



# Trends in Business R&D and Government Support for Business Innovation in OECD Countries

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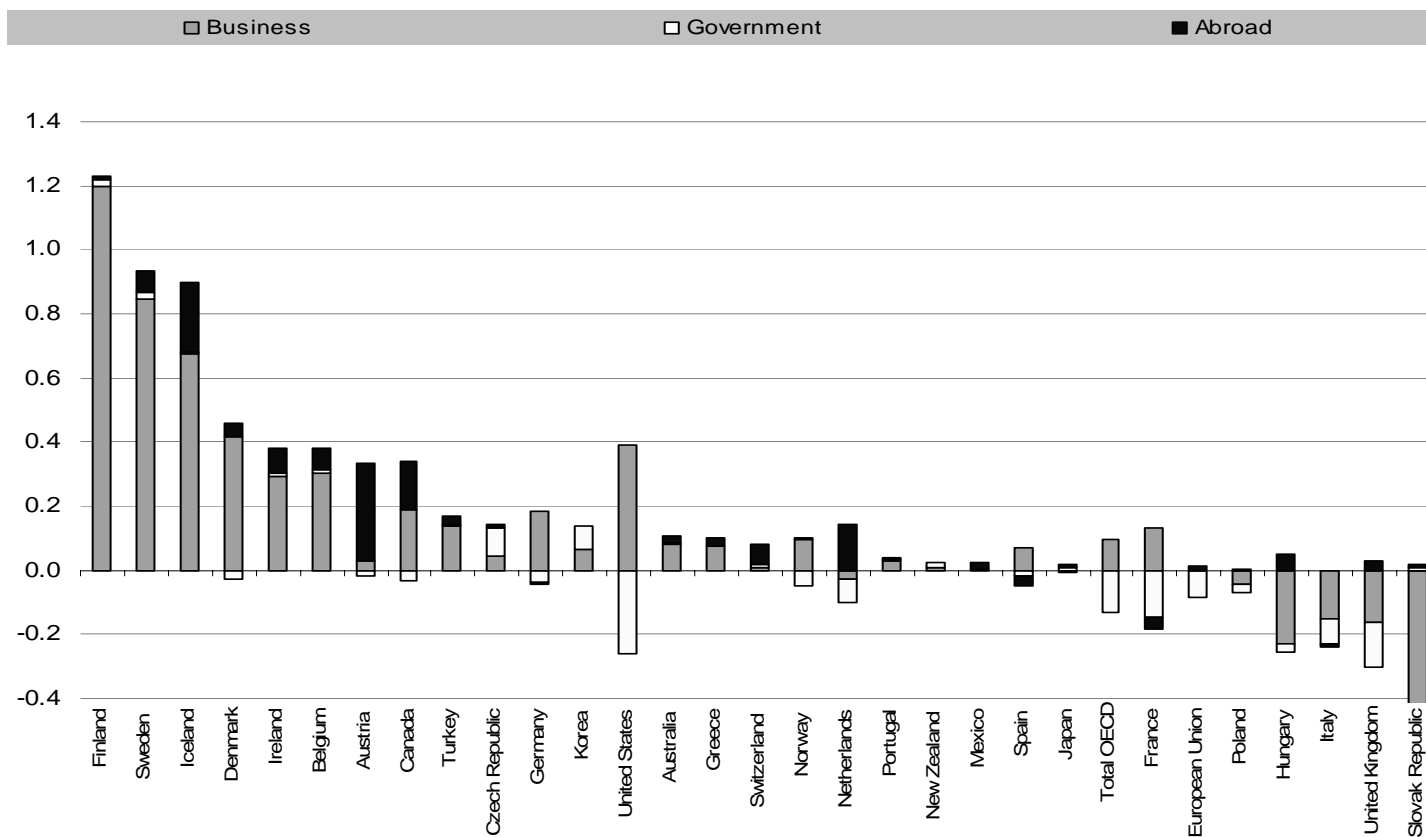
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# Policy Issue: How to improve support to Business R&D?

- *Increasing business R&D* is policy objective for many countries and regions.
- *Structure of business R&D* has changed in last decade: rapidly growing industry financing of R&D, and re-structuring of firms' R&D processes.
- *Patterns of government support* for R&D also changed: levels, motivation, and forms of support.
- *Issue*: how best to respond to and anticipate changing environment for business R&D in order to develop more effective & efficient S&T policies.

