Belgian Science Policy Office

Statistics in Brief

The Lisbon target: the long road to 3%

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Highlights

- The innovation system is largely driven by the business sector
- Compared to other countries Belgium is performing well
- Belgium is likely to reach the 3% objective by 2020

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What are we aiming for?

In 2000 the European Commission launched the Lisbon Strategy to stimulate growth and create additional jobs. The central objective of this strategy was to help the Member States of the European Union to face the social and economic challenges of the next millennium, such as globalisation, climate change and an ageing population. The European Commission identified four policy domains where fundamental improvements are necessary to tackle these challenges.

The second policy domain serves as the focal point of this text. The Lisbon Strategy sets out a specific target for the Member States of the European Union with regard to investment in research and development (see Box 1).

Policy domains

1. Investing in people – to adjust to globalisation, the EU's fast-changing economy requires a flexible and highly skilled workforce. Lifelong learning projects help people to adapt to a changing job market.
2. More research, development and innovation – strengthening links between research centres, universities and enterprises. At the same time, spending on research and development in the EU should increase to match that of international competitors' investments.
3. A more dynamic business environment – less red tape and easier access to credit, especially for small and medium-sized enterprises.
4. A greener economy – leading the fight against climate change, the EU aims to reduce the environmental impact of economic growth by saving energy and promoting new, environment-friendly technologies.

Box 1: Why are R&D investments essential for economic growth?

- Investments in R&D make it possible to keep a competitive advantage in an international context where labour-intensive industries are transferred to recently industrialized economies.
- All economic agents benefit from knowledge accumulation: knowledge developed in one firm or sector of the economy can have spill-over effects to other firms or sectors. It is not a zero-sum game.
- A steady increase of the world population and the emergence of newly industrialized countries like China and India compel us to reflect on sustainable development and rethink our use of natural resources. Knowledge is essential for the development of technologies for responsible and efficient production.

As time went by, the Lisbon Strategy was evaluated even before 2010, only to find that progress towards the 3% objective was slowly made. Consequently, the European Commission proposed a new ten-year strategy - Europe 2020 - on 3 March 2010 aiming at "smart, sustainable, inclusive growth" with greater coordination of national and European policy. Europe 2020 evolved around five targets, of which the 3% is again explicitly mentioned. The focus is placed on framework improvement to stimulate private R&D investment and monitoring innovation activities. One of the seven flagship initiatives to reach the 3% objective covers the Innovation Union aimed at the amelioration of framework conditions and access to finance for research and innovation in order to strengthen the innovation chain. The European Semester - annually reports on macro-economic, budgetary and structural policy coordination - monitors all progress made and ensures the active involvement of all Member States.

Who performs R&D?

Based on the OECD terminology (OECD, 2015), the innovation system of a country is composed of four sectors: the business sector covers all enterprises. In Belgium, the pharmaceutical and electronic sectors are the most R&D active sectors. The government sector consists of mission specific research centres such as IMEC (microelectronics), VIB (biotechnology) or SCK (nuclear energy); but also museums such as the Royal Belgian Institute of Natural Sciences or the Royal Museum for Art and History. Higher education institutes, including universities, university hospitals and university colleges, have always been important R&D actors. Lastly, the private non-profit sector (e.g. charity organisations) is very small in Belgium. All these organisations make up the national innovation system and are involved in performing R&D (see Box 2).

Box 2: Definition of R&D from the Frascati Manual 2015

Research and experimental development (R&D) comprise creative and systematic work undertaken in order to increase the stock of knowledge –including knowledge of humankind, culture and society– and to devise new applications of available knowledge.

