

# NEWSLETTER on STI Data and Indicators

DG RTD, A4, Analysis and monitoring of national research policies

## 1. Eurostat data on government appropriations and outlays for R&D (GBAORD)

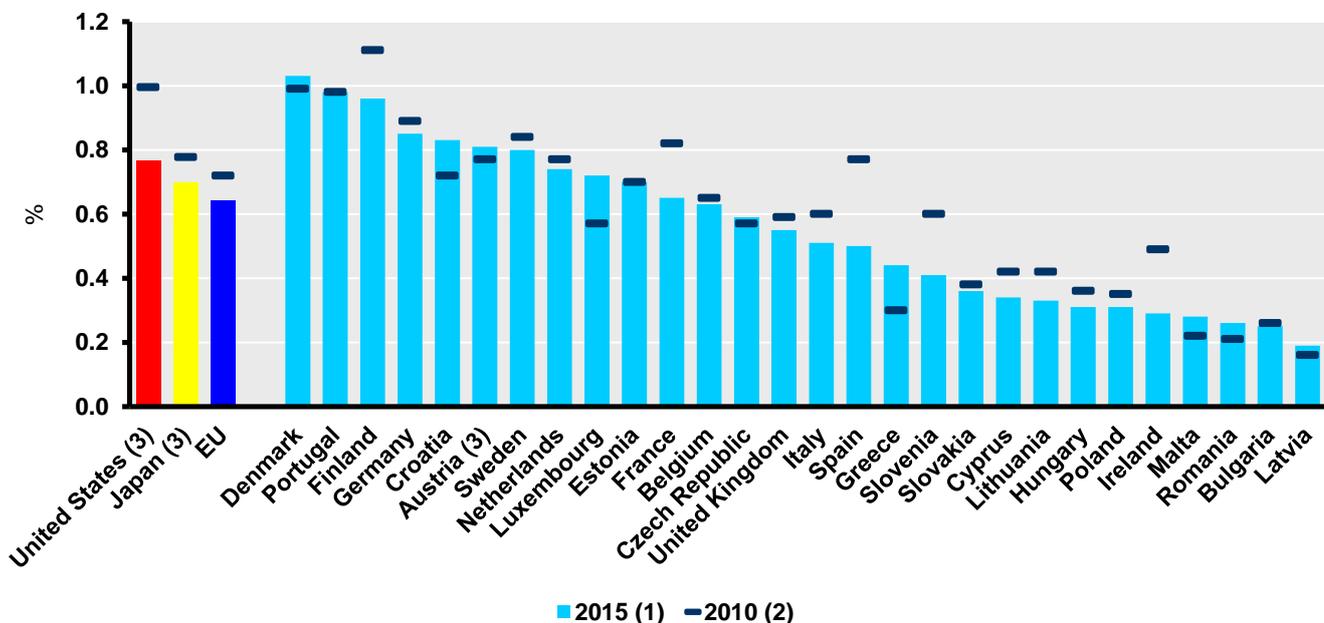
On 29 September 2016 Eurostat released an update of **GBAORD** data (government appropriations or outlays for R&D), with provisional results for 2015. In 2015 GBAORD as a % of GDP was highest in Denmark, Portugal and Finland, while it was lowest in Romania, Bulgaria and Latvia. Compared to 2010 GBAORD as a % of GDP declined most strongly in Spain, Finland, France, Slovenia and Ireland, while it increased most in Greece, Luxembourg and Croatia. In the EU it decreased from 0.72% of GDP in 2010 to 0.67% in 2014 and 0.64% in 2015. Compared to 2014 it increased by 0.04 percentage points or more in Croatia, Malta, Portugal and

Romania, while it decreased by 0.04 percentage points or more in Belgium, the Czech Republic, Ireland, Spain, France, Poland and Sweden.