# Variable growth in business R&D

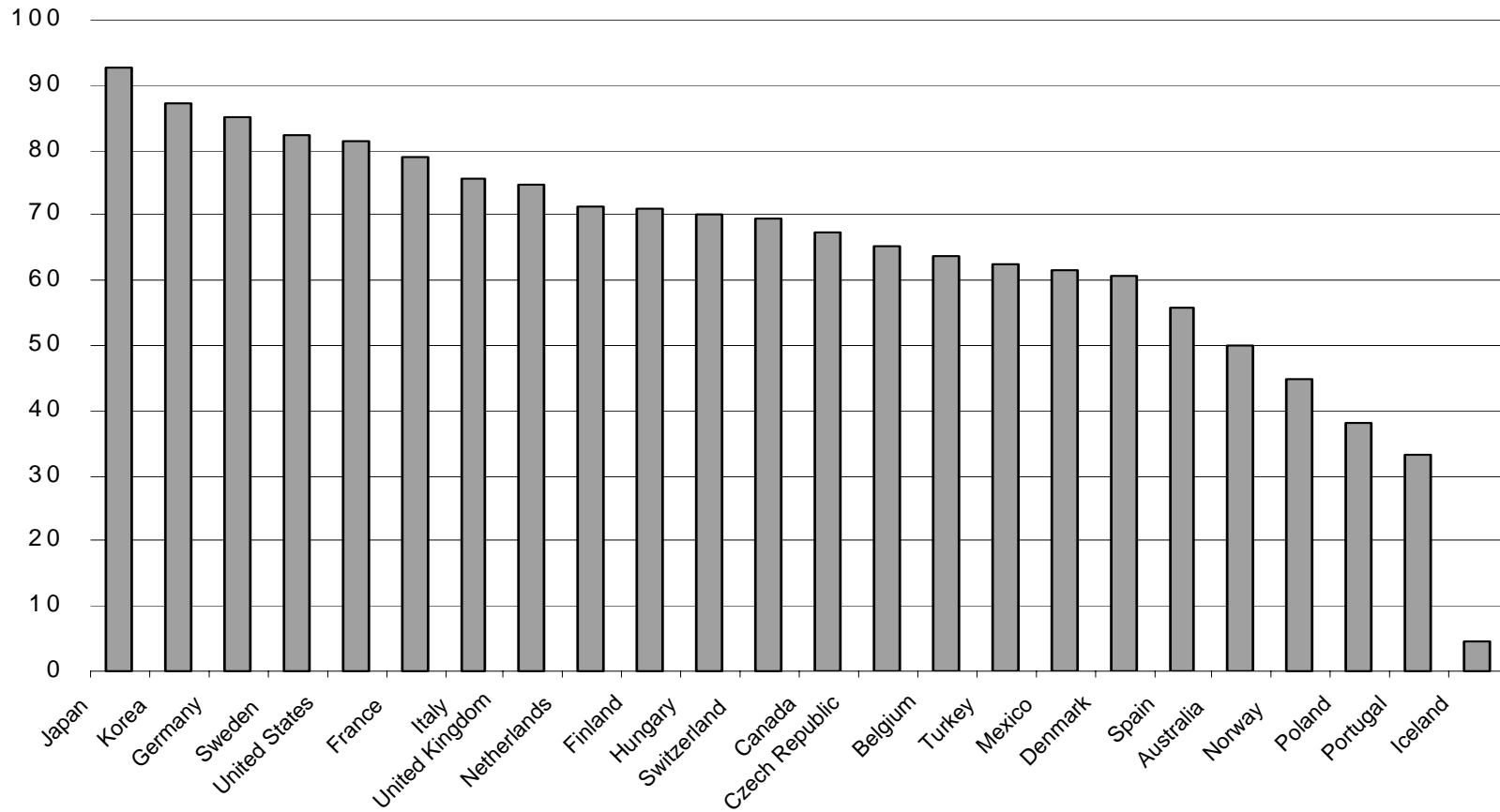
Change in business R&D as percentage of GDP, 1990- 2000 (or nearest available year), by source of funds



Source: OECD MSTI database, January 2002.

