

# JRC SCIENCE FOR POLICY REPORT

## RIO Country Report 2016: Portugal

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Observatory country  
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**Research and Innovation Observatory Country Report 2016 Portugal**

The 2016 series of the RIO Country Report analyses and assesses the development and performance of the national research and innovation system of the EU-28 Member States and related policies.

It aims at monitoring and evaluating the EU policy implementation as well as facilitating policy learning in the Member States.

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## **Foreword**

This report offers an analysis of the R&I system in Portugal for 2016, including relevant policies and funding, with a particular focus on topics of critical importance for EU policies. The report identifies the main challenges of the Portuguese research and innovation (R&I) system and assesses the policy responses implemented. It was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites, etc. The quantitative data are, whenever possible, comparable across all EU Member State reports. Unless specifically referenced all data used in this report are based on Eurostat statistics available in November 2016. The report contents are partly based on the RIO country report 2015.

The analysis does not take into account the full set of CIS 2014 data that was released mid-January 2017. The factsheet in Annex include however the most recent data including one indicator from the last wave of the Community Innovation Survey.

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<sup>1</sup> The views expressed by her do not represent the government's.

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## HIGHLIGHTS

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- Portugal shows excessive macroeconomic imbalances: large stocks of net external liabilities, private and public debt and the high share of non-performing loans constitute important vulnerabilities in a context of relatively high unemployment (European Commission, 2016a).
- The economic context is weighing on R&D expenditure; the latest GERD/GDP figure (1.28% in 2015) confirms the steady decline experienced since 2009.
- The weight of medium and high-tech manufacturing sectors still lies well below the EU average, both in terms of value added and employment shares.
- Two positive trends in the R&I sector are the increasing supply of high-skilled human resources as well as the high growth in the number of international scientific co-publications.
- While progress in R&I policy has been made, significant challenges remain. Tackling these requires not just launching new measures, but changing both the institutional setting and the economic structure, which requires a long-term, sustained commitment.

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## MAIN R&I POLICY CHALLENGES

- **Improving firms' innovation performance by strengthening their technological and managerial capabilities.** Innovation performance remains relatively low in spite of developments in the R&I system. This has both cyclical and systemic roots. There are signs of insufficient in-house capabilities within firms. Thus, continuing to build the technological of firms remains a key challenge.
- **Stimulating the emergence of new companies in knowledge-intensive activities.** High-tech exports continue their downward trend, while problem persists in the capacity to attract knowledge-intensive FDI. Even though initiatives have been made in the right direction, their effects remain uncertain.
- **Strengthening science-industry cooperation.** Agreement is widespread that academia-business interactions, at around 30% of the EU average, are weak. This is partly due to the prevalence of medium-low and low-tech companies.
- **Defining integrated agendas on innovation policy.** Despite measures aimed at involving businesses in R&I policy, there is still a limited number of 'bottom-up' initiatives, confirming the relatively minor role of the business sector in the R&I agenda.
- **Improving governance via increasing stakeholders' participation.** The fact that the R&D system is in need of a more consistent involvement of stakeholders and that R&I issues do not rank high in the policy agenda remain an important governance challenge.

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## MAIN R&I POLICY DEVELOPMENTS IN 2016

- The [Indústria 4.0](#) initiative, to enhance firms' awareness and responsiveness to digitalisation.
- [Start-Up Portugal](#), to rationalise entrepreneurship support facilities, improve the fiscal regime for investment in start-ups and promote their internationalisation.
- The [Lisbon Web Summit](#), expected to constitute a boost to Portugal's attractiveness for FDI.
- The [Capitalizar Programme](#), aimed at improving companies' balance sheets and financing conditions.
- The new [Commitment to Knowledge and Science](#), dealing with science and research policy.
- Scientific Employment – The new legal statute to contract doctorates.
- Internationalization of Research and Higher Education – Broad Policy Measures calling for a strict articulation between the Ministry of Science and Higher Education and the other Ministries.
- The *CITec* – Capacitar Programme for the Portuguese Industry, the main instrument of knowledge transfer between Higher Education (HE) institutions and companies.

# 1. Main R&I policy developments in 2016

## Indústria 4.0 (04/2016)

A new investment program aimed at entrepreneurs and firms with the objective of promoting start-ups and spin-offs, both in the business and academic sectors. It is meant to contribute to the development and modernization of the national industry, with the ultimate goal of rendering it globally more competitive. The Industry 4.0 concept delineates higher levels of interconnectivity and control of a product's value chain.

## Start-up Portugal

This is the Government's strategy for Entrepreneurship, centred around supporting extant entrepreneurs, ensuring the longevity of the companies created and increasing the impact they have on job creation and economic value. Devised as a four-year plan, it focuses on three areas of operation: ecosystem, funding and internationalisation.

## Lisbon Web Summit (11/2016)

Started in November 2016 and running for three consecutive years, this event is expected to boost Portugal's attractiveness for knowledge-intensive FDI as well as serve as an important international *show-room* for Portuguese high-tech firms. Under the umbrella of the Start-up Portugal initiative, the Web Summit is likely to increase awareness by foreign investors of investment conditions and potential partnerships in the country.

## Capitalizar programme

This measure, part of the National Reform Programme 2016, is aimed at business sector (especially, SMEs) recapitalisation to reduce this sector's level of indebtedness. It is therefore foreseen to indirectly contribute to the recovery of private sector R&D spending. This policy encompasses the promotion of new financial instruments, the support to financing sources other than bank credits and the acceleration of access to structural funds and foreign capital (National Reform Programme, 2016).

## Commitment to Knowledge and Science

The Government's programme, approved in June 2016, envisages knowledge as a key ingredient in promoting Portugal's economic and social development and focuses on four strategic dimensions: (i) Human Resources; (ii) Institutions; (iii) the S&T System; (iv) the Territorial dimension.

## Scientific Employment

New Legal Contracts Regime for Doctorates aiming at the promotion of scientific and technological employment in all areas of knowledge, the renewal of the Institutions as well as the enhancement of the activities of scientific research, management and communication of science and technology.

