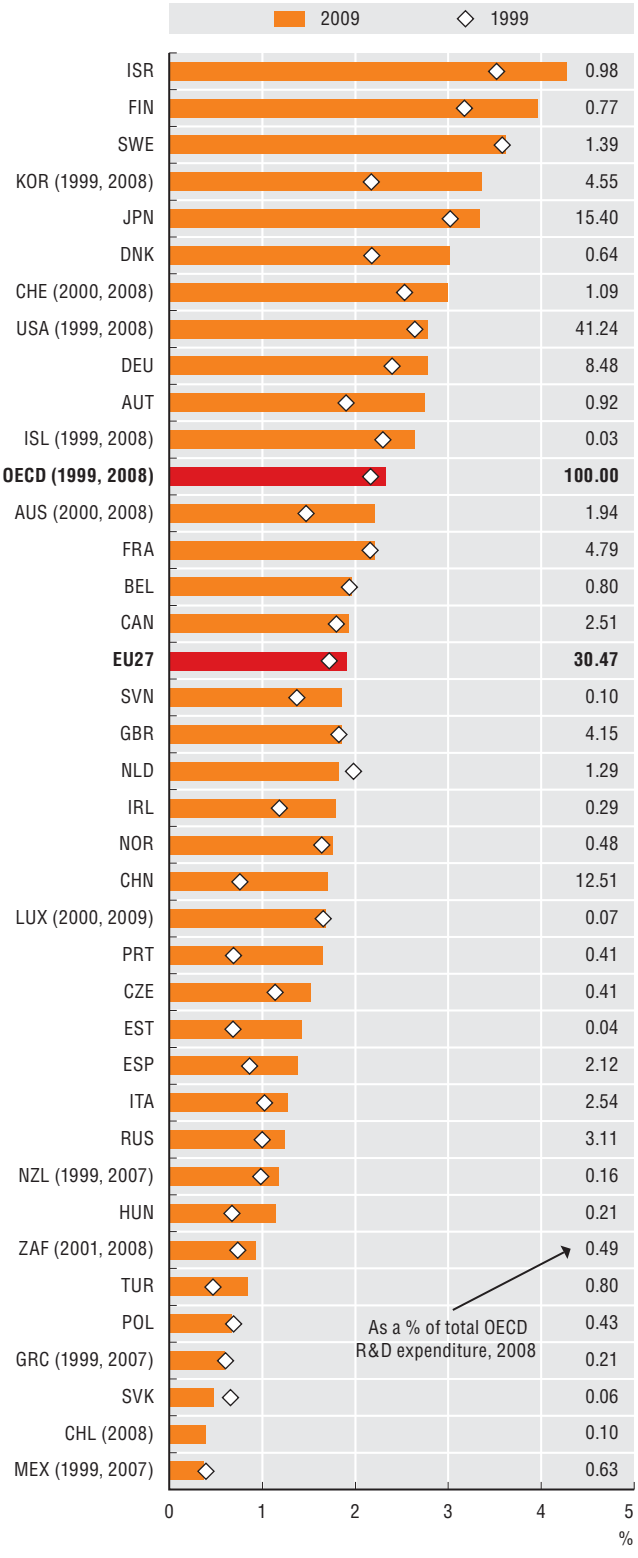
5. R&D expenditure

Gross domestic expenditure on R&D, 1999 and 2009

As a percentage of GDP



Source: OECD, Main Science and Technology Indicators Database, June 2011. See chapter notes.

StatLink http://dx.doi.org/10.1787/888932485956

Expenditure on research and development (R&D) is one of the most widely used measures of innovation inputs. R&D intensity (R&D expenditure as a percentage of GDP) is used as an indicator of an economy's relative degree of investment in generating new knowledge. Several countries have adopted "targets" for this indicator to help focus policy decisions and public funding. Israel has the highest R&D intensity, with gross domestic expenditure on R&D (GERD) in excess of 4% of gross domestic product (GDP). The OECD average stands at 2.3%. The United States accounts for 41% of OECD-area GERD, followed by Japan with 15% and Germany with 8%. China's domestic expenditure on R&D is the equivalent of 12% of total OECD GERD; it is therefore the world's third largest R&D performer.

The business sector continues to be the main performer of R&D in most economies and accounts for nearly 70% of R&D performed in the OECD area. Israel's business sector makes the largest contribution to GERD, with nearly 80% of total R&D, closely followed by Japan and Korea. Business R&D is exceeded by R&D in the higher education sector only in Turkey, Greece and Poland. Across the OECD, higher education R&D accounts for nearly 17% of total GERD. The government is the main performer of R&D only in Argentina, where it accounts for nearly 40% of GERD.