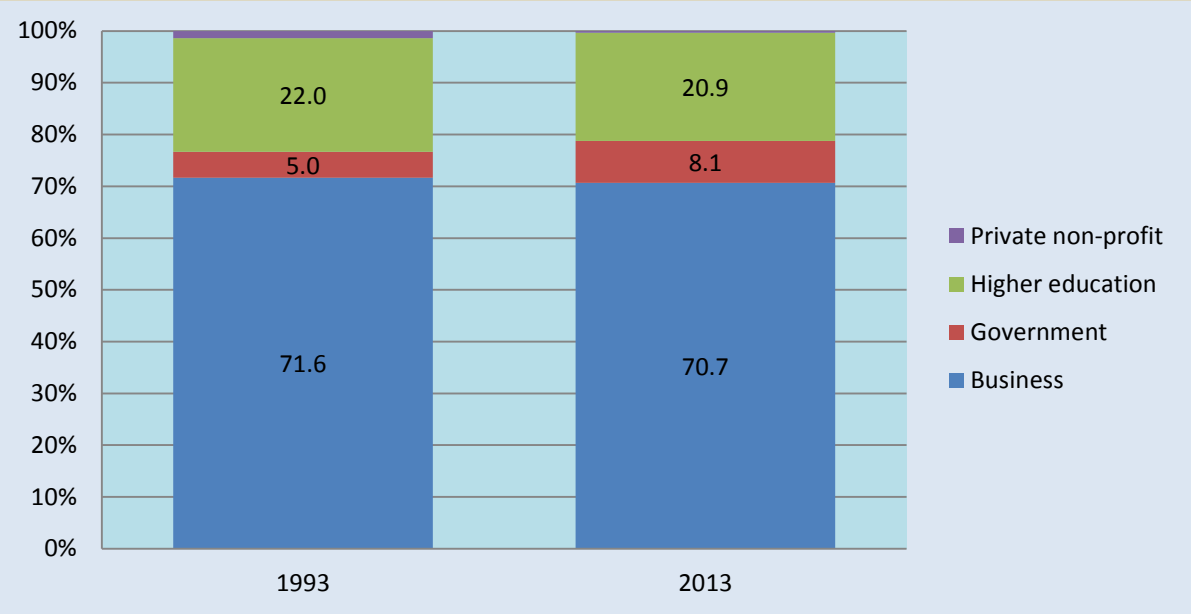
The term R&D covers three types of activity: basic research, applied research and experimental development. **Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. **Applied research** is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. **Experimental development** is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

(Source: OECD, 2015)

Figure 1 shows that the business sector was, and still is, the largest performer of R&D with 71% of all R&D expenditure. Higher education follows with 21%. Although the relative share of the different sectors did not change structurally since 1993, there is an increase in

the share of the government sector and a further reduction of the private non-profit sector.

Figure 1: Share of different sectors of the economy to R&D expenditure in 1993 en 2013 (in %)



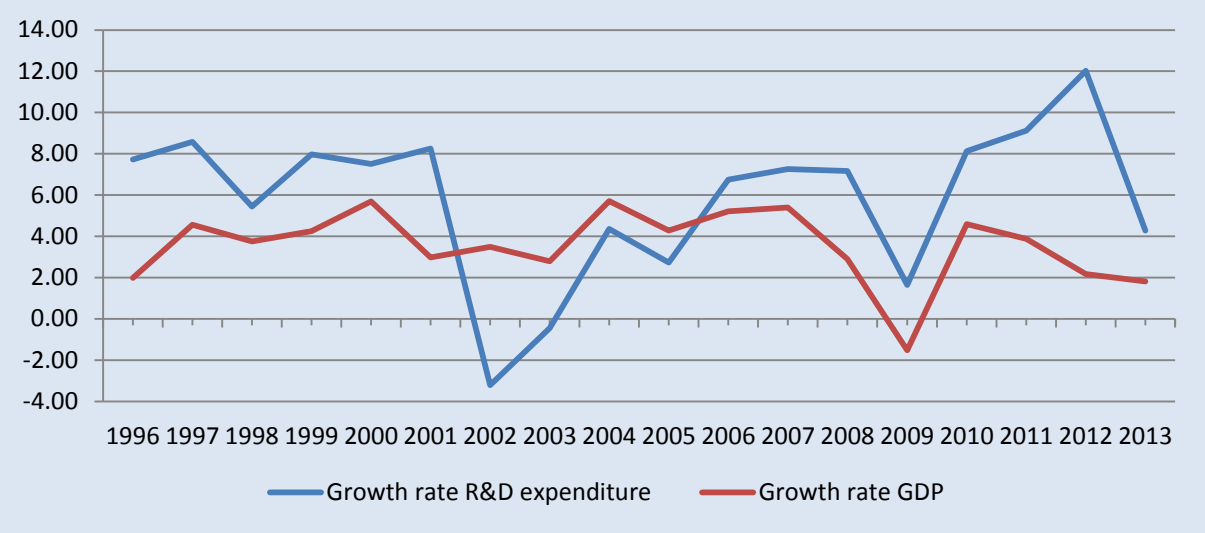
By 2010, each Member State should have invested at least 3% of its GDP in research and development. Realising this objective would require a combined effort of all sectors: the business sector, government sector, higher education and the private non-profit sector will all contribute.

