17 January 2014

OECD ESTIMATES OF R&D EXPENDITURE GROWTH IN 2012

RELEASE OF THE OECD *MAIN SCIENCE, TECHNOLOGY INDICATORS 2013/2*

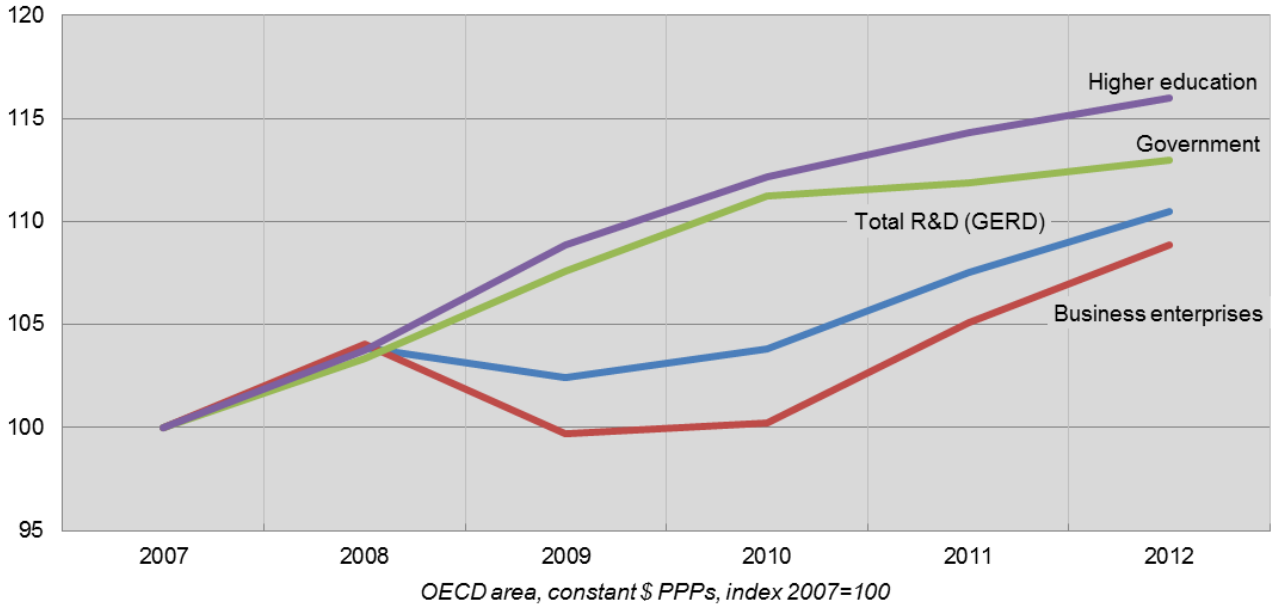
R&D spending has resumed growth in the OECD

Growth was driven mainly by the business sector…

The latest OECD estimates confirm the recovery of Gross domestic Expenditures on R&D (GERD) in 2012. In the OECD area, the level of R&D spending rose by 2.7% in real terms from 2011 to stand above pre-crisis levels for a second straight year.

This growth has been driven by a strong recovery in R&D performed by business (+3.5%), well in excess of subdued growth of R&D expenditures in higher education institutions (+1.4%) and in the government sector (+0.9).

Gross domestic expenditure on R&D in the OECD area, by performing sector



Source: OECD, based on *OECD Main Science and Technology Indicators* 2013/2. www.oecd.org/sti/msti.htm

… while government budgets for R&D have remained stable or declined in most countries

Across the entire OECD area, R&D budgets declined in real terms after having helped mitigate the slowdown in total R&D performance during the crisis. A majority of countries reduced or maintained their R&D budget allocations for 2012. The information available for a limited number of countries in 2013 points to a continued trend of stable or declining R&D budgets.

In addition to providing direct funding for R&D through grants and contracts, many OECD countries also provide tax-based incentives to entice business to invest in R&D. In recent years, some of them have re-oriented resources away from budget-based direct funding of R&D to providing tax relief for R&D costs. Separate information and statistics on this type of public support for R&D is available at http://www.oecd.org/sti/rd-tax-stats.htm.