## Internationalization of Research and Higher Education (R&HE)

Policy Measures to promote the internationalization of R & HE, calling for a strict articulation between the Ministry of Science and Higher Education and the other Ministries in what concerns: the internationalization process of R&HE

in Portugal; the development of cooperation with third countries; international cooperation in S&T together with international recognition of Portugal in Europe and in the World; the relationship with the Portuguese academic and scientific communities living abroad; scientific diplomacy and; the effectiveness of the broad guidelines for the internationalization of R&HE.

The CITec – *Capacitar* Programme the Portuguese Industry

The Government's programme, approved in December 2016, aims at qualifying the Technology Interface Centres (CIT) and is designed to make scientific and technological knowledge more valuable and strengthen its transfer to companies. Another goal is to improve networking among the different actors of the innovation system: Higher Education Institutions, CIT and companies.

## 1.1 Focus on National and Regional Smart Specialisation Strategies

Description and timing: In 2014, Portugal defined a RIS3 as a result of a process between different government agencies and a significant involvement from stakeholders. The RIS3 strategy defines a set of thematic R&I priorities, combining both the national and regional levels. A monitoring mechanism is envisaged for the RIS3 (Governo de Portugal, 2014), aimed at assessing its state of development, with an annual publication frequency.

New developments: The first annual report on the R&I strategy in the context of RIS3 is still to be published. Further evidence on developments regarding the implementation of the Smart Specialisation Strategies is thus limited at the time of writing. The report is expected to provide a complete assessment of the state of RIS3 development, and enable the identification of the adjustments required.

Outstanding issues: Portugal still lacks a sound policy evaluation culture with systematic integration of independent evaluations in the R&I policy-making process. In fact, a recent review of the calls for interest of the ESIF co-funded Operational Programmes raises questions about the prioritisation process.

## 2. Economic Context

Portugal is experiencing excessive macroeconomic imbalances. In particular, the large stocks of net external liabilities, private and public debt and a high share of non-performing loans constitute important vulnerabilities in a context of relatively high unemployment (European Commission, 2016a).

Low productivity is also a marked characteristic of the Portuguese economy. TFP continues on the downward trend initiated at the turn of the century. As reflected in European Commission (2016b), "...labour productivity in Portugal remained at around 60% of the euro area levels in 2013-2014, although it varies considerably across sectors [...] ". After reaching 0.2 per cent in 2015, annual labour productivity growth is projected at -0.1 and 0.5 per cent for 2016 and 2017, respectively (European Commission, 2016c). Importantly, Portugal's persistent productivity gap relative to average euro area levels can be partly attributed to differences in the level of R&D spending and innovation (DG RTD, 2016).

### 2.1 Structure of the economy

Portugal's services and manufacturing sectors value-added shares, respectively 75.4% and 13.8% in 2015, differ slightly from the equivalent EU28 averages, respectively 74.0% and 15.5% in 2014. By contrast, high and medium high-tech manufacturing

sectors have a much lower weight in the Portuguese economy compared to the EU average, with value-added and employment shares of, respectively, 2.9% and 2.3% in 2014 (well below the equivalent EU28 shares of, respectively, 7.2% and 4.7% in 2013).

As regards the trends in sectorial change, a drop in the share of manufacturing products has taken place in recent decades, whereas the shares of high-tech industries within the manufacturing sector, in terms of value-added, employment and exports, have shrunk (Mamede et al., 2014).

## 2.2 Business environment

According to the 2015 SBA Factsheet, Portugal's score on entrepreneurship is the second best in the EU (European Commission, 2015). This document stresses that "the country has made significant progress since 2008" in entrepreneurship. However, despite the country ranking 25th worldwide in 2016 according to the World Bank "Ease of Doing Business" index, there are certain dimensions of "doing business" in which Portugal is still lagging behind other countries, chiefly in areas related to starting a business.

Access to finance still remains costly and difficult for most business firms, with Portugal scoring below the EU average in this respect. This problematic situation is further compounded by the excessive dependence of business firms on bank credit. The problems faced by Portugal's banking sector have increased companies' financial burden and have put their sustainability at stake. As mentioned in the 2015 Country Report, "high indebtedness of the private sector remains a major vulnerability of the Portuguese economy" (European Commission, 2016b).

Regarding progress towards the digitalization of the economy, the [2016 Digital Economy and Society Index report for Portugal](#) shows that the country reached an overall DESI score of 0.53, ranking 14th out of the 28 EU Member States, and slightly above the EU average of 0.52. This report also highlights that "the country's greatest challenge is to improve the digital skills of its citizens and to bring them online (28% have never used the Internet) so that they can fully participate in the digital economy and society". It also states that "Portuguese businesses have made clear progress in taking advantage of the possibilities offered by online commerce" (DESI, 2016),<sup>2</sup> though this report also points out that businesses still "have room for improvement in seizing the advantages of digitisation, in particular concerning the use of social media to engage and communicate with customers and partners." (DESI, 2016).

## 2.3 Supply of human resources

Data from Eurostat shows that Portugal in 2013 outperformed the EU average in terms of new doctorate graduates, and in the number of researchers, in general, and of female researchers, in particular.<sup>3</sup> Only with regard to the supply of science, technology, engineering and mathematics graduates is the country underperforming slightly vis-à-vis the EU average.<sup>4</sup>

However, the country still has a shortage of adequate human resources, especially at intermediate professional levels. The mismatch between chosen educational careers and the needs of the economic system in recent years and the low employability of PhD graduates in firms are also two of the main challenges in the labour market. Furthermore, the absence of large technology-intensive firms that might absorb more graduates from science and technology studies as well as the insufficient focus on training researchers to collaborate with businesses are likely to counteract the policy measures taken in the recent past to counter the persisting *brain drain* phenomenon

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<sup>2</sup> In particular, it ranks second among EU countries in the use of RFID and fifth in electronic information sharing (DESI, 2016).