In cooperation with its regional partners - the Regions and Communities - the Belgian Science Policy Office annually calculates the R&D intensity for the Belgian economy. In 2013, the R&D intensity reached 2.43%[1]. Two things should be kept in mind when evaluating its significance. First, the R&D intensity should be placed in a historical context. Changes in the economic environment have an impact on the investment behaviour of R&D actors. Austerity measures, taken to balance the government budget in the wake of the financial crisis, influence the financing and operational management of R&D performers. Government policies towards science, technology and innovation also influence the R&D intensity. Fiscal incentives and subsidies can soften the impact of an economic or financial crisis by, for example, encouraging SMEs to undertake R&D activities which would be too expensive without this extra support.

Second, R&D intensity is an indicator that is calculated as a ratio. To grasp the real underlying meaning of a ratio both parts - the numerator and the denominator - should be considered in relation to each other (see Figure 2).

[1] The 2014 prevision for Belgium by Eurostat amounts to 2.46%. http://ec.europa.eu/eurostat/documents/299551/7092226/9-30112015-AP-EN.pdf/29eeaa3d-29c8-496d-9302-77056be6d586

Figure 2: Growth rates of R&D expenditure and gross domestic product (GDP)



Note: growth rates to preceding year

Why are growth rates so volatile?

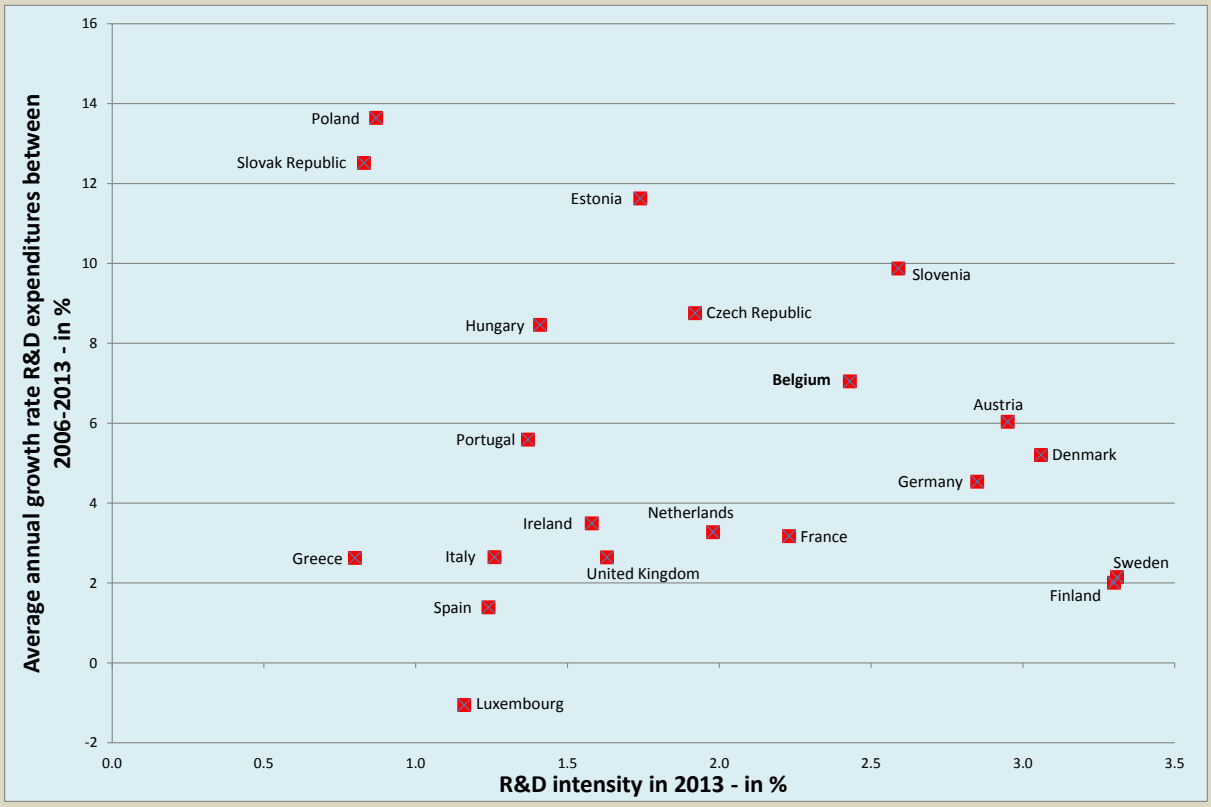
Because of the difference in size between GDP and R&D expenditure, putting both factors in one graphic would do nothing to elucidate their interactions. Calculating their respective growth rates, however, would. A growth rate is the ratio between the most recent figure and the preceding one. By presenting the fluctuations of these ratios over time, examining the interactions and their impact on the R&D intensity becomes possible.