A changing geography of R&D growth

China's R&D intensity is now on a par with the European Union

For the first time, China's R&D intensity (1.98%) has caught up with the European Union (1.97%) in 2012, having previously surpassed the United Kingdom and Canada in 2011 (see **Box 1**). The rapid and sustained growth in China's R&D spending over the past two decades has been driven by R&D expenditures in enterprises (BERD). In absolute terms, China's R&D is the equivalent of 72% of EU's total GERD and 88% of total BERD, measured in purchasing power parities (PPPs). The equivalent comparative numbers with the United States are, respectively, 54% and 59%.

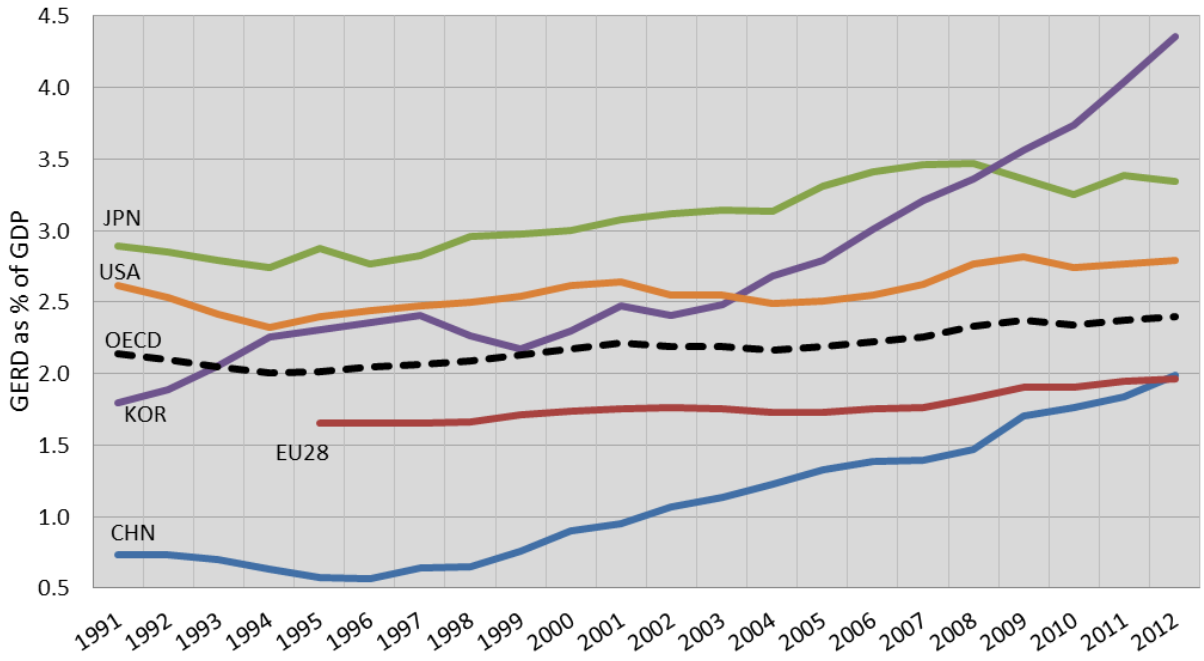
OECD patent indicators confirm this trend

There has also been a significant increase in the number of patents filed by Chinese inventors. In terms of triadic patent families, China became the 7th – ranked economy in 2011. Considering patents filed under the Patent Cooperation Treaty (PCT), inventors based in China filed more than those based in Germany in 2011, placing China as the 3rd highest ranked economy, after the United States and Japan (4th if the EU28 total is considered).

Korea has the largest R&D intensity in the OECD

Korea is, along with China, the country with the most rapidly growing R&D expenditure levels in recent years. According to the latest available estimates, it now ranks first among OECD countries in terms of its R&D intensity, a position long held by Israel. This performance has also been driven by rapid growth in the R&D spending of its business sector.

