

1. RESPONDING TO THE ECONOMIC CRISIS

1.3. R&D growth over the business cycle

Research and development (R&D) expenditure is one of the most widely used measures of the innovative efforts of firms and countries. It is directly linked to innovation via new products and new processes, and indirectly as investment in knowledge.

For the OECD area as a whole, R&D tends to show larger variations than gross domestic product (GDP) over the business cycle. This suggests that the expected drop in GDP due to the current crisis would result in an even larger decrease in R&D expenditure.

This decrease is likely to affect some countries more than others. Responsiveness of R&D to the business cycle (see box right) appears strongest in Hungary, the Slovak Republic, Poland and Spain where on average, over 1981-2007, any variation in GDP has been associated with a variation two to three times greater in R&D. This suggests that in these countries the current crisis will have a significant impact on R&D. In Denmark, Japan and the United States, R&D expenditure has been moving nearly proportionally with GDP. Belgium, Germany, Austria, Norway and the United Kingdom have been better able to preserve their R&D levels over the business cycle. If this pattern is maintained, the impact of the current crisis on R&D in these countries is likely to be relatively contained.

In 2007, R&D expenditure in the OECD area reached USD 886.3 billion (in current purchasing power parity, PPP), or about 2.29% of overall GDP. Gross domestic expenditure on R&D (GERD) has been growing steadily since the 1980s despite a slowdown in the early 1990s and 2000s.

R&D intensity (GERD/GDP) is a relatively stable measure: in 2007 in only four OECD countries (Finland, Japan, Korea and Sweden) was it greater than 3%; the OECD average was 2.3% and that of the EU 1.8%. In the last two years, significant positive growth in terms of R&D intensity was reported for Portugal (0.4 percentage points) and Australia (0.2); R&D intensity declined slightly in Canada from 2.1% in 2004 to 1.8% in 2008.

Non-OECD economies are also important R&D spenders: China's GERD is equivalent to around 11.5% of that of the OECD area and Israel's R&D intensity (4.7%) is higher than that of any OECD country.

R&D expenditure and responsiveness to GDP

Resources allocated to a country's R&D efforts are measured using two indicators, R&D expenditure and personnel. For R&D expenditure, the main aggregate used for international comparisons is gross domestic expenditure on R&D (GERD), which represents a country's domestic R&D-related expenditure for a given year. The R&D data are compiled on the basis of the *Frascati Manual* which defines R&D as "creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications".

The magnitude of estimated resources allocated to R&D is affected by several national characteristics, principally:

- Coverage of national surveys on R&D in terms of industries, firm size, sampling methods.
- Frequency of national surveys.
- Methodology used, e.g. for the United States, capital expenditure is not covered.

Responsiveness is measured as the estimated elasticity of GERD to GDP. The estimation is based on an OLS regression on the first-order differences of natural logs. Only coefficients significant at the 10% level and below are reported.

Source

OECD, Main Science and Technology Indicators Database, June 2009.

Going further

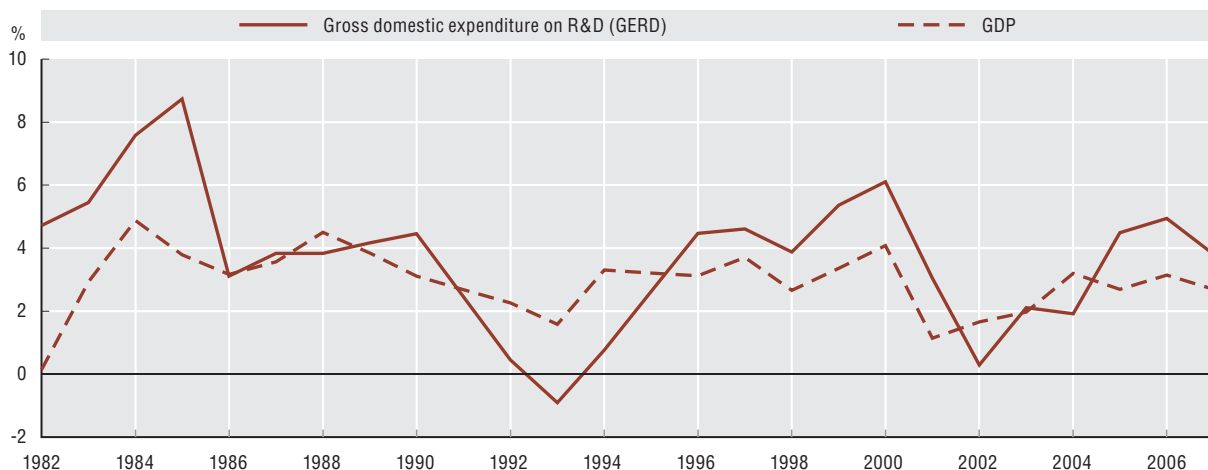
OECD (2002), *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD, Paris, www.oecd.org/sti/frascaticmanual.