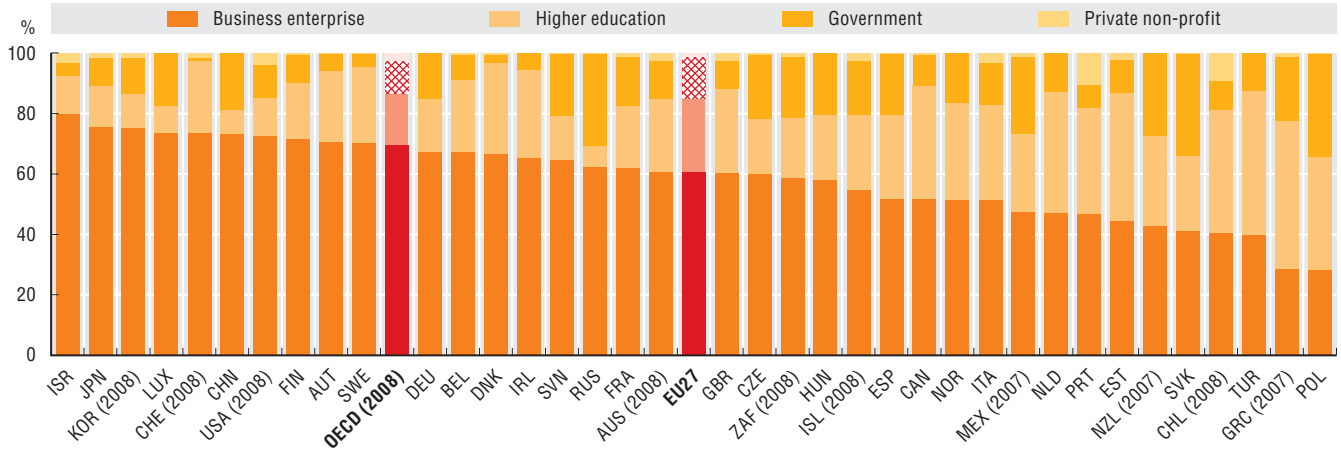
Within countries, even in the most R&D-intensive, there is also considerable variation in R&D intensity. In making international and regional comparisons, it is important to be aware of differences in industrial structure and research capabilities. New Mexico is the most R&D-intensive region with 7.5% of regional GDP. In Australia, France, Germany, Korea, Norway, the United Kingdom and the United States, the R&D intensity of the leading region is at least twice the national average.

Definitions

The main aggregate used for international comparisons of R&D expenditures is gross domestic expenditure on R&D (GERD). GERD data and their components are compiled on the basis of the OECD *Frascati Manual 2002* methodology, 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". GERD is usually broken down among four sectors of performance: business enterprise, higher education, government and private not-for-profit institutions serving households (PNP). GERD is often reported in relative terms as a percentage of GDP, to denote the R&D intensity of an economy. Regional R&D intensity is defined as total intramural expenditures on R&D performed in the sub-national territory (the region) in a given year, and it is defined relative to regional GDP.

R&D expenditure by performing sectors, 2009

As a percentage of GERD

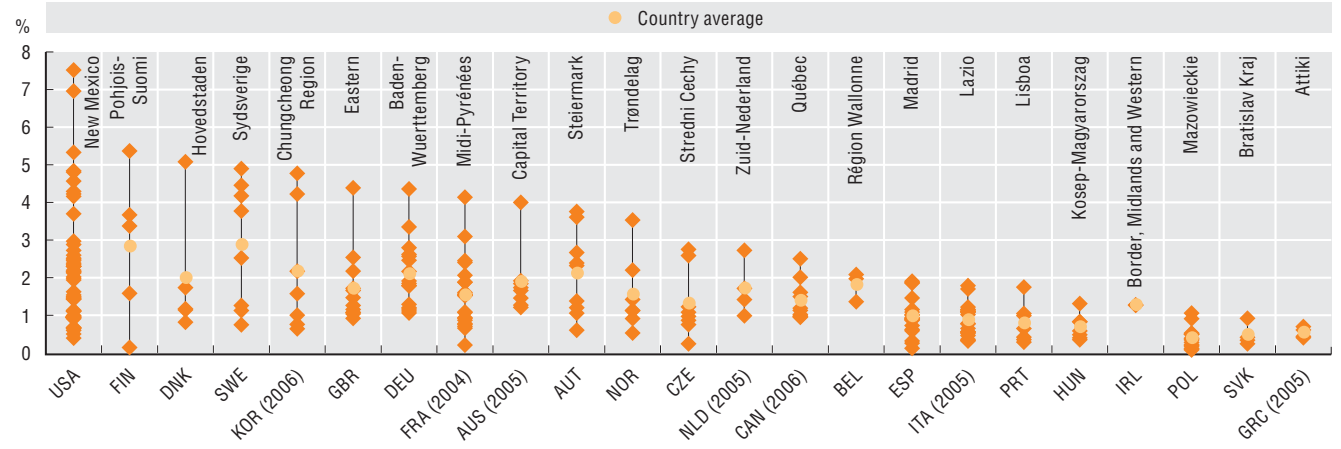


Source: OECD, Main Science and Technology Indicators Database, May 2011. See chapter notes.

StatLink http://dx.doi.org/10.1787/888932485975

R&D intensity by region, 2007

As a percentage of regional GDP



Source: OECD, Regional Database, July 2010. See chapter notes.

StatLink http://dx.doi.org/10.1787/888932485994

Measurability

Estimated resources allocated to R&D are affected by national characteristics: coverage of national surveys on R&D across sectors and industries; firms and organisations of different sizes; use of different sampling and estimation methods. Because R&D typically involves a few large performing organisations, R&D surveys use various techniques to maintain up-to-date registers of known performers. They have developed ways to avoid double counting of R&D by performers and companies that contract with them or fund R&D activities of third parties. Following changes to the System of National Accounts, countries have begun to include investment in R&D (from an ownership perspective) in their estimates of gross fixed capital formation, thus helping to raise the estimated level of GDP. Estimating R&D intensity by region or other sub-national units presents additional challenges. In addition to information on regional GDP levels, it requires domestic R&D performers to break down R&D activities across sites in different national territories or regions.