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## RIO Country Report 2015: Spain

Chapter:

*3. Public and private  
funding of R&I and  
expenditure*

Ana Fernandez-Zubieta  
Thomas Zacharewicz

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**Contact information**

Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)  
E-mail: [jrc-ipts-secretariat@ec.europa.eu](mailto:jrc-ipts-secretariat@ec.europa.eu)  
Tel.: +34 954488318  
Fax: +34 954488300

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**Abstract**

The 2015 series of RIO Country Reports analyse and assess the policy and the national research and innovation system developments in relation to national policy priorities and the EU policy agenda with special focus on ERA and Innovation Union. The executive summaries of these reports put forward the main challenges of the research and innovation systems.

### 3. Public and private funding of R&I and expenditure

#### 3.1 Introduction

Spain's R&D intensity (GERD as a percentage of GDP) has been decreasing since 2009, and has decreased even further below the EU average. Spanish R&D intensity was 1.2 % in 2014 (1.32 % in 2011), which is below the EU-28 average of 2.03 % (see Table 3 below for the latest Eurostat data for 2011–2015). Spanish R&D intensity has returned to 2007 levels (1.23 %). On a per-capita basis, GERD in Spain amounted to EUR 273.6 in 2014 (EUR 303.9 in 2011), which is less than half of the European average (EUR 558.4). The GBAORD in Spain and its regions has been decreasing significantly over the last four years. In 2014, GBAORD decreased again by 5.7 %, to EUR 5 360 million. The amount of funding for R&D provided by the enterprise sector as a percentage of GDP declined slightly from 0.58 % in 2011 to 0.57 % in 2013, which is far less than the European average of 1.12 %.

The funding for research provided by different sectors (i.e. HES, PNP and abroad), as a percentage of GDP, remained quite stable between 2011 and 2013 (with changes of only 0.05 %, 0.01 % and 0.09 % for each sector, respectively). The Spanish R&D funding system relies more on funds from the HES sector than the European R&D funding system does (0.05 % for Spain versus an EU-28 average of 0.02 %).

The proportions of funding for research performed by the three sectors HES, government and business, as a percentage of GDP, all decreased during the period 2011–2014: the HES sector decreased from 0.37 % in 2011 to 0.34 % in 2014; the government sector decreased from 0.26 % to 0.23 %; and the business sector decreased from 0.69 % in 2011 to 0.63 % in 2014; All of these percentages are below the European averages for the same period (0.47 %, 0.25 % and 1.3 %, respectively, in 2014).

Table 1. Basic indicators of R&D investments

| Indicator                                      | 2011  | 2012 | 2013  | 2014  | 2015 | EU average (2015)* |
|--|-------|------|-------|-------|------|--------------------|
| GERD (as a percentage of GDP)                  | 1.32  | 1.27 | 1.24  | 1.2   | n.a. | 2.03               |
| GERD (EUR per capita)                          | 303.9 | 286  | 278.5 | 273.6 | n.a. | 558.4              |
| GBAORD (million EUR)                           | 7252  | 6185 | 5682  | 5360  | n.a. | 92828              |
| R&D funded by HES (% of GDP)                   | 0.05  | 0.05 | 0.05  | NA    | n.a. | 0.02               |
| R&D funded by PNP (% of GDP)                   | 0.01  | 0.01 | 0.01  | NA    | n.a. | 0.03               |
| R&D funded by BES (% of GDP)                   | 0.58  | 0.58 | 0.57  | NA    | n.a. | 1.12               |
| R&D funded from abroad                         | 0.09  | 0.08 | 0.09  | NA    | n.a. | 0.2                |
| R&D performed by HEIs (% of GERD)              | 0.37  | 0.35 | 0.35  | 0.34  | n.a. | 0.47               |
| R&D performed by government sector (% of GERD) | 0.26  | 0.24 | 0.23  | 0.23  | n.a. | 0.25               |
| R&D performed by business sector (% of GERD)   | 0.69  | 0.67 | 0.66  | 0.63  | n.a. | 1.3                |

\*Refers to the last year available. NA: Not Available

After 2013, data on only the central government's budget for public expenditures (PGE) on R&I are available.<sup>1</sup> The PGEs for 2014 and 2015 increased by 3.6 % and 4.2 %, giving a budget of EUR 6 406 million in 2015. Despite these increases, the 2015 PGE was lower than the 2006 PGE (EUR 6 546 million) (ICONO-MINECO: 2015). In relative terms, the R&I budget represented 1.46 % of PGE (PGE-46/PGE) in 2015, and therefore the R&I budget has returned to 2000–2001 levels (1.4 % in 2000 and 1.49 % in 2001). The foreseen budget for 2016 envisages a slight increase of EUR 23.1 million (0.4 %) (Molero and de Nó, 2015b). These data indicate that, despite the slight increase in the central government's budget for R&I since 2014, the impact of the R&I investment crisis might have been exacerbated by reductions in government public budgets for R&I.

