policy of the 1960s-1970s, which gave certain industries (aviation, rail, nuclear) a lasting technological advantage. Some of its pharmaceutical, aeronautical and nuclear industries are among the world's largest private investors in R&D (Panel $1^{(e)}$). Nevertheless, the intensity of BERD, which returned in 2010 to its 2001 level (1.38% of GDP) after several years of decline, remains weak. Growth of BERD is constrained by: the shrinking share of manufacturing in value added and low spending on R&D by services (12% of BERD in 2007); the concentration of R&D activities in medium-high-technology sectors (29%), in particular the automotive industry (14%); and a broad base of SMEs that play a minor role in the research system (21%) (Panel 2). The funding of public research by industry is limited ($1^{(o)}$), a sign of weak ties between these sectors. Furthermore, innovative entrepreneurship is fragile: France is below the OECD median for patents filed by young companies ($1^{(i)}$). The French government maintains a strong influence over large segments of network industries, and regulatory barriers restrict competition in the retail sector and setting up of new stores. In the public sector, universities and PRIs are active in terms of PCT patent applications ($1^{(p)}$) and patents filed in emerging technologies (Panel 3). The inflow of new doctoral graduates in science and engineering is steady ($1^{(u)}$).

Recent changes in STI expenditures: With the adoption of the *Research Law* and the allocation of extra funding, GERD exceeded USD 40 billion in 2006. The Investments for the Future Programme (PIA), implemented as part of the stimulus plan, accelerated the roll-out of new STI capacities by injecting USD 40 billion over ten years to promote research, higher education, innovation and sustainable development.

Overall STI strategy: The priorities of the National Strategy for Research and Innovation (SNRI, 2009-12) are the strengthening of research capacity, scientific performance and the conditions of development for new companies, as well as knowledge transfer between public research bodies and business (in particular SMEs).

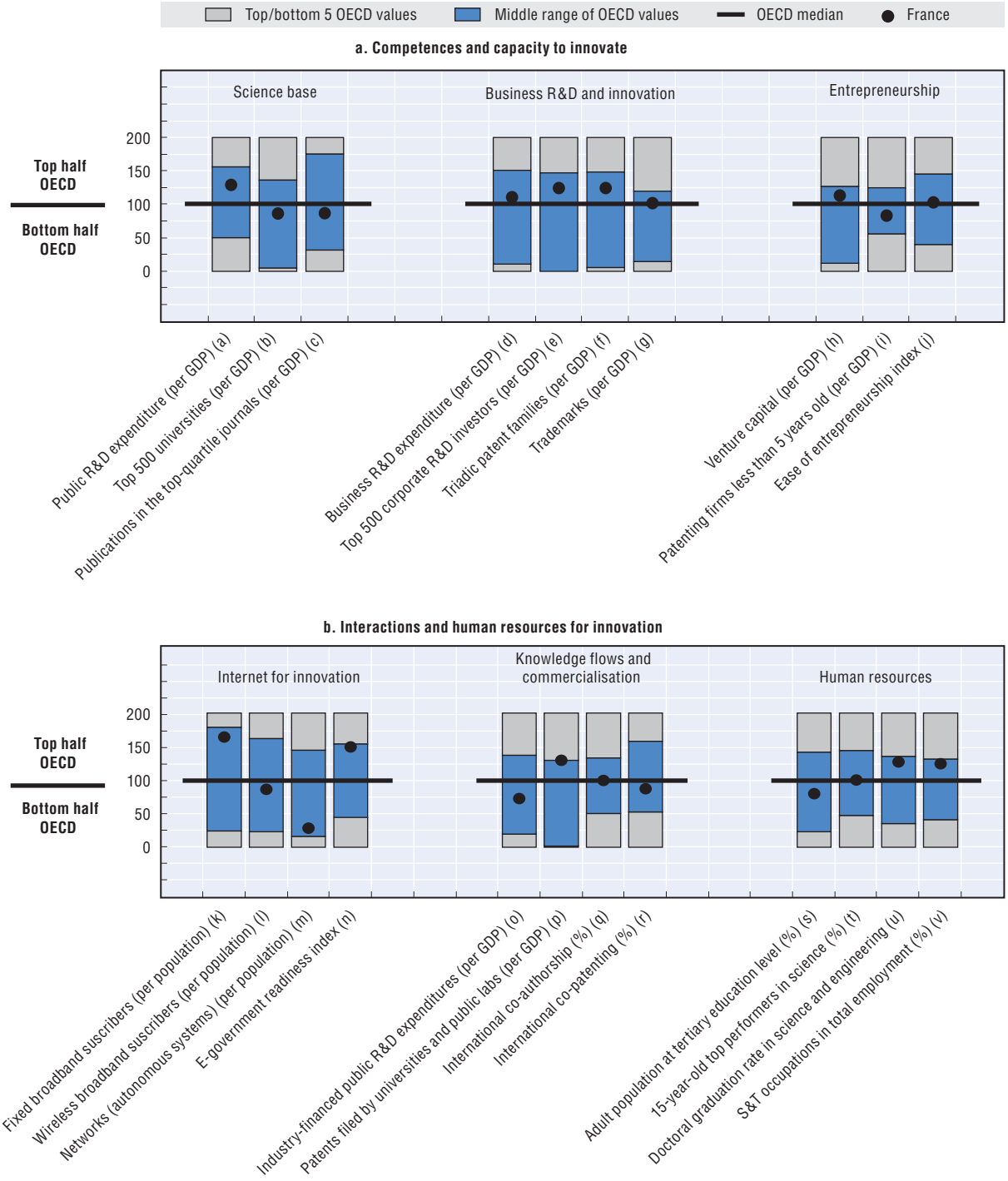
STI policy governance: The research and higher education system has recently undergone far-reaching reforms, including ministerial re-organisation, establishment of agencies for research funding (ANR) and for higher education and research