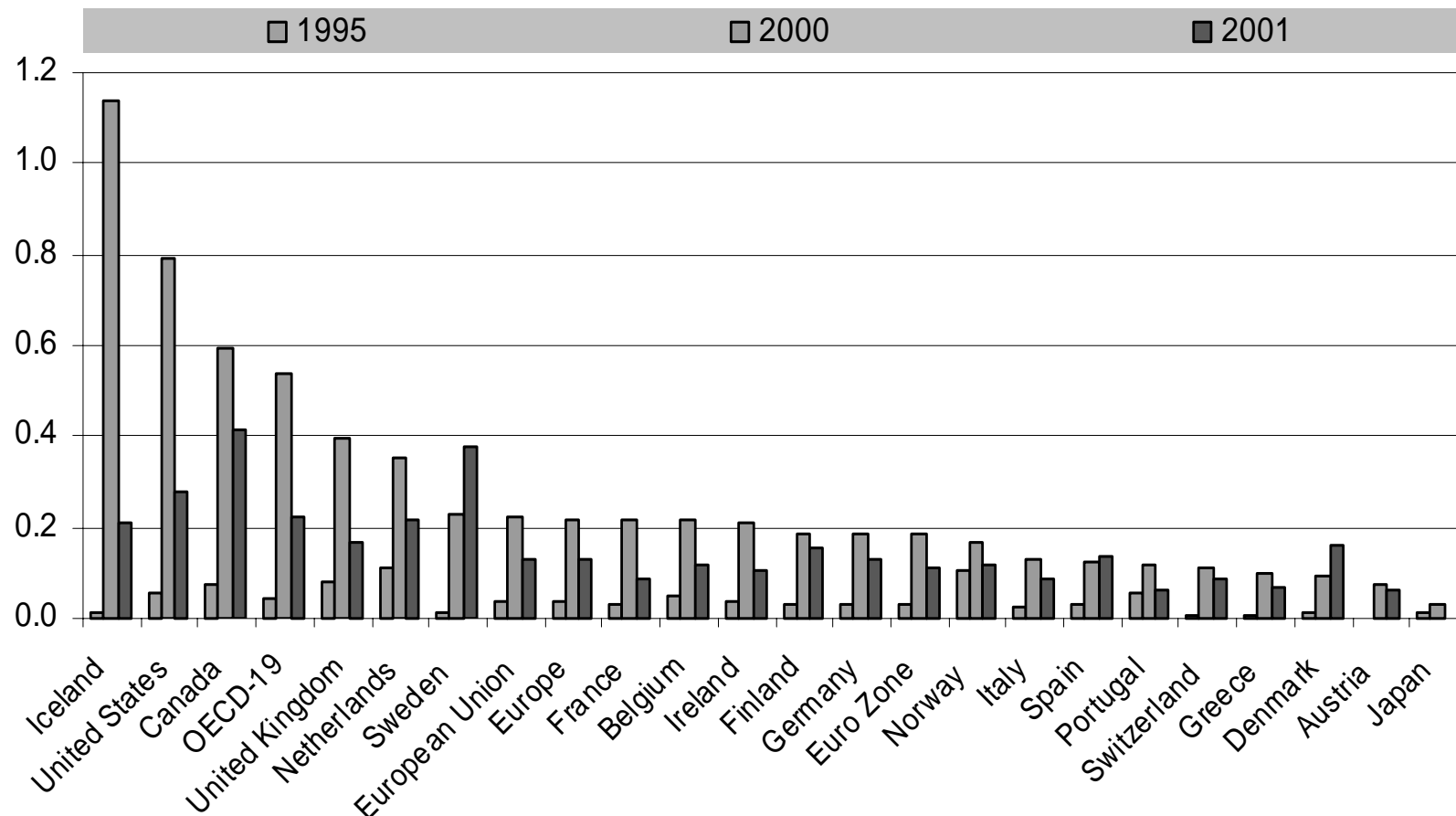
# Business R&D dominated by large firms

Share of BERD performed by firms with 500 or more employees (nearest available year)