<sup>3</sup> In 2013, the numbers for those three categories were, respectively for Portugal and the EU28 average, 1.48 vs. 1.07 (per thousand population aged 25-34), 7.47 vs. 5.36 (per thousand population), and 45.42 vs. 33.17 (as a share of total researchers).

<sup>4</sup> In 2014, this supply was, respectively for Portugal and the EU28 average, 2.25 vs. 2.3 (per thousand population).

### 3. Main R&I actors

In terms of fund allocation and political coordination, R&D governance continues to be mostly centralised. The regions have traditionally had a minor role in the allocation of research funds. However, part of the structural funds dedicated to research has been allocated through the regional operational programmes (OPs) in recent years. In 2016, 10,7% of the government budget appropriations or outlays for R&D (GBAORD) were assigned to the 5 continental regional OPs, plus the two Atlantic regional OPs ([DGEEC, 2016a](#)). This is in line with previous years since 2010, with the exception of 2014 when that share rose to 15.2%. At €1,756 m in 2015, GBAORD was at almost the same level as in 2010, where it reached a historic maximum.

The two organisations within government in charge of R&I policy are the Ministry for Science, Technology and Higher Education (MCTES) and the Ministry for the Economy (ME). The main funding agency for academic research is the Fundação para a Ciência e a Tecnologia (FCT). This institution has performed the role of research council, providing funding for academic research units, and supporting research projects as well as advanced training, mainly at the PhD and postdoc levels. In parallel, the Agência Nacional de Inovação (ANI) also funds applied R&I activities. In contrast to the academia-oriented FCT, this entity has managed policies directly aimed at supporting firm-oriented R&D, including cooperative projects between firms and R&D organisations.

The higher education (HE) sector dominates the R&I scene among academic institutions. Most of the research that is carried out in the HE sector takes place within universities, including the semi-autonomous R&D units in their perimeter. Most of the R&D expenditure by the HE takes place in the largest public universities, such as the Universidade de Lisboa, Universidade do Porto, Universidade do Minho, Universidade de Coimbra and Universidade de Aveiro.

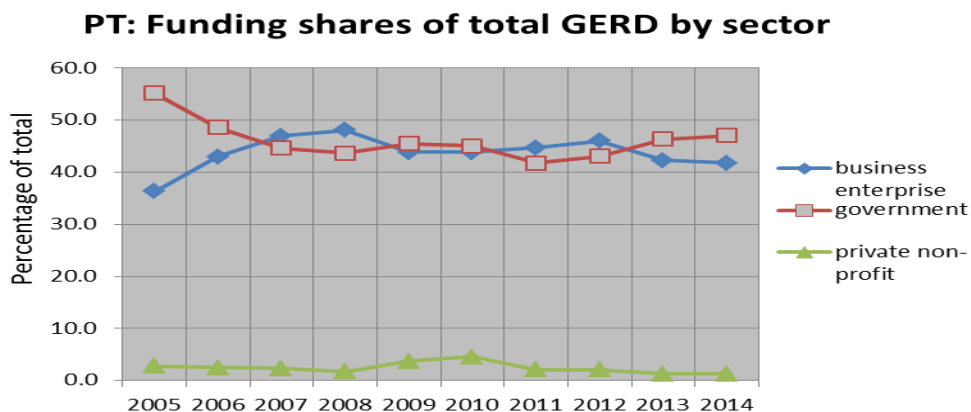
Within the business sector, larger companies, with 500 or more employees, had a 34.9% share in 2014 BERD, with the remainder carried out by SMEs ([DGEEC, 2016b](#)). These figures suggest that larger firms play a disproportionately less important role in Portugal than in other comparable economies. The [ranking in terms of BERD in 2015](#) is led by PT (telecom), followed by SONAE (distribution), Grupo Banco Comercial Português (finance) and BIAL (pharma). One characteristic of the Portuguese BERD performers is the relative importance of banking corporations, with at least two of them among the top 10 performers in 2015. The relevance of these corporations is reflected in the overall importance of the services sector. On the other hand, multinational companies do not perform a dominant role in domestic BERD. Overall, foreign firms carried out 23% of the total 2014 BERD ([DGEEC, 2016b](#)).

In terms of private non-for-profit (PNPs), there are two main foundations for research funding. The first is the Gulbenkian Foundation. In addition to providing grants to support research and university chairs, this foundation also has its own Instituto Gulbenkian de Ciência, an institution that hosts several high-level biomedical research groups and a PhD programme. The second is the Champalimaud Foundation. It started more recently and founded a centre for biomedical research in 2010. PNPs funded only 1.28% of total GERD in 2014.

The quality of the R&I system is related to the linkages between its main actors. This has traditionally been a weaker feature of the Portuguese R&I system. A revealing figure in this sense is the 7.1 public-private co-publications per million population reached in 2014, well below the EU's average of 33.9 (EIS, 2016). ANI has supported academia-business links by funnelling structural funds towards R&I cooperation. Clustering policy has also played a role in this regard. Likewise, the University Technology Enterprise Network (UTEN) promotes the incubation of technologically-intensive start-ups, international business acceleration and business development.

## 4. R&I trends

The GERD/GDP ratio declined over the last few years; after reaching a historical high of 1.58% in 2009, this ratio diminished to just 1.28% in 2015. Underlying this evolution there are a number of changes, both in funding patterns and in the structure of R&D performance.