Key figures

Labour productivity, GDP per hour worked in USD, 2010	**57.7**	**GERD, as % of GDP, 2010**	**2.25**
(annual growth rate, 2005-10)	(+0.6)	(annual growth rate, 2005-10)	(+2.0)
Environmental productivity, GDP per unit of CO_2 emitted in USD, 2009	**6.13**	**GERD publicly financed, as % of GDP, 2010**	**0.92**
(annual growth rate, 2005-09)	(+2.3)	(annual growth rate, 2005-10)	(+2.5)

Figure 10.15. **Science and innovation in France**

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).

evaluation (AERES), greater autonomy for universities (*LRU Act*), mutualisation of activities (PRES) and introduction of contract-based relations between the state and research bodies. The establishment in 2009-10 of thematic alliances (energy, health, ICTs, the environment, and human and social sciences) is a further step towards better co-ordination and programming.

Science base: France has a dual public research system: PRIs carry out almost half of public R&D, but the share is shifting towards universities (Panel 4). In spite of substantial public R&D expenditure (0.85% of GDP in 2010), the science base has few articles in leading scientific journals (1[(a)(c)]). The French university system is fragmented; it has only recently strengthened its research profile and relatively few institutes feature in university rankings (1[(b)]). Recent reforms in STI policy governance have resulted in a move towards more thematic research and competitive project-based funding and a larger role for universities (Panel 4).

Business R&D and innovation: Business R&D is a key priority of the SNRI and has drawn much policy attention in recent years. Government funding in this area has increased significantly. Indirect funding through the research tax credit (CIR) was reinforced by a major revision of the scheme in 2008 (at a budgetary cost of nearly USD 6 billion in 2010), while direct funding through the innovation agency (OSEO) and the ANR was maintained. The share of indirect funding rose from one-third to two-thirds of total government funding between 2005 and 2010, with a turnaround in the policy mix over the period (Panel 4). To consolidate corporate cash flows during the crisis, an immediate refund of research tax claims was introduced for 2009 and 2010. For SMEs immediate repayment was made permanent in 2011.

***Entrepreneurship*:** The Estates General of Industry (EGI), an industry roundtable, has been the opportunity to draw up a new industrial policy focused on the structuring of industrial sectors, on re-industrialisation and on identification of strategic sectors (digital, eco-industries, energy, transport, chemicals, innovative materials). Under the PIA, OSEO funding to support industry and SMEs was increased by USD 2.8 billion. The PIA has enabled the establishment of two special venture capital funds: the National Seed Fund (2011) with USD 460 million, and the National Fund for Digital Society (2010), with USD 2.6 billion to support innovative digital services, applications and content.

ICT and scientific infrastructures: Under the PIA, France has invested massively in upgrading its research sites (laboratories and facilities of excellence). The Plan Campus sets aside USD 6.9 billion for renovating university buildings, including over USD 1 billion for the Plateau de Saclay.

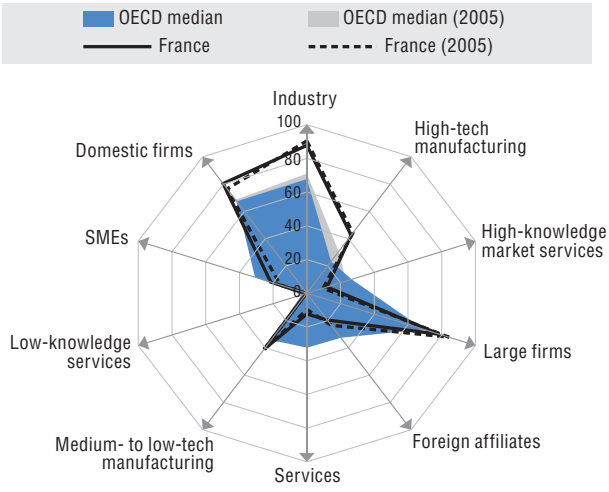
Clusters: The Competitiveness Cluster policy, introduced in 2004 to strengthen technological and industrial partnerships, has come to the end of its second phase (2009-11). It has received USD 575 million as part of the PIA (in addition to the initial USD 1.7 billion endowment). Efforts during the second phase focused on inter-cluster co-ordination and greater international visibility.