# VC investments boosted business R&D

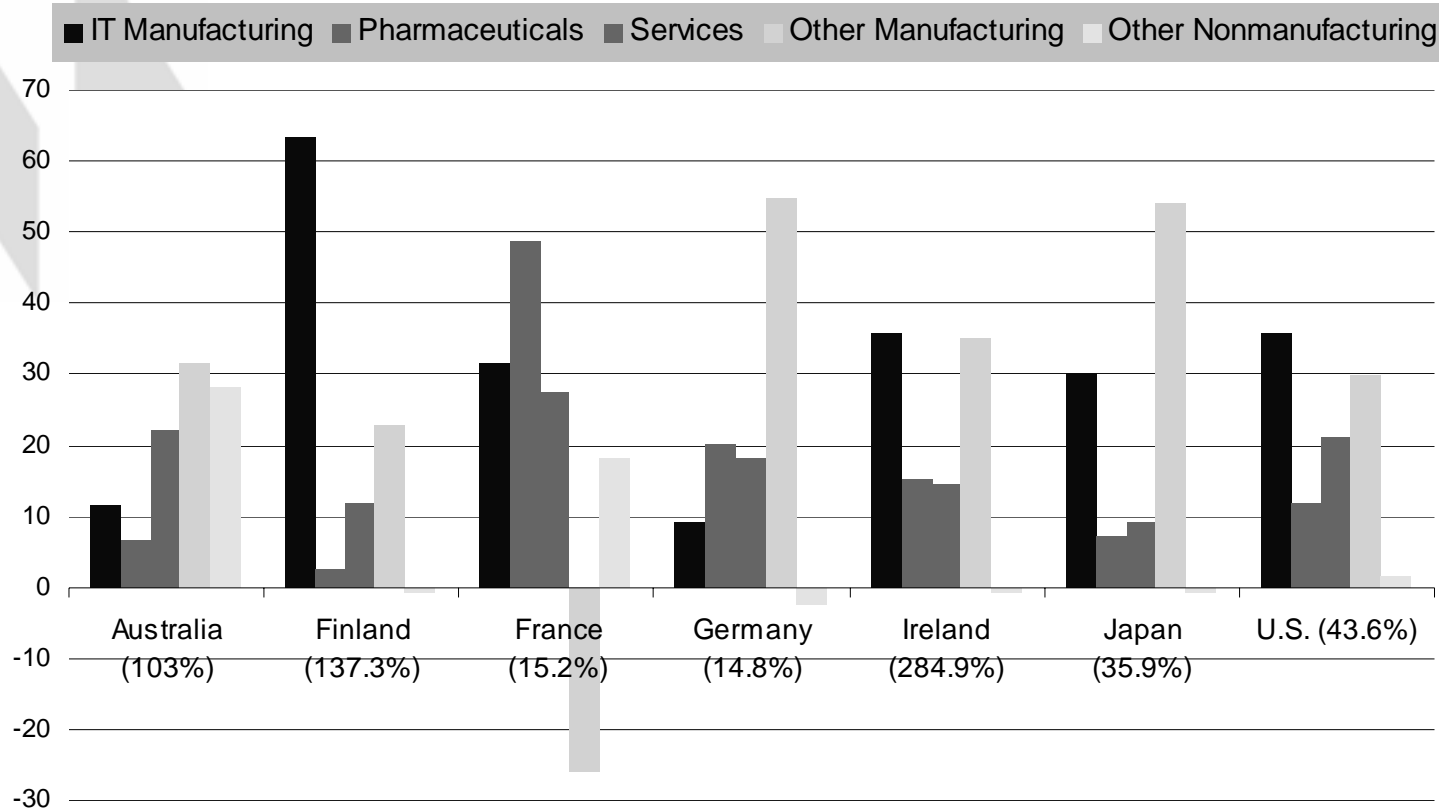
Early stage and expansion financing as percentage of GDP, 1995-2001 (or nearest available year)



Source: OECD, STI Scoreboard, 2001.

# High-tech manufacturing and services drove business R&D growth

Distribution of the growth in business R&D by industry, 1990-1998 (as percentage of total increase in BERD)



Source: OECD ANBERD database, 2001

# A Changing Environment for Business R&D

- *Shorter time-to-market.* Greater competition, shorter product life-cycles.
- *Expanding technological opportunities--*Hard to maintain necessary competencies in-house; uncertainty about future technology & markets
- *Increased cost and risk.* Cost of innovation is growing, in many capital-intensive industries.
- *Globalisation* of markets, S&T capabilities.
- *Increased mobility* of S&T workers. Increases rate of diffusion of knowledge
- *Erosion of dominant positions.* Greater competition makes it harder to appropriate returns.