**Figure 1** Breakdown of sectoral contributions to total GERD funding.  
Data source: Eurostat, November 2016.

### 4.1 Public allocation of R&D and R&D expenditure

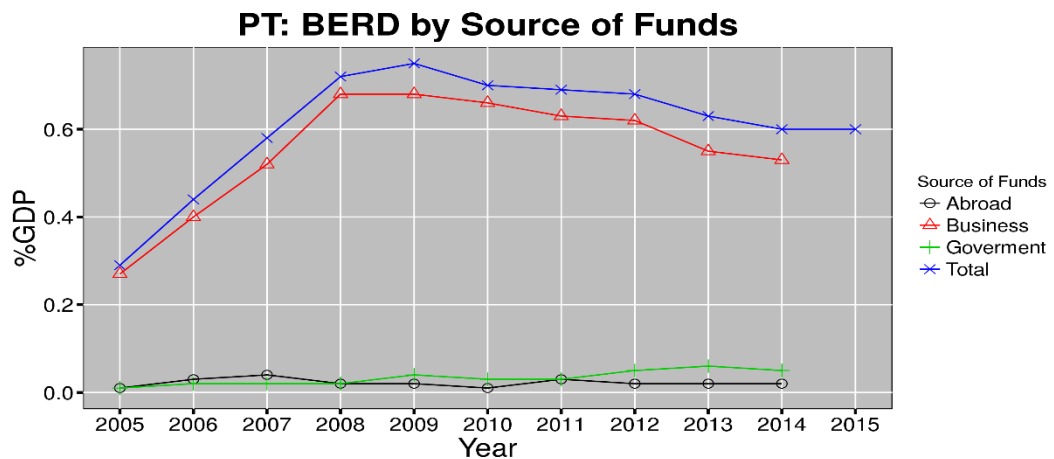
The government's share of R&D funding has been increasing since the recession started, from a historical low of 44% in 2008 to 47% in 2013. This is despite actual R&D investment from government sources declining by 15.4%, from € 1,130 m in 2008 to € 1,052 m in 2014. The reason for the rise in the government's share owes to the evolution of private business funding, which dropped faster than public funding. This was against an economic background in which GDP in that period declined, in nominal market prices, from € 178.9 billion to € 173 billion. The stronger decline in private funding of R&D in the recession years revealed, therefore, a higher elasticity, compared to public R&D, of private R&D to GDP.

In terms of R&D performance, rather than funding, the weight of the government sector is much smaller. The government R&D sector has been shrinking in relative weight in recent decades, down to only 5.9% of total GERD in 2015. The dominance of public R&D until the early 1980s was replaced by a rise of the share of the HE sector, which reached 43% in 1992. Since that year, the share of higher-education R&D (HERD) expenditure first decreased to 30% in 2007, coinciding with the rise in the share of business, but then increased again to 45.5% in 2015.

### 4.2 Private R&D expenditure

Business expenditure on R&D (BERD) has been declining since 2009. Before that, the BERD/GDP ratio rose continuously, up to 0.75% in 2009, but declined since then, to 0.6% in 2014. Similar trends are observed concerning the BERD/GERD share and overall funding of R&D by business firms. While in 2008 R&D investment funded by the business sector reached a level of €1243m, by 2014 the equivalent figure fell below the €1b threshold, to €933m.

These recent trends owe partly to the investment climate that ensued the 2008 recession. Faced with significant liquidity problems, firms tend to slash their R&D budgets. Moreover, shrinking profits meant that firms did not have an incentive to claim fiscal credits provided by the SIFIDE measure, and thus R&D expenditures were not reported as before.



**Figure 2** Breakdown of sectoral contributions to total BERD funding.  
Data source: Eurostat, November 2016.

### 4.3 Public sector innovation and civil society engagement

In June 2016 a Council was set up with the objective to draw a Strategy and Plan for ICT use within the Public Administration, relying on three pillars: interoperability and integration of technologies, resources' sharing, and innovation and competitiveness. This Plan, which was expected by the end of 2016, was intended to clarify how Portugal is aligned with the EU's eGovernment Action Plan 2016-2020.

Cross-country comparison indicators show that Portugal performs relatively well. It ranks relatively high (38<sup>th</sup>) in the UN E-government Development Index ranking (UN, 2016), whereas according to Eurostat 43% of its citizens interacted with public services through the Internet in 2015 (close to the EU28 average of 49%). The Strategy and Plan of the ICT Council is expected to provide orientation on further rationalisation, the improvement of services to citizens and the economy, and the use ICT procurement to induce innovation, both inside and outside the public administration.

As regards civil society engagement, actions can be categorized within citizen science initiatives, non-profit organisations support, and mediating structures. The most noteworthy new event concerning the first category is the announcement by the government of a Participatory Budget for Science and Technology. This is aimed at launching new research projects through public initiative, by involving citizens, business companies, non-profit entities and scientists. Regarding non-profit initiatives, the most outstanding ones include the Academia de Código, to teach computer code to both youngsters and unemployed people, and several R&I prizes, granted mainly by pharmaceutical companies and banks.

## 5. Innovation challenges

### 5.1 Challenge 1: Improving firms' innovation performance by strengthening their technological and managerial capabilities

#### Description

Innovation performance remains relatively low in spite of developments in the R&I system (European Commission, 2016a). Financial constraints and the high levels of indebtedness of Portuguese firms partly explain the evolution of BERD (around 45% of the EU average (EIS, 2016) as well as the 6.4 per cent decline in 'Non-R&D innovation expenditures' over the last eight years. But the problem also has a systemic dimension; the insufficient in-house capabilities of firms (both SMEs and large firms) prevent

enablers from translating R&D and innovation investment into economic effects (EIS, 2016). Therefore, continuing to build the capacity in business firms to increase firms' technology and knowledge intensity is a key challenge for the Portuguese R&I system.

### **Policy response**

In the context of the Portugal 2020 Partnership Agreement, between 2014 and 2020, the 'Operational Programme for Competitiveness and Internationalisation' (Compete 2020), comprises six axes: (1) Company innovation and entrepreneurship; (2) SMEs' capabilities and internationalisation; (3) Firms' research and technological development; (4) Public Administration modernisation and capability building; (5) Scientific and technological research, addressed to research organisations; and (6) Support to collective actions, including clustering. Axes 1 and 3 comprise a variety of policy tools to support R&I by business firms. Measures falling under Axis 2 are taken at the national and especially regional levels. These include the SMEs' Capabilities and Internationalisation Incentive System and the SMEs' Productive Innovation scheme, which aim at market creation and stimulation for SMEs by supporting the launch of new products as well as the adoption of new processes and organization methods.