Two periods can be broadly distinguished. First of all, from 1995 to 2001 and from 2005 to 2013, growth rates in R&D expenditure are consistently higher than growth rates in GDP. This means that investments in R&D outperformed the growth rates of the economy as a whole. However, this trend is reversed during the intermediate period stretching from 2001 to 2005. A second observation concerns the growth rates' respective trends. Sometimes, both indicators move in the same direction (or are pro-cyclical): an increase/decrease in R&D accompanies an increase/decrease in growth in GDP. From 2010 to 2012, one observes that both factors move in opposite directions (or are countercyclical). This implies that the relation between both factors is no longer correlated. This might be interpreted as a positive sign: a contraction of the economy does not always imply a contraction of R&D investments. Government intervention, like the fiscal measures aimed at cheapening knowledge workers, might play a role in this. From 2012 onwards R&D expenditure growth declines sharper than GDP growth does, but still remains above it, thus raising R&D intensity. Another element of interest is the reaction of both R&D expenditure and economic growth to crisis situations. Two crises are clearly visible in Figure 2: the dotcom bubble in the beginning of the millennium and the financial crisis which started in 2008. Both crises had different impacts on R&D investment growth. While R&D expenditure growth fell below the growth rate of GDP in 2001-2003; during the financial crisis it remained well above the growth rate of the total economy, although the growth rate of R&D expenditure followed the general economic pattern. Because of the weight of the business sector in total gross expenditure on R&D, it is responsible for the pattern of fluctuations.

How are other countries performing?

Spending 3% of GDP on R&D investment by 2010 was a European objective. Many individual European countries and regions subscribed to the objective, which turned out to have been too ambitious. Only Finland, Sweden and Denmark reached the target. Figure 3 positions Belgium in relation to the other countries in their respective attempts to achieve the 3% objective.

Figure 3: R&D intensity and average annual growth of R&D expenditures - in %



Source: OECD (2015), Main Science and Technology Indicators
Notes: Belgium data are provided by the CFS/STAT for 2013; Ireland has data for 2012

Although not among the leading countries in terms of the 3% objective, or in the annual growth in R&D Belgium is, due to several successful policy measures, nevertheless part of the upper segment of European countries. Sweden, Finland, Denmark and Germany have a long tradition when it comes to the role R&D investments play in their economies and this is reflected in a strong position among their European peers. Looking at growth in R&D expenditures of the past seven years, Belgium takes the seventh place. Apart from Slovenia, most fast growers have lower R&D intensities.