# Firm Strategies: From Closed to Open Business R&D

## Old model: closed innovation

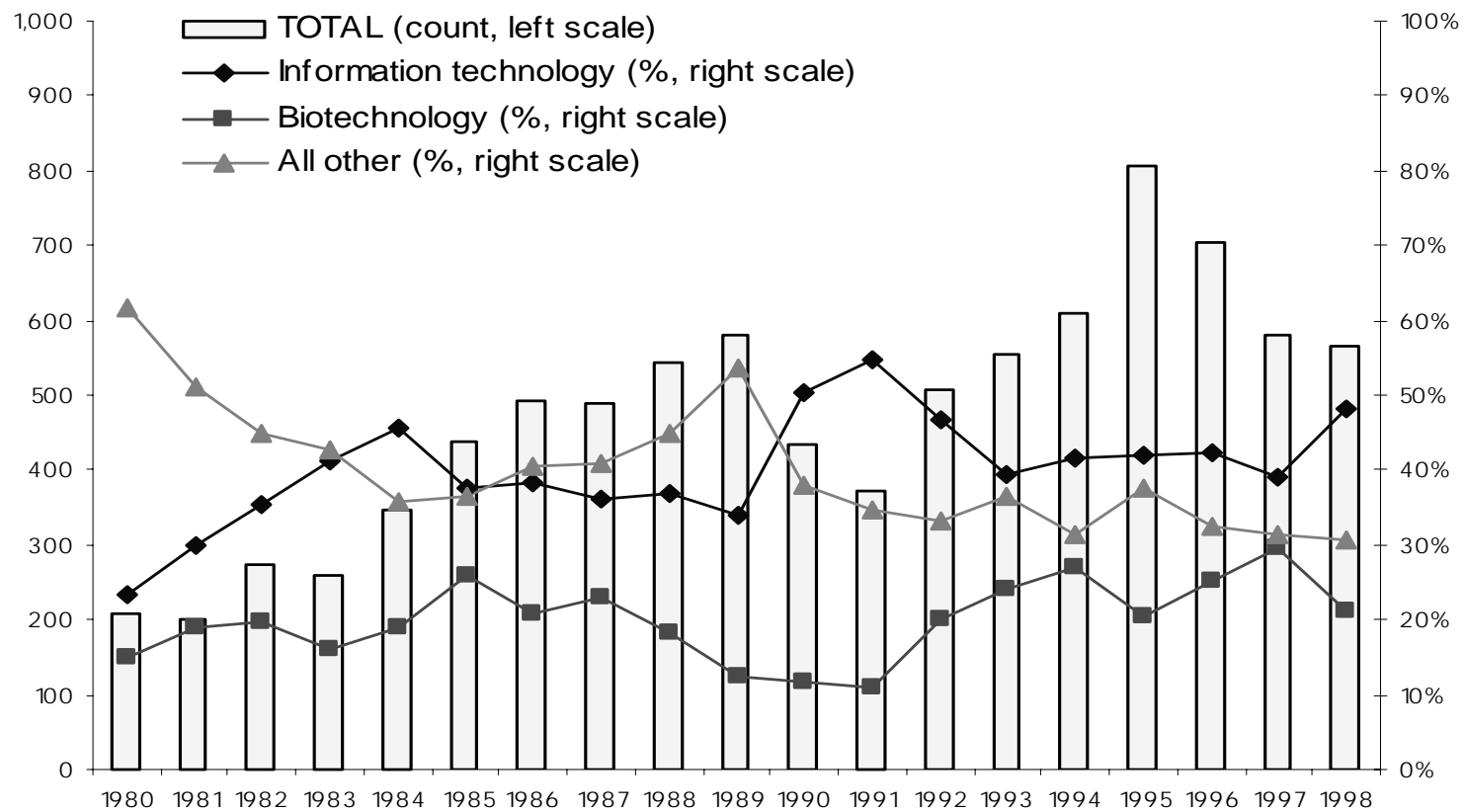
- Virtuous circle
- Firms identify needed technological advances
- Firms conduct R&D internally
- Firms incorporate advances into new products & services
- Product revenues finance additional R&D