The establishment of Collaborative Laboratories, in the context of the 'Commitment to Knowledge and Science', is also aimed at increasing R&D cooperation between business firms and other organisations of the S&T system. In the same vein, the Indústria 4.0 initiative is expected to enhance Portuguese firms' awareness and responsiveness to digitalisation.

### **Policy Assessment**

The country still has an excessive reliance on activities of lower knowledge intensity. Even though the number of firms conducting R&D activities on a permanent basis has been steadily increasing, further deepening of innovation-friendly framework conditions for business investment in R&I remains crucial. Collaborative R&D projects became increasingly common in several economic sectors and some of the innovation output indicators show signs of an improved, although still modest, performance (EIS, 2016). There is potential for gains from economies of scale and knowledge spillovers, enhanced by the concentration of several clusters in regions Norte and Centro.

The evaluation of the measures included in the former Compete 2007-2013 programme was positive. This exercise concluded that the incentive system had reached a high level of maturity, drawing upon a systemic view of innovation, focused on promoting companies' capabilities. Furthermore, the evaluation concluded that there had been a co-evolution of companies' capabilities in innovation and internationalisation (IESE/Quatenaire, 2013). There is, however, still room for improvement as regards advancing firms' capabilities, fostering collaboration and promoting instruments to enable converging approaches towards the definition of common R&I agendas.

Unfortunately, so far no evaluations are available with regard to the measures included under Compete 2020. However, this policy approach seems appropriate for two main reasons. First, it comes in the wake of earlier measures which have worked reasonably well, according to independent evaluations (IESE/Quatenaire, 2013; A. Mateus & Associados/PwC, 2013). Second, the scope of support actions was expanded to include training-action programmes, a type of support which, if properly implemented, may enhance the development of managerial capabilities.

## **5.2 Challenge 2: Stimulating the emergence of new companies in knowledge-intensive activities, with a view to fostering structural change**

### **Description**

The evolution of the country's international specialisation continues in the same unfavourable path; the EIS 2016 indicates a decline, around 1.2 per cent of medium-high tech exports along the eight-year period ending in 2014. This is partly due to the

effect of wage-reduction measures (Godinho, Simões & Zifciakova, 2016), but also reflects obstacles to developing more technology-intensive manufactures.<sup>5</sup>

The situation is aggravated by the absence of large, internationally-oriented companies in medium and high-tech sectors, which typically carry out the majority of business R&D expenditure in small and medium European countries. Another problem is related to the capacity to attract knowledge-intensive FDI. Despite the upgrading of activities carried out by some multinationals, there has been a relative lack of new knowledge-intensive FDI projects.<sup>6</sup> Also, less than one third of planned short-term investments are on manufacturing projects, and only about 10 per cent involve R&D activities (Ernst & Young, 2016).

### **Policy response**

Since 2011, the promotion of entrepreneurship has ranked high in the policy agenda. Following the creation of Portugal Ventures in 2011, the new public venture capital company, the programme '+Inovação +Indústria' was launched in 2012, with a view to promoting the creation of knowledge-intensive companies in traditional industries. A new financing line for Business Angels was also opened in 2014, which provides seed and early stage capital.

Portugal defined a Research and Innovation Strategy for Smart Specialisation (RIS3) as a result of a process launched by FCT and the *Agência para a Competitividade e Inovação* (IAPMEI), with a significant involvement from stakeholders. Compete 2020 has some measures specifically aimed at stimulating the creation of knowledge-intensive start-ups. Likewise, ANI, the National Innovation Agency, intends to spur technology-based entrepreneurship by focusing its support upstream, providing advice for entrepreneurs before having access to venture capital.

In 2016, the government launched the 'Start-Up Portugal' programme. This programme intends to rationalise entrepreneurship support facilities, improve the fiscal regime for investment in start-ups and promote their internationalisation. The Lisbon Web Summit, which started in November 2016 and will run for three consecutive years, is expected to boost Portugal's attractiveness for FDI as well as serve as an international *show-room* for Portuguese high-tech firms.

### **Policy Assessment**

The procedure leading to the design of the RIS3 was appropriate and the ex-ante evaluations of Compete 2020 were positive. With regards to the measures launched in 2016, the establishment of an Incubators network is likely to increase the quality of support and the sharing of know-how among start-ups. Two other initiatives, the aforementioned Web Summit and the establishment of a 'Technological Free Area', are, respectively, likely to increase the awareness by foreign investors of investment conditions and make research, testing and industrial application activities more attractive.

In contrast, in terms of FDI policy, an apparent divide needs to be addressed: pre-existing foreign investors assess the country conditions more positively than outside companies which ponder whether to invest in the country (IESE/Quatenaire, 2013).<sup>7</sup>

## **5.3 Challenge 3: Strengthen synergies between science and industry**

### **Description**

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<sup>5</sup> A sign of this is the fact that Portugal's exports of knowledge-intensive services have stagnated in the last eight years (EIS, 2016).

<sup>6</sup> The recent EY Portugal Attractiveness Survey (EY, 2016) indicates that the FDI projects launched in 2015 could generate 3,500 new jobs, the highest figure since 2008.

<sup>7</sup> This is confirmed by the EY Portugal Attractiveness Survey: 55 per cent of existing investors believe Portugal's attractiveness will improve in the next 3 years, while the corresponding figure for non-investors is 36 per cent.

There is widespread agreement that interactions between academia and industry continue to be weak.<sup>8</sup> The approach adopted so far to respond to the problem, expressed on the previous NRPs, is based on a 'technology transfer' view, which assumes that knowledge flows only from science to industry, thereby downplaying the role of business demand. There are signs that this perspective is changing in favour of a more balanced approach, giving more room to the encouragement of the demand side. Indicators for academia-industry cooperation, show that it is still comparatively low, at around 30% of the EU average, and has declined by 2.7% over the past eight years (EIS, 2016). Likewise, at around €1.7m in 2014, business-funded public R&D expenditure remains very low. This partly owes to the structural composition of the Portuguese economy, with a higher weight of low to medium-low technological activities. Furthermore, at 2.6%, Portugal remains the EU country with the lowest rate of PhD holders employed in the business sector (FCT, 2013).