R&D intensity trends: Gross Domestic Expenditure on R&D as a percentage of GDP, 1991-2012



Source: *OECD Main Science and Technology Indicators* 2013/2. www.oecd.org/sti/msti.htm

Box 1. The concept of R&D intensity, its use and measurement

R&D intensity is term commonly used to describe the ratio of Gross domestic Expenditures on R&D (GERD) to GDP. It is often used as an indicator of the R&D effort made by an economy relative to its overall size. The indicator of R&D intensity is calculated in many countries and areas to monitor progress towards meeting R&D policy objectives, and in some cases, explicit targets. For example, the Lisbon strategy set the EU an objective of devoting 3% of GDP to R&D activities by 2010, which was maintained as one of five key targets within the Europe 2020 strategy adopted in 2010. The United States has a similar goal. More information on R&D intensity-based targets is available at the OECD Science, Technology and Industry Outlook 2012, to be updated later this year.

As a ratio between two economic variables, its evolution over time depends on a number of factors impacting on numerator and denominator (see **Box 2**). During a recession, the levels of both GDP and R&D investment typically decline. In 2009-2010, R&D in the OECD area dropped faster than GDP, resulting in a reduction in measured R&D intensity. This behaviour confirmed previous evidence that R&D tends to exhibit a pro-cyclical behaviour.

Measuring R&D intensity for groups of countries

The OECD calculates measures of total R&D and R&D intensity for areas such as the OECD and the European Union areas. Both OECD and Eurostat estimates of R&D intensity for the EU28 are weighted averages of national R&D intensity measures, where the weights are defined by each country's share in the entire area's GDP. This requires using a common unit. In the case of Eurostat, each country's GDP is converted to EUR using current exchange rates for the period. The GDP weights used in OECD estimates are expressed in equivalent USD Purchasing Power Parity (PPPs) units, namely the ratio of the price of a representative basket of goods and services in a country relative to the United States, as estimated by OECD. This is in line with established OECD practice across other domains, as an attempt to take into account differences in relative prices (http://www.oecd.org/std/prices-ppp).

Traditionally, this difference in approach has resulted in the Eurostat average estimate for the EU28 area (2.06% in 2012) being slightly higher than the OECD's (1.97%). In the Eurostat estimate, countries with a relatively higher R&D intensity tend to have larger current EUR-based GDP weights than PPP-based GDP weights and vice versa. For example, Germany and Finland, with their high R&D intensity exert a higher weight in Eurostat than in OECD estimate, while the opposite holds for Spain or Poland. Differences between the two measures have been very stable in recent years. It should be noted that it is the Eurostat estimate for the EU area and not the OECD's that is used by the European Commission for monitoring purposes.

United States: the recovery in R&D spending is confirmed

New figures for the United States confirm the recovery of R&D expenditures in 2011 and 2012, ahead of the pace of GDP, more than offsetting the decline experienced in 2009 and 2010. GERD in the United States has increased in real terms by 3.9% in 2012, mainly driven by business R&D (+5.8%), while the increase in government R&D remained modest (+1.0) and expenditures in higher education institutions actually declined (-1.3%).

Europe: a diverse picture

Overall R&D expenditure growth in the European Union has remained modest (+0.6% in real terms) in 2012. The performance of individual countries is highly heterogeneous. France and Germany experienced real growth in R&D expenditures (+0.6%) and (+1.6%) respectively, while GERD in the United Kingdom decreased by 3.1% in 2012. Central and Eastern European countries continued to increase their R&D expenditures, while R&D in some other EU countries like Portugal and Spain are still below pre-crisis levels as they appear to have experienced higher budget cuts in 2012.

Japan: R&D spending remains stable

After a rebound in 2011 with increased spending in enterprises and higher education institutions, R&D expenditure in Japan remained stable in 2012.