## New model: open innovation

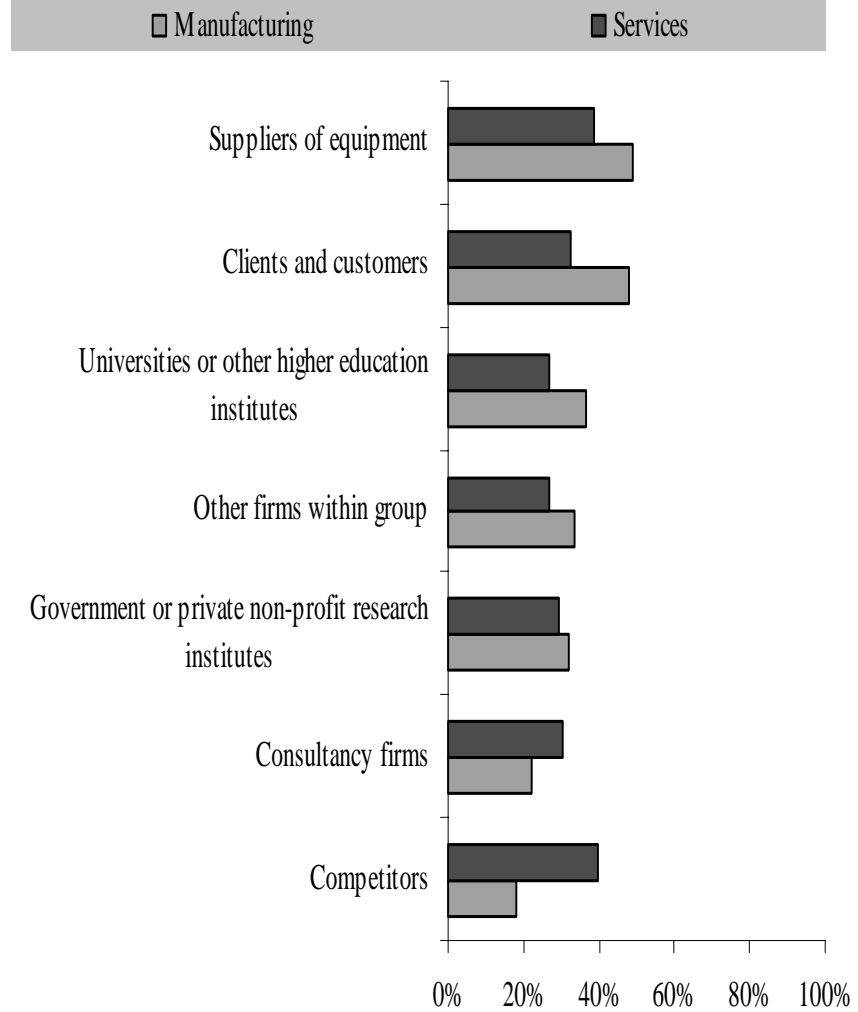
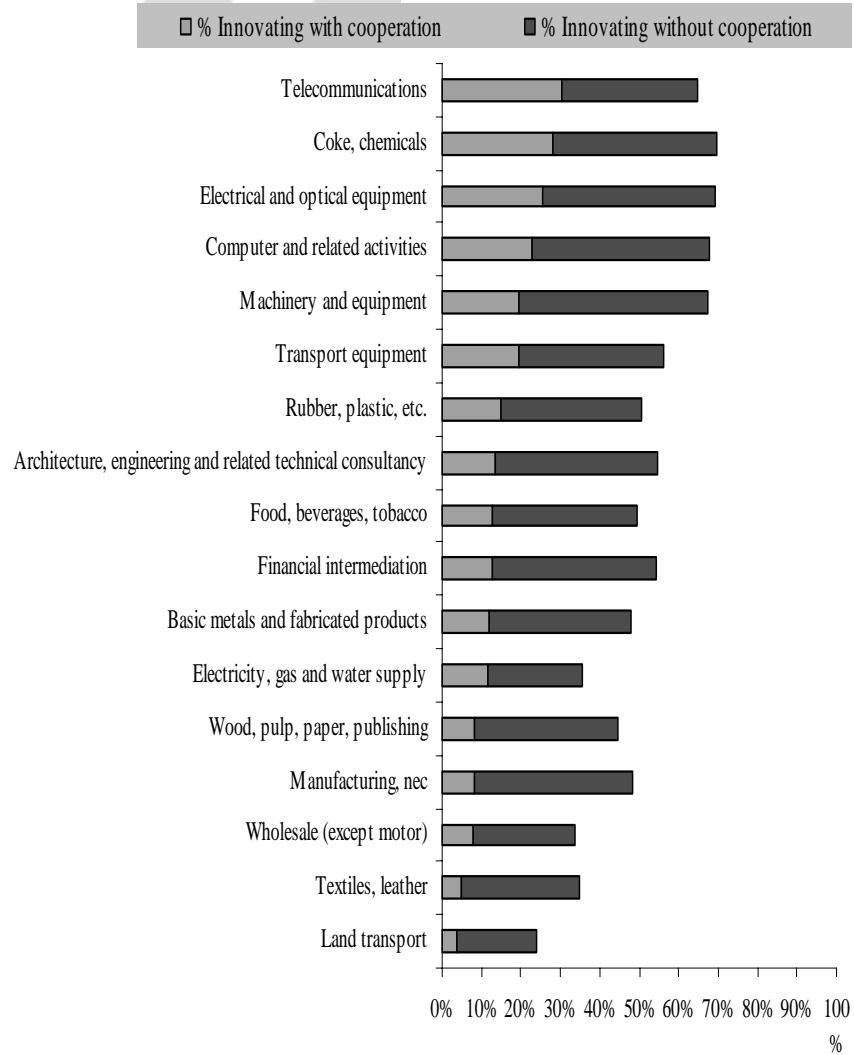
- R&D linked to business strategy (new funding models, incentives for workers)
- Acquisition of external technology (licensing, corporate VC, M&A, collaborative research)
- Externalisation of R&D results (licensing, spin-offs)
- Globalisation to tap into world-wide talent pools