## Policy response

The decision to relaunch the innovation agency (ANI), taken in 2014, was very positive, since this organisation may play an important role in promoting academia-industry cooperation. ANI manages a set of policy measures under Compete 2020, including: Mobilising R&D programmes (bringing together universities, R&D organisations and firms); Demonstration Programmes, aimed at the diffusion of spearhead technologies; Co-promotion of R&D teams, providing incentives to set up and develop collaborative R&D structures, led by a SME; and Co-promotion R&D projects. Other initiatives have also made a positive contribution to respond to these challenges, such as UTEN, which has for some years been contributing to the training of technology transfer professionals.<sup>9 10</sup>

'Start-Up Portugal' is intended to set up a country-wide incubating network. This is expected to stimulate cooperation among incubating facilities, promote specialisation and foster know-how sharing. The intention to set up a *Fablabs* and makers network goes in a similar direction. The 'Technological Free Area' action is also likely to stimulate cooperation between different players in the Portuguese R&I system with a view to create improved conditions for the testing of innovative technology-based businesses aimed at creating new markets. The 'Commitment to Knowledge and Science' aims at promoting the conditions for the development of medium- to long-term agendas involving various stakeholders. The aforementioned Collaborative Laboratories also promote cooperation through the establishment of joint laboratories that will bring together different types of partners in the design of R&I agendas. The CITec – Capacitar Programme is a programme geared towards upgrading the capabilities of interface organisations and Technology Interface Centres (CITs). It is designed to promote the economic exploitation of scientific and technological knowledge by facilitating its application by private companies, including by providing public funding to develop and/or absorb emerging technologies. In addition, the Council of Ministers set up the Fund for Innovation, Technology and Circular Economy, which complements the aforementioned funding in the R&I domain. All these measures can boost university-industry cooperation.

Following the evaluation of the cluster initiative in 2013, the government published in March 2015 a regulation on the recognition of Competitiveness Clusters which led to the selection of ten clusters. Information collected so far suggests that selected clusters will also include new initiatives (e.g., aeronautics & space, automotive industry, railways).<sup>11</sup>

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<sup>8</sup> European Commission (2016a), European Council (2016).

<sup>9</sup> The role played by UTEN regarding the commercialisation of research was mentioned in earlier RIO reports (Godinho & Simões, 2015; Godinho, Simões & Zifciakova, 2016).

<sup>10</sup> The analysis on the evolution of Technology Transfer Offices (TTO) suggests an increase in their activity during the 2007-2012 period (UTEN, 2015). Another interesting finding is the densification of networking among TTO organisations (UTEN, 2015).

<sup>11</sup> Importantly, in the framework of Compete 2020, clustering initiatives are provided financial support. At the time of writing, no calls have yet been launched with regard to the cluster policy in 2016.

## Policy Assessment

An increase in the number of collaborations between companies, universities and research institutes has been registered over the past years, while evaluations of the 2007-2013 Compete programme and the 2007-2013 National Strategic Framework are positive in this regard (Godinho, Simões & Zifciakova, 2016). Measures to promote cooperation under Compete 2020 and the goal of ANI to focus not just on research supply but also on demand suggest that policy is on the right track.

Concerning clusters, the policy assessment is not so positive. In fact, evaluation findings are mixed (SPI/Inno-TSD, 2013). Furthermore, the ME decision to define the new list of clusters as a result of the evaluation process undertaken since 2014 is taking longer than anticipated.

The process of enhancing academia-business cooperation will take time and committed effort from different actors. There are still challenging issues both on the demand and supply side that require a systemic approach to tackle them. On the demand side, the manufacturing sector is characterised by medium-low and low-tech companies, and the contribution of the few technology-intensive companies towards the definition of long-term R&I agendas has been limited. Besides this, it is important to understand the non-technological dimensions of the interaction process. There are also behavioural and institutional barriers which hamper university-industry cooperation.

## 5.4 Challenge 4: Defining integrated agendas on innovation policy, including public sector and demand-driven innovation

### Description

R&I policies have been gradually changing their traditional focus in Portugal. While research policy was essentially aimed at improving academic research, other objectives have been increasingly incorporated. Public policies progressively shifted their focus to spurring the development of innovative capabilities in the business sector. More recently, however, another shift in the R&I policy outlook is happening. New measures envisaged recently are intended to make the public administration more involved in innovation (e.g., through process development and public procurement) as well as to promote public hearings and taking measures to match public policies with bottom-up initiatives. Thus, the idea of 'participation' is being incorporated by research policy.

### Policy response

An important initiative was the launch in May 2016 of [SIMPLEX+](#), a programme on administrative simplification and eGovernment. This programme aims at improving and creating new services provided by the public administration to both citizens and firms. A 'Council for ICT within the Public Administration sector' was established in June 2016. A Strategy and Plan are expected to be completed by Autumn 2016. The focus of this policy will be on ICT rationalization within the public administration, but also on how to use ICT procurement to induce innovation. The new Public Sector Experimentation Lab, called LabX®, was launched in October 2016 with the remit to experiment with new solutions to improve public services and the daily life of citizens and businesses. The projects envisaged include the so-called "single employment desk", aimed at concentrating in a single physical space and on a single digital platform all employment interactions (job search, professional training and recruitment), between public services, unemployed citizens and potential employers.