GBAORD as % of government expenditure declined in the EU from 1.45% in 2010 to 1.39% in 2014 and 1.36% in 2015. In 2015 it was highest in Portugal (2.03%), Germany (1.95%), Denmark (1.85%), Croatia (1.77%) and Estonia (1.75%) and lowest in Latvia (0.51%) Bulgaria (0.61%), Hungary (0.61%) and Malta 0.64%.

In the United States (2.04%), Japan (1.68%) and South Korea (3.78% in 2013) GBAORD represents a higher share of government spending than in the EU.

**Total government budget appropriations or outlays for R&D (GBAORD) as % of GDP, 2015**



Source: DG Research and Innovation - Unit for the Analysis and Monitoring of National Research Policies, Data: Eurostat  
Notes: (1) Luxembourg: 2014. (2) Japan: 2011; Poland: 2012; Romania: 2013. (3) Austria, United States, Japan: GBAORD refers to federal or central government only.

More info: <http://ec.europa.eu/eurostat/web/science-technology-innovation/data/database>

## 2. World Economic Forum Global Competitiveness Index 2016/17

The World Economic Forum (Geneva) released on 27 September the 2016/17 edition of the annual **Global Competitiveness Index**, which ranks 138 economies according to over 150 indicators organised in 12 pillars. Switzerland, Singapore and the United States are the top three countries in the overall ranking for 2016. Five EU countries are in the top 10 with the Netherlands, Sweden and the UK, improving their rankings, while

Germany and Finland are ranking lower than in 2015. Croatia (74), Cyprus (83) and Greece (86) are the lowest ranked EU countries.

In the pillar *Innovation* Switzerland and Israel are the top performers in 2016. Finland (3) Germany (5), Sweden (6), Netherlands (7) and Denmark (10) are the EU countries in the top 10. Romania (93) and Croatia (103) are the lowest ranked EU countries in the innovation pillar.