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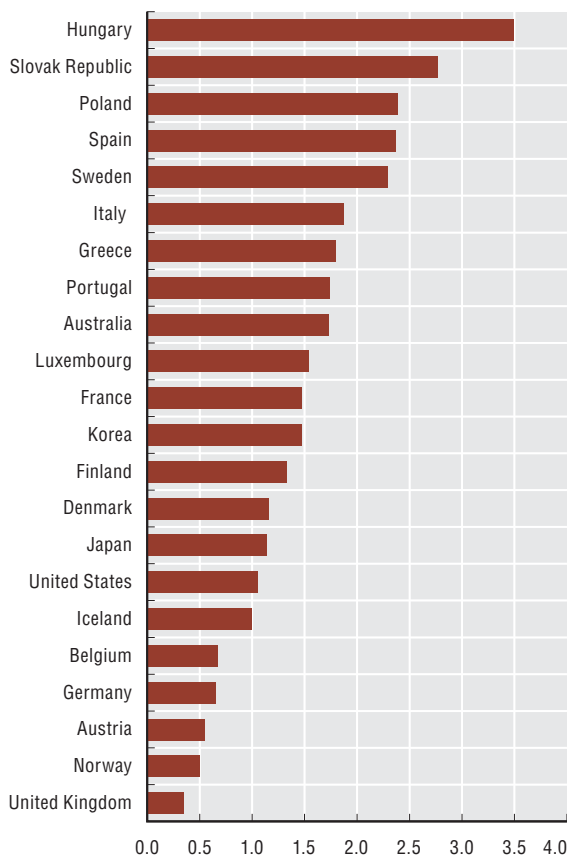
R&D growth over the business cycle, OECD, 1982-2007

Average annual real growth rate, percentage



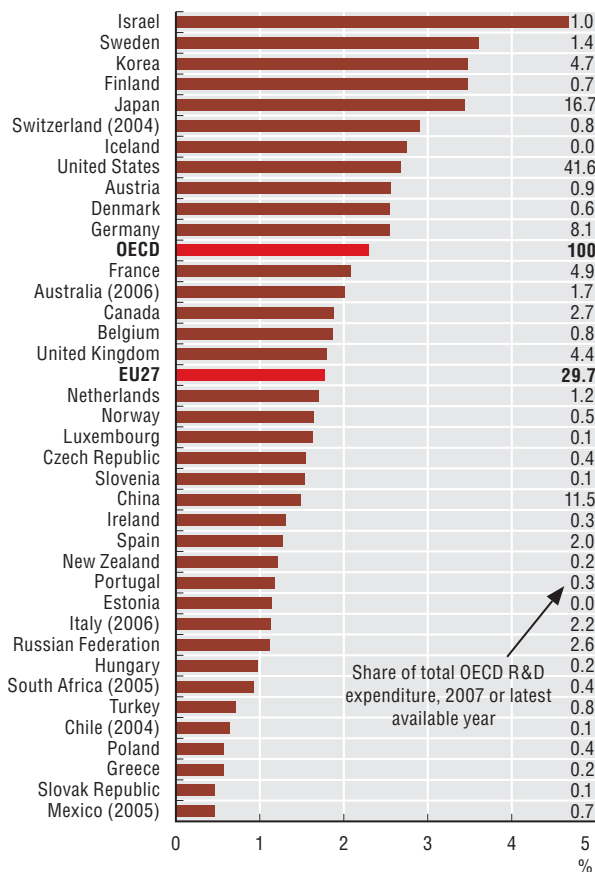
StatLink <http://dx.doi.org/10.1787/742000505178>

Responsiveness of R&D to the business cycle, 1981-2007



StatLink <http://dx.doi.org/10.1787/742013061504>

R&D intensity (GERD/GDP), 2007 or latest available year



StatLink <http://dx.doi.org/10.1787/742024553847>



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