The National Participatory Budget foresees four horizontal areas of intervention: science, culture, agriculture and tertiary education. There is already a provision in the 2017 Government Budget for a Participatory Budget for Science and Technology. The Collaborative Laboratories and Public Participation Laboratories, announced in July 2016, are also good attempts to foster the involvement of different R&I system players in the planning of longer-term research agendas. In the public procurement field, the launching of the National Strategy for Ecological Public Purchasing and the revision of the Public

Contracts Code, disclosed in 2016, are likely to stimulate demand-driven innovation. Earlier, in 2014, [Portugal Inovação Social](#) was established with the mandate to stimulate the ecosystem of non-technological innovation and social entrepreneurship.<sup>12</sup>

## **Policy Assessment**

2016 was marked by a change in public policies on innovation. Promoting the involvement of stakeholders in the design of research policy and in the definition of research agendas emerged as a policy priority. This is in contrast to the trend observed in the years before 2016 in which some public procurement measures to induce innovation, such as the Mobi.E programme, launched in 2008 to promote electric-powered mobility, were discontinued. Overall, despite recent efforts to rationalise ICT use in the public administration, the public sector is still not viewed as a lead innovator. The Strategy and Plan to be implemented by the new ICT Council is expected to reverse this situation. Also, despite measures aimed at involving stakeholders in relevant R&I areas, and the existence of a well-funded programme geared towards social innovation, there is still a limited number of 'bottom-up' initiatives, confirming the detachment of the business sector faces in the formulation of R&I agendas.

Recent important changes in governance have yet to progress along the learning curve to become effective at a wider scale. Furthermore, it is necessary that both civil society and the business sector are able to profit from the planned measures and become more active in disseminating co-creation and collaboration across the R&I system.

In general, the scope for public policies to progress in this area is wide. Specific problems that are affecting the country, together with opportunities emerging from existing comparative advantages, can drive efforts for further coordination between academic research, public intervention towards innovation and private sector initiatives. Examples of issues that may be considered under this perspective include the control of wild fires, problems derived from an unfavourable demographic structure, or the exploitation of the large oceanographic resources to which Portugal has access to.

## **5.5 Challenge 5: Improving governance via increasing stakeholders' participation**

### **Description**

Since the outbreak of the Great Recession in 2008, public research funding has been hampered by unfavourable macroeconomic conditions.<sup>13</sup> This context led to an attempt to rationalise the research system. Several measures were implemented in this sense, albeit with low involvement of stakeholders. This was partly due to long-standing difficulties with firms' capacity to build R&I agendas. Even though Portugal's research policy entered a new course recently, improving policy governance remains a challenge. On one hand, the R&D system is in need of a more consistent involvement of stakeholders, which might help to smooth changes arising from the political cycle. On the other hand, R&I issues do not rank high in the policy agenda. In particular, a convergence of actions among Ministries has not been ensured yet and an analysis of the innovation implications of legislation is still absent.

### **Policy response**

The 'Commitment to Knowledge and Science', disclosed in early 2016, reveals a clear intention to strengthen the governance of the R&D system. Two important instruments are the aforementioned 'Collaborative laboratories' and the 'Public Participation Laboratories'. The latter aim at involving different actors in the design of R&I agendas as well as in the debate on public policy on S&T and on knowledge diffusion. This initiative is intended to encourage participation in S&T issues, including the contribution of knowledge towards the development of cities and regions. The revision of the guidelines

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<sup>12</sup> This is the first time EU structural funds are mobilized for promoting social innovation projects.

<sup>13</sup> This is, for instance, reflected in the negative evolution of the GBAORD and the *brain drain* of high-skilled labour.

for FCT's activity (Magalhães et al., 2016) is also expected to enhance the participatory governance of the research system as well as the relationship between FCT and the scientific community. On the scientific employment front, new measures were announced in 2016. The new legal scientific employment regime approved on the 29<sup>th</sup> of August 2016 is intended, among other things, to secure the permanence of PhDs in Portugal and to recruit new staff for Portugal's S&T organisations.<sup>14</sup>

## **Policy Assessment**

The assessment of policy developments during 2016 for the R&I system's governance is positive. The measures taken are aimed at enhancing trust and improving the governance of the R&I system. In fact, some measures such as the 'Collaborative laboratories', are aimed at promoting stakeholders' involvement in the definition of R&I agendas. Another positive feature is ANI's effort to foster cooperation between the different players in the R&I system.

The evaluation of the developments regarding the implementation of the Smart Specialisation Strategies might open new opportunities to improve the governance of the R&I system. Evidence in this regard is limited. It was decided to wait until the first year of implementation of Compete 2020 (where RIS3 criteria are explicitly considered) to make an assessment of progress. ANI has not yet disclosed the first annual report on Portugal's R&I strategy in the context of RIS3. This will provide a more complete assessment of the state of RIS3 development, and enable the identification of the adjustments required.

Despite this progress, increasing stakeholders' role in R&I policy remains a challenge. R&I activities are collaborative processes demanding appropriate networks. To address this, a new approach, based on cooperation, stakeholder participation and open discussion could enable the development of evidence-based, effective R&I strategies. It will also ensure the sustainability of the R&I system.

## **6. Focus on creating and stimulating markets**

*This section aims at describing and assessing national level efforts to introduce demand-side innovation policies to stimulate the uptake of innovation or act on their diffusion, including public procurement and regulations supporting innovation. It also analyses policy measures aimed at internationalisation of companies with the aim of increasing the innovativeness of the economy.*

Demand-driven innovation was already present in the policy agenda between 2006 and 2011, as mentioned in the ERAWATCH 2011-2012 Mini-Country Portugal Report (Godinho & Simões, 2012). A set of programmes were included in the so-called Technological Plan, especially E-escola and Mobi.E. The Agenda Digital approved in 2010 encompassed a number of programmes designed to stimulate the development of new goods and services for both export and domestic use (Godinho & Simões, 2012:5). These programmes included E-escola, E-health and Mobi.E.

With the advent of the crisis, a significant decline in demand-driven policies ensued, rendering the use of this type of instrument to foster innovation very limited at present. However, some initiatives adopted in 2016 are worth mentioning. One is the centre for ICT competences currently being developed in the public administration. Additionally, the Public Contracts Code introduces an interesting novelty: the establishment of a 'partnership for innovation'.<sup>15</sup> The revision of the Code initiated in August 2016 also gives special treatment to contracts exhibiting a 'significant' innovation content. Despite these interventions, the role played by public procurement as a lever to promote innovation can be deemed weak.