| Economy                 | Score <sup>1</sup> | Prev. <sup>2</sup> | Trend <sup>3</sup> | Economy               | Score <sup>1</sup> | Prev. <sup>2</sup> | Trend <sup>3</sup> | Economy                    | Score <sup>1</sup> | Prev. <sup>2</sup> | Trend <sup>3</sup> |
|-------------------------|--------------------|--------------------|--------------------|-----------------------|--------------------|--------------------|--------------------|----------------------------|--------------------|--------------------|--------------------|
| 1 Switzerland           | 5.81               | 1                  |                    | 41 South Africa       | 4.47               | 49                 |                    | 91 Lao PDR                 | 3.93               | 83                 |                    |
| 2 Singapore             | 5.72               | 2                  |                    | 42 Bahrain            | 4.47               | 39                 |                    | 92 Trinidad and Tobago     | 3.93               | 89                 |                    |
| 3 United States         | 5.70               | 3                  |                    | 43 Latvia             | 4.45               | 44                 |                    | 93 Tunisia                 | 3.92               | 92                 |                    |
| 4 Netherlands           | 5.57               | 5                  |                    | 44 Bulgaria           | 4.44               | 54                 |                    | 94 Kenya                   | 3.90               | 99                 |                    |
| 5 Germany               | 5.57               | 4                  |                    | 45 Mexico             | 4.41               | 57                 |                    | 95 Bhutan                  | 3.87               | 105                |                    |
| 6 Sweden                | 5.53               | 9                  |                    | 46 Rwanda             | 4.41               | 58                 |                    | 96 Nepal                   | 3.87               | 100                |                    |
| 7 United Kingdom        | 5.49               | 10                 |                    | 47 Kazakhstan         | 4.41               | 42                 |                    | 97 Côte d'Ivoire           | 3.86               | 91                 |                    |
| 8 Japan                 | 5.48               | 6                  |                    | 48 Costa Rica         | 4.41               | 52                 |                    | 98 Moldova                 | 3.86               | 84                 |                    |
| 9 Hong Kong SAR         | 5.48               | 7                  |                    | 49 Turkey             | 4.39               | 51                 |                    | 99 Lebanon                 | 3.84               | 101                |                    |
| 10 Finland              | 5.44               | 8                  |                    | 50 Slovenia           | 4.39               | 59                 |                    | 100 Mongolia               | 3.84               | 104                |                    |
| 11 Norway               | 5.44               | 11                 |                    | 51 Philippines        | 4.36               | 47                 |                    | 101 Nicaragua              | 3.81               | 108                |                    |
| 12 Denmark              | 5.35               | 12                 |                    | 52 Brunei Darussalam  | 4.35               | n/a                |                    | 102 Argentina              | 3.81               | 106                |                    |
| 13 New Zealand          | 5.31               | 16                 |                    | 53 Georgia            | 4.32               | 66                 |                    | 103 El Salvador            | 3.81               | 95                 |                    |
| 14 Chinese Taipei       | 5.28               | 15                 |                    | 54 Vietnam            | 4.31               | 56                 |                    | 104 Bangladesh             | 3.80               | 107                |                    |
| 15 Canada               | 5.27               | 13                 |                    | 55 Colombia           | 4.30               | 61                 |                    | 105 Bosnia & Herzegovina   | 3.80               | 111                |                    |
| 16 United Arab Emirates | 5.26               | 17                 |                    | 56 Romania            | 4.30               | 53                 |                    | 106 Gabon                  | 3.79               | 103                |                    |
| 17 Belgium              | 5.25               | 19                 |                    | 57 Jordan             | 4.29               | 64                 |                    | 107 Ethiopia               | 3.77               | 109                |                    |
| 18 Qatar                | 5.23               | 14                 |                    | 58 Botswana           | 4.29               | 71                 |                    | 108 Cape Verde             | 3.76               | 112                |                    |
| 19 Austria              | 5.22               | 23                 |                    | 59 Slovak Republic    | 4.28               | 67                 |                    | 109 Kyrgyz Republic        | 3.75               | 102                |                    |
| 20 Luxembourg           | 5.20               | 20                 |                    | 60 Oman               | 4.28               | 62                 |                    | 110 Senegal                | 3.74               | 110                |                    |
| 21 France               | 5.20               | 22                 |                    | 61 Peru               | 4.23               | 69                 |                    | 111 Uganda                 | 3.69               | 115                |                    |
| 22 Australia            | 5.19               | 21                 |                    | 62 Macedonia, FYR     | 4.23               | 60                 |                    | 112 Ghana                  | 3.68               | 119                |                    |