Compared to its direct trade partners, Belgium outperforms the Netherlands, France and the United Kingdom. Due to its faster growth than the German one, Belgium is slowly catching up.

Figure 3 also demonstrates the presence of β-convergence (-0.17) among the European countries, indicating that there is some degree of conversion between them.

Is the 3% objective by 2020 within reach?

The Federal Planning Bureau regularly provides growth projections which show that the GDP in 2020 will presumably be 471 billion €. Compared to the GDP in 2013, this implies a compound average growth rate in current prices of 2.53%. Therefore, the 3% objective requires an R&D investment of 14.1 billion € in 2020 measured at current prices. Given the current amount of R&D investment of 9.5 billion €, this implies a compound average annual growth rate of 5.75%. The growth rate of R&D expenditure needs to be substantially superior to the projected GDP growth between 2013 and 2020. Table 1 provides an overview of past and future efforts to attain the 3% objective.

Table 1 – Predictions of R&D expenditures by sector of performance

Sector of performance (*)	R&D expenditures in 2013 (in mio €)	Past R&D expenditures annual growth 1993-2013 (in %)	Additional R&D expenditures by 2020 (in mio €) (°)	Projected R&D expenditures annual growth 2013-2020 (in %)
Business sector	6745.55	5.62	3124.67	5.59
Government sector	775.19	8.28	269.73	4.36
Higher education sector	1990.76	5.41	1073.39	6.35
Gross expenditure on R&D	9545.66	5.69	4574.83	5.75

Notes: (*) In Belgium the 'Private non-profit organisations' represent a very small percentage of R&D expenditures and will not be covered in the table. (°) In order to estimate the R&D expenditures in 2020 the average share of each sector between 1993 and 2013 is used. The gross expenditure on R&D differs from the sum of the three sectors because of the omission of the small private non-profit sector. The provision of the Federal Planning Bureau can be found on their website:
http://www.plan.be/databases/PVarModal.php?VC=PRFRESL01&DB=PRF&lang=nl&XT=1

A comparison between the growth rate over the past twenty years (5.69%) and the required growth rate for the next seven years (5.75%) suggests that the 3% target is within reach. The hoped-for growth rate of the higher education sector is the highest (6.39%); an increase by over a billion € in this sector is needed. Because the business sector is by far the largest one, its required growth rate (5.59%) is close to that of the necessary gross domestic expenditure on R&D (5.76%). The public research centers have known a large increase in their R&D expenditures in the past (8.28%), which makes their minimum future effort feasible (4.36%).

This scenario assumes that the structure of the innovation system remains unchanged. There are however two caveats: first, the business sector is characterized by a strong concentration of R&D activities in two high-tech sectors. Second, enterprises in Belgium are often foreign controlled and their opting for relocation outside Belgium remains a possibility.

Conclusion

The 3% target has not been reached yet by the majority of the European Member States, but it was reinserted in the Commission's recent strategy for the near future, Europe 2020. Although this objective had an arguable base, it soon became a policy goal in itself, which was subjected to its own flaws. R&D expenditure is, after all, directed exclusively to the input side of the innovation system. To conclude, we could state that it is a reasonable goal to demand from countries to invest a certain percentage of their GDP in R&D, but when choosing a specific target we cannot stay blind for its inner logic and how historical events might blur its original purpose. Using this general conclusion to evaluate the efforts of Belgium, we might say that it is gradually moving towards the 3% target. In case the general circumstances, such as the current distribution over the sectors of performance - each having their own growth pattern of R&D expenditure -, do not change; and adherence to the preceding growth path remains, it will still take a certain amount of time before Belgium reaches the 3% objective in 2020. Taking the other European countries as a benchmark, however, demonstrated the favourable position of Belgium in this respect.

Statistics in Brief aims at presenting relevant data to inform a broad audience, including policy makers.
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Further information:
Interested readers can find up-to-date data and analyses on the following websites

- general information: www.belspo.be
- general online statistics: www.innovationdata.be or http://www.stis.belspo.be/en/statisticsWelcome.asp

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