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<sup>14</sup> Measures include the extension of the duration of researchers' employment contracts to six years and the widening of the range of remuneration amounts to accommodate different experience and qualifications levels.

<sup>15</sup> whereby the purchasing party demands the carrying out of R&D activities with a view to acquiring the corresponding results.

Portugal does not have a tradition in using regulations and standards to spur innovation. With respect to regulations, their effects on innovation are generally not taken into account. Nevertheless, the government has made three business-friendly decisions on new regulations. These should reduce the unpredictability of legislation and reduce the compliance costs borne by business, among other things. However, no specific consideration is made regarding the costs impinging upon the R&I system. An interesting initiative to use regulation to promote innovation is the intention to establish a 'Technological Free Area', with the main goal of revising the existing regulations in order to increase Portugal's attractiveness for R&D activities related to spearhead technologies.

Regarding company internationalisation, there are three main types of measures targeting individual firms, start-ups and collective internationalisation initiatives. The Incentive System for SME Qualification and Internationalisation (SIQPME) is particularly important, since it provides financial support to SMEs' projects whenever they are aimed at achieving a number of objectives deemed support-worthy (e.g., expanding firms' web presence).

Specific support is provided to the internationalisation of start-ups. The UTEN project is a good example of promotion of internationally-oriented entrepreneurship. Thanks to this project, several firms have been born simultaneously in the US and Portugal (UTEN, 2015).

Internationalisation is also one of the main axes of the Start-Up Portugal initiative, launched in 2016. As mentioned above in 4.2, measures include a set of initiatives in the context of the Web Summit event.

For collective internationalisation initiatives, Compete 2020 includes two key measures. The first is the support by SIQPME of joint internationalisation projects.<sup>16</sup> The second is the incentive system on Collective Actions (SIAC). Portuguese authorities are committed to attract FDI, partly in response to the unmet demand by foreign investors' for better investment conditions. However, recent performance in attracting new knowledge-intensive FDI to the country has been relatively poor (Godinho & Simões, 2015; Godinho, Simões & Zifciakova, 2016).

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<sup>16</sup> i.e., projects involving at least 5 SMEs without equity links among them or 10 SMEs otherwise.

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## List of abbreviations and definitions

ANI	National Innovation Agency
BERD	Business Expenditures for Research and Development
BES	Business Enterprises Sector
CIS	Community Innovation Survey
CIT	Technology Interface Centres
Compete 2020	Competitiveness and Internationalisation Operational Programme
DGEEC	General Directorate of Education and Science Statistics
ERA	European Research Area
ERC	European Research Council
EU	European Union
EU28	28 EU Member States
FCT	Science and Technology Foundation
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
HERD	Higher Education Research and Development expenditures
HES	Higher Education Sector
Horizon 2020	EU Framework Programme for Research and Innovation
IAPMEI	Agency for Competitiveness and Innovation
ICT	Information and Communication Technologies
JRC	European Commission's Joint Research Centre
MCTES	Ministry for Science, Technology and Higher Education
ME	Ministry for the Economy
OPs	Operational Programmes
PhD	Doctor of Philosophy
PNP	Private non-profit sector
R&D	Research and development

R&I	Research and Innovation
RIS3	Research and innovation strategies for smart specialisation
SME	Small and Medium Sized Enterprise
UTEN	University Technology Enterprise Network

## Factsheet

	2009	2010	2011	2012	2013	2014	2015	2016
GDP per capita (euro per capita)	16600	17000	16700	16000	16300	16700	17300	
Value added of services as share of the total value added (% of total)	75.41	75.19	75.84	75.99	76.17	76.03	75.42	
Value added of manufacturing as share of the total value added (%)	12.56	13.15	12.94	13.01	13.14	13.49	13.76	
Employment in manufacturing as share of total employment (%)	15.12	14.93	14.93	14.98	15.14	15.27	15.61	
Employment in services as share of total employment (%)	62.81	63.66	64.4	65.05	65.7	66.68	67.23	
Share of Foreign controlled enterprises in the total no. of enterprises (%)	0.58	0.6	0.61	0.62	0.61			
Labour productivity (Index, 2010=100)	96.9	100	101.4	102.4	103.6	102.7	102.8	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	1.5	0.95	0.74	0.98	1.48	1.44		
Summary Innovation Index (rank)	21	22	22	22	22	22	23	
Innovative enterprises as a share of total number of enterprises (CIS data) (%)				54.6		54		
Innovation output indicator (Rank, Intra-EU Comparison)			25	24	24	24		
Turnover from innovation as % of total turnover (Eurostat)		14.4		12.4				
Country position in Doing Business (Ease of doing business index WB)(1=most business-friendly regulations)						23	23	25
Ease of getting credit (WB GII) (Rank)						80	81	81
Venture capital investment as % of GDP (seed, start-up and later stage)	0.024	0.036	0.007	0.01	0.017	0.026	0.039	
EC Digital Economy & Society Index (DESI) (Rank)						15	16	14
E-Government Development Index Rank		39				37		38
Online availability of public services – Percentage of individuals interacting with public authorities via the Internet (last 12 months)	21	26	37	39	38	41	43	45
GERD (as % of GDP)	1.58	1.53	1.46	1.38	1.33	1.29	1.28	
GBAORD (as % of GDP)	1	0.98	1	0.92	0.93	0.94	0.98	
R&D funded by GOV (% of GDP)	0.72	0.69	0.61	0.59	0.62	0.61		
BERD (% of GDP)	0.75	0.7	0.69	0.68	0.63	0.6	0.6	
Research excellence composite indicator (Rank)				17				
Number of scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country		8.85	9.01	9.38	9			
Public-private co-publications per million population	8.99	11.25	13.53	9.49	8.11	7.1		
World Share of PCT applications	0.11	0.08	0.06	0.07	0.07	0.08		

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