| 23 Ireland              | 5.18               | 24                 |                    | 63 Hungary            | 4.20               | 63                 |                    | 113 Egypt                  | 3.67               | 116                |                    |
| 24 Israel               | 5.18               | 27                 |                    | 64 Morocco            | 4.20               | 72                 |                    | 114 Tanzania               | 3.67               | 120                |                    |
| 25 Malaysia             | 5.16               | 18                 |                    | 65 Sri Lanka          | 4.19               | 68                 |                    | 115 Paraguay               | 3.65               | 118                |                    |
| 26 Korea, Rep.          | 5.03               | 26                 |                    | 66 Barbados           | 4.19               | n/a                |                    | 116 Zambia                 | 3.60               | 96                 |                    |
| 27 Iceland              | 4.96               | 29                 |                    | 67 Uruguay            | 4.17               | 73                 |                    | 117 Cameroon               | 3.58               | 114                |                    |
| 28 China                | 4.95               | 28                 |                    | 68 Croatia            | 4.15               | 77                 |                    | 118 Lesotho                | 3.57               | 113                |                    |
| 29 Saudi Arabia         | 4.84               | 25                 |                    | 69 Jamaica            | 4.13               | 86                 |                    | 119 Bolivia                | 3.54               | 117                |                    |
| 30 Estonia              | 4.78               | 30                 |                    | 70 Iran, Islamic Rep. | 4.12               | 74                 |                    | 120 Pakistan               | 3.49               | 126                |                    |
| 31 Czech Republic       | 4.72               | 31                 |                    | 71 Tajikistan         | 4.12               | 80                 |                    | 121 Gambia, The            | 3.47               | 123                |                    |
| 32 Spain                | 4.68               | 33                 |                    | 72 Guatemala          | 4.08               | 78                 |                    | 122 Benin                  | 3.47               | 122                |                    |
| 33 Chile                | 4.64               | 35                 |                    | 73 Armenia            | 4.07               | 82                 |                    | 123 Mali                   | 3.46               | 127                |                    |
| 34 Thailand             | 4.64               | 32                 |                    | 74 Albania            | 4.06               | 93                 |                    | 124 Zimbabwe               | 3.41               | 125                |                    |
| 35 Lithuania            | 4.60               | 36                 |                    | 75 Brazil             | 4.06               | 75                 |                    | 125 Nigeria                | 3.39               | 124                |                    |
| 36 Poland               | 4.56               | 41                 |                    | 76 Montenegro         | 4.05               | 70                 |                    | 126 Madagascar             | 3.33               | 130                |                    |
| 37 Azerbaijan           | 4.55               | 40                 |                    | 77 Cyprus             | 4.04               | 65                 |                    | 127 Congo, Democratic Rep. | 3.29               | n/a                |                    |
| 38 Kuwait               | 4.53               | 34                 |                    | 78 Namibia            | 4.02               | 85                 |                    | 128 Venezuela              | 3.27               | 132                |                    |
| 39 India                | 4.52               | 55                 |                    | 79 Ukraine            | 4.00               | 79                 |                    | 129 Liberia                | 3.21               | 129                |                    |
| 40 Malta                | 4.52               | 48                 |                    | 80 Greece             | 4.00               | 81                 |                    | 130 Sierra Leone           | 3.16               | 137                |                    |
| 41 Indonesia            | 4.52               | 37                 |                    | 81 Algeria            | 3.98               | 87                 |                    | 131 Mozambique             | 3.13               | 133                |                    |
| 42 Panama               | 4.51               | 50                 |                    | 82 Honduras           | 3.98               | 88                 |                    | 132 Malawi                 | 3.08               | 135                |                    |
| 43 Russian Federation   | 4.51               | 45                 |                    | 83 Cambodia           | 3.98               | 90                 |                    | 133 Burundi                | 3.06               | 136                |                    |
| 44 Italy                | 4.50               | 43                 |                    | 84 Serbia             | 3.97               | 94                 |                    | 134 Chad                   | 2.95               | 139                |                    |
| 45 Mauritius            | 4.49               | 46                 |                    | 85 Ecuador            | 3.96               | 76                 |                    | 135 Mauritania             | 2.94               | 138                |                    |
| 46 Portugal             | 4.48               | 38                 |                    | 86 Dominican Republic | 3.94               | 98                 |                    | 136 Yemen                  | 2.74               | n/a                |                    |