Knowledge flows and commercialisation: STI policy has sought to reinforce collaborative research and technology transfer. Under the PIA, interdisciplinary technological research institutes can be set up as public-private partnerships (USD 2.3 billion), with a view to becoming world-class campuses for technological innovation and enhancing cluster ecosystems. In addition to its funding for collaborative research, the ANR introduced in 2011 an Industrial Chairs programme to support collaborative research on strategic issues for French industry. The PIA has also funded the creation of a USD 1.2 billion National Fund for Research Promotion (2010) to support the deployment of accelerated technology transfer societies (SATT) and the professionalisation of research promotion. France Brevets, an IP investment fund, was set up in 2011.

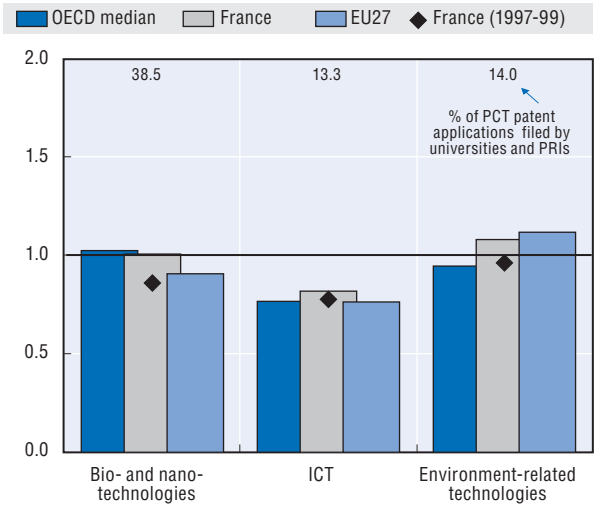
Green innovation: The Grenelle de l'environnement (2007) led to the introduction of measures targeting sectors with high environmental impact (tax incentives, eco-labels, green procurement, etc.). Nearly USD 7 billion has been invested for the research and pre-industrialisation phases of green industries of the future (*e.g.* technology platforms, clean vehicles, smart grids and circular economy). Public research has shifted towards environmental issues, an area in which France has acquired a slight RTA (Panel 3). The

Ambition Ecotech 2012 programme also aims at fostering the growth of eco-industries by providing funding to promote innovation and exports and by advising green SMEs.

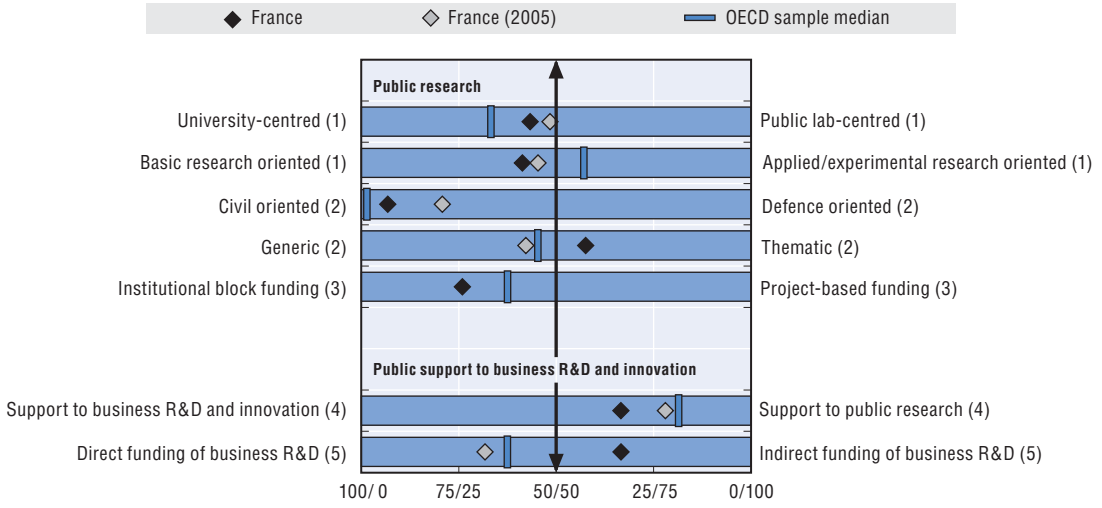
Panel 2. Structural composition of BERD, 2009
As a % of total BERD



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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