# Strategic alliances widespread in high-technology industries

## Technology-related strategic alliances

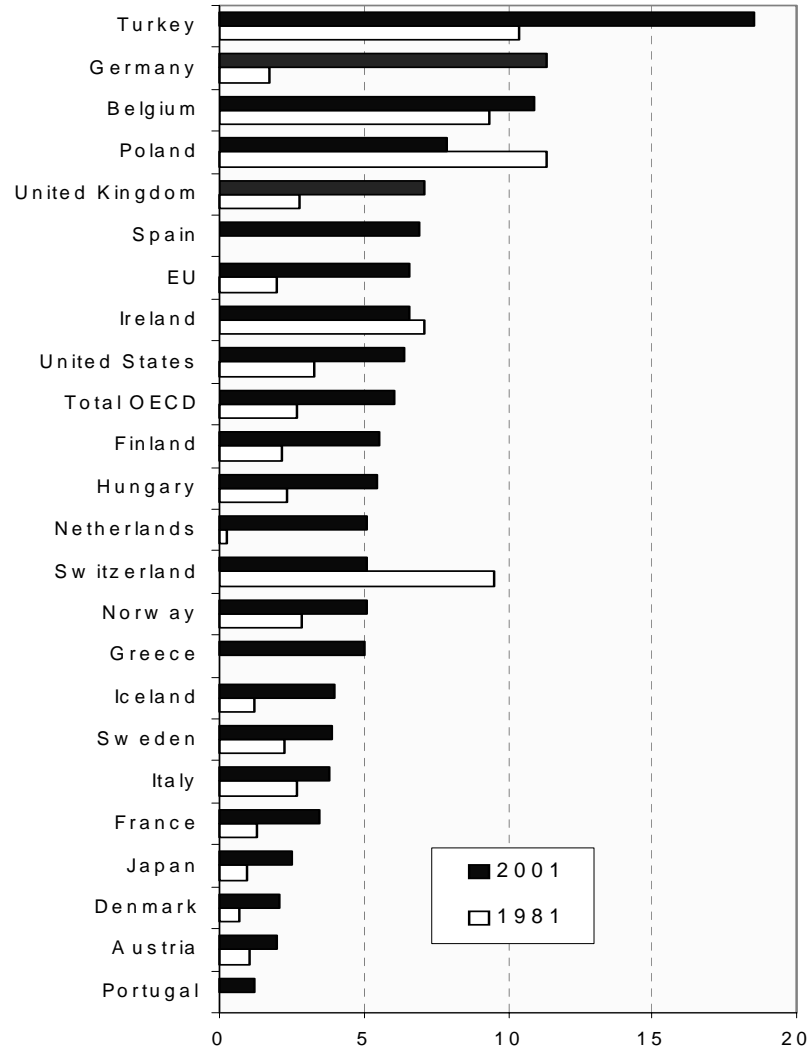


# Partners in innovation

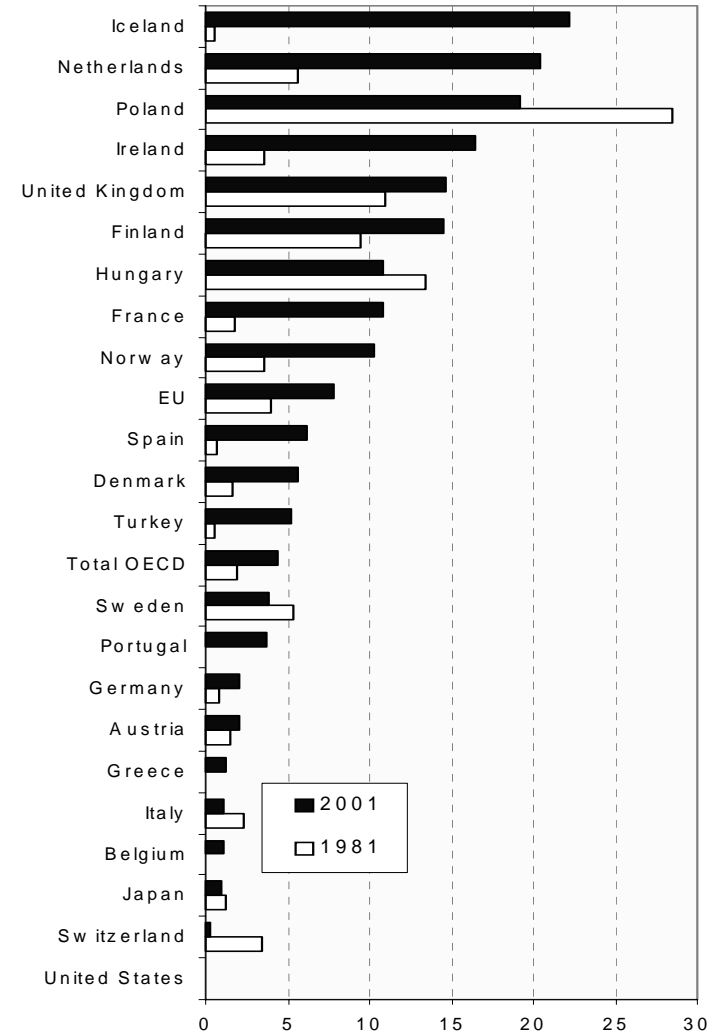


# Business funding of public research

*Higher education*



*Government*



## Implications for R&D Policy

- Government support for business R&D is broader than explicit forms of assistance (e.g., direct financing and tax incentives).
- Government support for *basic research* increasingly important. Support to business R&D must be made in the context of support for *public sector institutions*.
- Explicit support for business R&D needs to match instruments to business needs & impediments to R&D (i.e. right mix of direct financing and tax incentives).
- *R&D in SMEs* is increasingly important, but support must be balanced against increasing availability of private VC for NTBFs.

# Creating an innovative environment

- *Ensuring linkages* among innovating organisations (large firms, small firms, universities, public laboratories, service intermediaries) is increasingly important--systemic aspects of innovation
- *IPR* is both a motivator of business R&D (appropriability) and a facilitator of knowledge dissemination (e.g., through licensing).
- *Human resources*--skilled scientists and engineers are basis of business R&D.
- *Measurement and support* issues harder in more diffuse innovative and policy environment.

## Some questions for research: Improving understanding business R&D

- What factors underlie the significant *differences* in business R&D patterns at the country level (e.g., structural changes, global R&D investments, role of SMEs/NTBFs?) ==> influences strategies governments might take to increase business R&D (e.g., growth of high-tech industry vs. broader R&D deepening; large firms vs small firms)
- What *barriers* limit business investments in R&D: financial limitations, technological risk, limited demand/market access==> influences choice of policy instruments.
- How do *business strategies* for R&D differ across industry sector, country, and size of firm ==> could contribute to differences in business R&D performance and effectiveness?

## More questions for research: policy implications and directions

- How effective are different policy instruments in encouraging business R&D investments. How is effectiveness influenced by design and implementation?
- How do different policy instruments influence firm behavior (direct funding, tax incentives, public research, etc.):
  - levels of R&D investment, in both near- and long-term
  - types of projects pursued
  - relationships with other innovators?
- What mix of instruments is suited to different situations, countries, etc.?