More information: <http://reports.weforum.org/global-competitiveness-index/#topic=about>

### 3. Times Higher Education World University Rankings 2016-17

On 21 September 2016 the **Times Higher Education (THE) World University Rankings 2016-17** were published. The ranking assesses about 980 higher education institutions according to 13 performance indicators grouped into five areas: teaching (the learning environment), research (volume, income, reputation), citations (research, influence), international outlook (international staff, students and research), and industry income (knowledge transfer). A specific academic reputation survey is one of the data sources. THE's rankings are based on a broader set of criteria than the often questioned and research focussed Shanghai ranking, but includes subjective factors (perception).

The top ranked university in 2016 was Oxford, the first UK and EU university to head the ranking since it was created 12 years ago. Caltech (ranked n° 1 in 2015) is now second, followed by Stanford, Cambridge, MIT and Harvard, the number one in the Shanghai ranking.

The United States has, as in 2015, 63 institutions in the top 200. The EU has 90 (4 fewer than in 2015), of which the UK 32 (-2), Germany 22 (+2, 10 more than in 2014), the Netherlands 13 (+1), Sweden 6, France 4 (-1), (Belgium 3 (-1), Denmark 3, Italy 2 (-1), Spain 2 (-1) and Luxembourg, Finland, Austria one each. Ireland, had one institution in the top 200 in 2015 (University College Dublin), which moved to the rank range 201-250 in 2016. The number of Asian universities in the top 200 increased from 15 to 19 (two from mainland China and two from Hong Kong joined the list), of which Hong Kong 5, mainland China 4, South Korea 4, Japan 2, Singapore 2, Israel 1, Taiwan 1.

| 2016-17 rank | 2015-16 rank | Institution   | Country        |
|--------------|--------------|---|----------------|
| 1            | 2            | University of Oxford                                      | United Kingdom |
| 2            | 1            | California Institute of Technology                        | United States  |
| 3            | 3            | Stanford University                                       | United States  |
| 4            | 4            | University of Cambridge                                   | United Kingdom |
| 5            | 5            | Massachusetts Institute of Technology                     | United States  |
| 6            | 6            | Harvard University  | United States  |
| 7            | 7            | Princeton University                                      | United States  |
| 8            | 8            | Imperial College London                                   | United Kingdom |
| 9            | 9            | ETH Zurich - Swiss Federal Institute of Technology Zurich | Switzerland    |
| =10          | 13           | University of California, Berkeley                        | United States  |
| =10          | 10           | University of Chicago                                     | United States  |

**More info:** <https://www.timeshighereducation.com/news/world-university-rankings-2016-2017-results-announced>

### 4. QS World University Ranking 2016

On 6 September the 2016 edition of the **QS World University Ranking** was published. The QS ranking covers over 900 higher education institutions and is based on 6 indicators (academic reputation with a weight of 40%, employer reputation 10%, student to faculty ratio 20%, citations per faculty 20%; international faculty ratio 5 %, international student ratio 5%). Up until 2010 QS provided data for the Times Higher Education Ranking, since 2011, it has produced its own ranking.

The top performing institution in the 2016 QS ranking is MIT, followed by Stanford, Harvard and Cambridge. The US has 5 institutions in the top 10, the UK 4, and Switzerland 1 (ETH Zurich). With regard to the top 200 institutions, the United States has 48 (1 more than in 2015) on that list, the UK 30 (-2), the Netherlands 12, Germany 11, France 5, Belgium 4, Denmark 3, Finland 2, Ireland 2, Austria 2, Italy 1, Spain 1 (-2). Asia has 37 universities on the list: Japan 8, China 7, South Korea 7, Hong Kong 5, Taiwan 3, Singapore 2, India, 2, Saudi Arabia 1, Malaysia 1, Israel 1 (-2) The highest ranked Asian university is the National University of Singapore (rank 12), which is also the top-ranked Asian institution on the THE list. QS, furthermore, ranks institutions by over 40 subject and by five faculty areas.

|    |  |   |
|----|--|---|
| 1  |  Massachusetts Institute of Technology (MIT)        |  |
| 2  |  Stanford University                                |  |
| 3  |  Harvard University                                 |  |
| 4  |  University of Cambridge                            |  |
| 5  |  California Institute of Technology (Caltech)       |  |
| 6  |  University of Oxford                               |  |
| 7  |  UCL (University College London)                    |  |
| 8  |  ETH Zurich - Swiss Federal Institute of Technology |  |
| 9  |  Imperial College London                            |  |
| 10 |  University of Chicago                              |  |

**More info:** <http://www.topuniversities.com/university-rankings/world-university-rankings/2016>

## 5. Miscellaneous results from national data sources

### a) Germany: autumn forecast expects higher GDP growth.

On 29 Sept. 2016 the autumn forecast of the leading German economic research institutes was published.