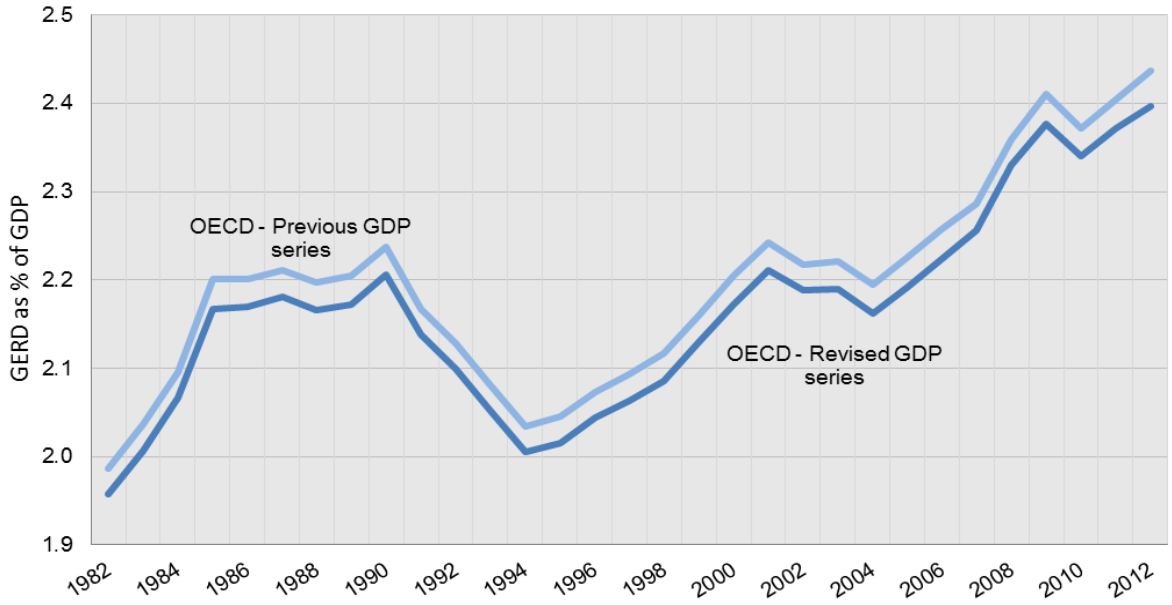
Box 2. The impact of changes to GDP measurement on R&D intensity targets

GDP statistics are compiled by national statistical offices (NSOs) using the standards set in the System of National Accounts (SNA).Its latest update, the SNA2008, recognised the role of R&D as an activity leading to the creation of an intellectual asset. One implication of recognising R&D as an asset-building (i.e. investment) activity is that the level of GDP will be revised upwards by a magnitude close to the value of domestic business expenditure on R&D, either carried out in house or bought from other companies. The revision of economic statistics by NSOs to bring them into line with the SNA2008 reduce the R&D intensity ratio, as the GERD numerator stays constant and the GDP denominator increases to incorporate an element that was previously missing from the GDP estimate.

A few countries have recently implemented a revision to their GDP figures to take into account the role of R&D as investment. New figures for Australia (since 2010) and the United States (since late 2013) are already incorporated in the OECD GDP database, while figures for Canada, Israel and Mexico will be soon included following recent revisions. It is expected that Korea and most European countries will adopt the new system in 2014. When such changes take place, historical data are retroactively updated, going as far back as data availability allows.

Users should be careful when comparing the R&D intensity of countries as the revision of national accounts is not a simultaneous process. Furthermore, comparison with previously published measures of R&D intensity and more recent ones should be clearly avoided. As the chart below shows, using the previously available set of GDP estimates for the OECD area instead of the most recent ones would have resulted in an otherwise 0.4% higher R&D intensity for 2012. The latest GDP estimates for the OECD incorporate a significant upward revision to US GDP. The data series contained in the OECD *Main Science and Technology Indicators* 2013/2 database contain a specific flag (z) to indicate where SNA2008-consistent figures have been used.

Changes in OECD R&D intensity due to the upward revision of OECD GDP in late 2013



Source: OECD, based on *OECD Main Science and Technology Indicators database* 2013/2 (GERD and GDP) and 2013/1 (GDP only). www.oecd.org/sti/msti.htm

Notes and further information:

R&D figures in the *OECD Main Science and Technology Indicators* are based on a joint OECD/Eurostat international data collection from NSOs, carried out according to the guidelines in the OECD Frascati Manual developed by the OECD Working Party of National Experts on Science and Technology Indicators.

Detailed R&D data, including R&D budgets, are available in the OECD R&D Statistics Database. A comprehensive collection of structural indicators and trends on science, technology and innovation is available in the 2013 OECD Science, Technology and Industry Scoreboard.

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