The new forecast expects GDP in Germany to increase by 1.9%, compared to 1.6% in the spring forecast (the Commission's Spring 2016 economic forecast expected also 1.6%). However, for 2017 the new forecast expects growth to slow down to 1.4% (compared to 1.5% in the German spring forecast and 1.6% in the Commission forecast). For 2018 a growth of 1.6% is forecast.

On 22 September 2016 the labour market research institute **IAB** published its forecast for the German labour market in 2017. According to IAB, employment in Germany will increase by 0.48 million in 2017 to reach 44 million, while unemployment will decrease by 70 000 persons (Germany already has one of the lowest unemployment rates in the EU), despite an influx of refugees that is expected to increase the labour force by 560 000 persons in 2017.

**More info:**

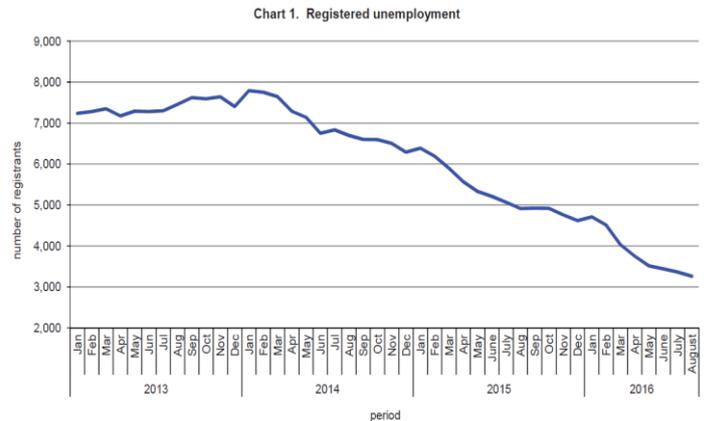
<http://www.bmwi.de/DE/Presse/pressemitteilungen,did=781448.html>

<http://www.iab.de/de/informationsservice/presse/presseinformationen/kb2016.aspx>

### b) Malta: lowest unemployment rate in the EU

Data released on 23 September by the National Statistical office of Malta show a further decline in the number of registered unemployed to about 3000, which represents about 2% of the Maltese labour force. Malta is one of the few EU countries where administrative data on registered unemployed show lower rates than the European labour force survey. According to harmonised Eurostat statistics (based on labour force survey data) Malta had the lowest unemployment rate in the EU in July 2016. However, a news release by Eurostat on 30 September shows Malta with higher figures and now ranked third, after the Czech Republic and Germany. Nevertheless, whatever source is used, Malta is among the EU countries with the lowest unemployment rates. The smallest Member State by population and area (same area as the city of Munich, it is also the most densely populated EU country) , Malta is currently one of the

fastest growing EU countries, both in terms of GDP and population. One of the booming sectors is the online (video) gaming industry, which already employs 8000 people in Malta.



**More info:** [https://nso.gov.mt/en/News\\_Releases/View\\_by\\_Unit/Unit\\_C2/Labour\\_Market\\_Statistics/Documents/2016/News2016\\_153.pdf](https://nso.gov.mt/en/News_Releases/View_by_Unit/Unit_C2/Labour_Market_Statistics/Documents/2016/News2016_153.pdf)

## 6. Quotation check

### "90% of the scientists that ever lived are alive today."

This often-quoted statement illustrates the exponential growth of science and knowledge. It can be found in the book *'Little science, big science and beyond'* (1963) by British scientist Derek J. de Solla Price (1922-1983), who is considered being the *'father of scientometrics'*. In fact he wrote more precisely *'we can say that 80 to 90 percent of all the scientists that have ever lived are alive today'*. Since the quote comes from the early 1960s, many wonder if it still holds today. Harvard Business school graduate Eric Gastfriend recently made an estimate based on PhDs granted (as a proxy for scientists) annually since 1900 (<http://futureoflife.org/2015/11/05/90-of-all-the-scientists-that-ever-lived-are-alive-today/>) and came to the conclusion that 90% of scientists that ever lived (since 1900) are alive today. The estimate did not include scientists that lived before 1900, but the 80-90% range is sufficiently large to include them .

☞ Hence it can be concluded that when quoted with the 80-90% range the statement still holds today.

De Solla Price furthermore found that the number of scientists doubled every 15 years. Gastfriend's analysis showed that this has probably slowed down to every 18 years. De Solla Price also estimated the total number of people who have ever lived to be at least 60 billion and that 3 billion or 5% were alive in the early 1960s. Newer estimates put that figure at about 100 billion, of which 7 billion are alive today.

☞ Over 90% of the people, who ever lived, are dead, but 80-90 % of scientists who ever lived are still alive.

## Calendar of data releases and indicator based publications

Update of: 28/9/2016 (grey= already published)

| 2016             | Eurostat data updates   | Commission indicator based reports   | Data and indicator based reports of other organisations  |
|------------------|---|--|--|
| <b>January</b>   |   |  | Transparency International Corruption Perception Index<br>Bloomberg Innovation Index   |
| <b>February</b>  | Tertiary attainment (2015, prov.)<br>High growth enterprises data (provisional, 2014)<br>IPR (patent 2013, CTM 2014 and RCD 2014)                                     | Winter forecast (ECFIN)<br>DESI indicator (CNECT)  | OECD R&D expenditure data<br>Excelacom Internet Minute   |
| <b>March</b>     | R&D intensity (2014 update)<br>GBAORD final (2014)  | She Figures (online version; RTD)<br>Science, Research and Innovation performance report (RTD)   | European Patent Office , EPO annual results (2015)<br>Reuters Most Innov. Institutions<br>OICA world motor vehicle production data |
| <b>April</b>     | Education headline indicators (LFS)   |  |  |
| <b>May</b>       | High-tech trade (2015)<br>Venture capital (2015)<br>Education enrolment, graduates<br>Knowledge-int. activities (2015)  | Spring Forecast (ECFIN)<br>Skills forecast (Cedefop)   | Invest Europe 2015 European Private Equity Report<br>Times Higher Ed. Reputations Ranking<br>IMD World Competitiveness Yearbook    |
| <b>June</b>      | Education spending<br>Employment high-tech (2015)<br>HRST education inflows (2014)  | Europe 2020 publication (ESTAT)  |  |
| <b>July</b>      | IPR (Patents, 2013), Community Trademarks (2015), RC Designs (2015)   | Innovation Union Scoreboard (GROW)   | UNESCO UIS STI stats release   |
| <b>August</b>    |   |  | Academic Ranking of World Universities (Shanghai)<br>WIPO/Cornell/INSEAD Global Innovation Index                                   |
| <b>September</b> | GBAORD (2015 preliminary)<br>Final high growth ent. data (2014)<br>Economic data on high-tech (2015)  |  | WEF Global Competitiveness Index   |
| <b>October</b>   |   |  | World Bank Doing Business  |
| <b>November</b>  | R&D intensity (2015 preliminary, 2014 final)<br>Knowledge-int. activities (2015)<br>CIS 2014<br>Employment high-tech (2015)<br>IPR Statistics (CTM 2015 and RCD 2015) | Autumn Forecast (ECFIN)<br>Education Monitor (EAC)<br>European Competitiveness report (GROW)<br>Industrial R&D Investment Scoreboard (JRC)<br>Annual Growth Survey (ECFIN) | Top500.org: Top 500 Supercomputer list<br><br>OECD Education at a Glance<br>OECD STI Outlook (2-yearly)                            |
| <b>December</b>  | ICT household data (2016)<br>ICT enterprise data (2016)<br>HRST stocks (2015)   | Joint Employment Report (EMPL)   | WIPO World Intellectual Property Indicators<br><br>BDI/Telekom (German) Innovation Indicator                                       |

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