The percentage of Structural Funds devoted to R&I is increasing (Heijs and di Anselmo, 2013; ERAC, 2014). In the 2007–2013 period, a total of EUR 7.8 billion was allocated to research, innovation and entrepreneurship in Spain,<sup>2</sup> which represents 22.6 % of the total FEDER fund for Spain (EC, 2014a). Spain increasingly participates in Horizon 2020, the EU Framework Programme for Research and Innovation. The Spanish share of this EU programme increased from 6.1 %, under the Sixth Framework Programme (FP6) to 8.8 %, under Horizon 2020 (it was 8.1 % under FP7). Spain participated in 1 322 projects as part of Horizon 2020 and coordinated 653 projects.<sup>3</sup> Spain has also increased the percentage of projects it coordinates, from 25.1 % under FP6 to 49.4 % under Horizon 2020 (37.9 % in FP7). This percentage of coordinated projects is well above the EU average (37.6 % under Horizon 2020).

EECTI and PECTI aim to increase the following: the Spanish participation in the EU Framework Programme from the current 8.3 % to 9 %; the returns from OPIs by up to 20 %; and the percentage of projects headed by Spanish entities up to 10 %. There was an increase in the total budget allocated to Spain from FP7 (from EUR 6 866 million in 2012 to EUR 8 910 million in 2013), but the return levels for Spain from FP7 decreased from 8.3 % in 2012 to 7.8 % in 2013 (ICONO-CDTI: 2015). Most of the FP7 funds received are concentrated in Madrid, Catalonia and the Basque Country, which receive 33.2%, 27.3 % and 12 % of the funds, respectively.

## 3.2 Smart fiscal consolidation

### 3.2.1 Economic growth, fiscal context<sup>4</sup> and public R&D

After an extended deep recession in 2008–2013, **economic growth** resumed in 2014 (1.4 % in real terms). Driven by private consumption growth, due mainly to job creation, negative inflation and a pick-up in business activity, the economy is estimated to have expanded by 3.2 % in 2015. It is expected to grow further in 2016–2017, but at a slower pace (by 2.8 % in 2016 and by 2.5 % in 2017).

Spain has been severely hit by the economic crisis and there has been a significant worsening of public finances as an immediate consequence, that is, **budget deficits** have widened and **public debt** has increased (Figure 1). However, as a result of consolidation measures, the deficit decreased from 11 % of GDP in 2009 to 5.9 % of GDP in 2014. It is expected to narrow further, although gradually, to 4.8 % in 2015, 3.6 % in 2016 and 2.6 % in 2017. Public debt increased rapidly during and after the financial crisis, and it is expected to reach around 100.1 % of GDP by 2016–2017.

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<sup>1</sup> Data from FECYT (2015a) and COSCE reports (expenditure heading 46).

<sup>2</sup> Core RTD allocated to Spain from 2007–2013 was EUR 4.2 billion with a total of EUR 3 billion of certified expenditure.

<sup>3</sup> Data provided in October 2015 by RIO.

<sup>4</sup> Sources: DG ECFIN, [http://ec.europa.eu/europe2020/pdf/csr2016/cr2016\\_germany\\_en.pdf](http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_germany_en.pdf)

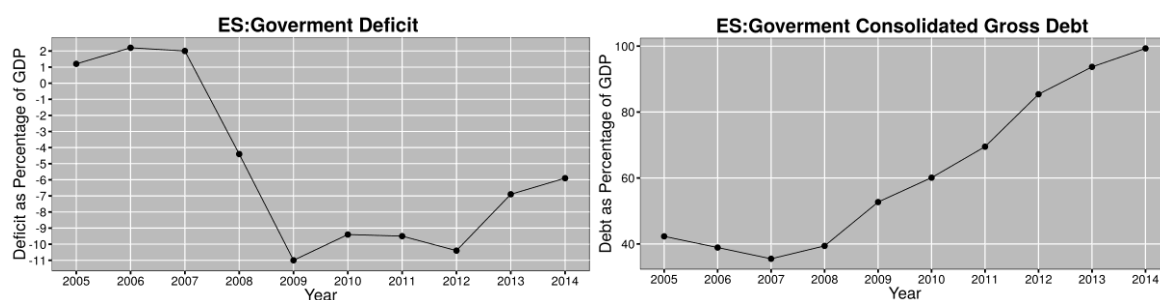


Figure 1. Government deficit and public debt

Data source: Eurostat.

Total GERD in Spain was EUR 13 011.8 million in 2013. There are three main sources of R&D funding in Spain: the business sector (EUR 6 025.1 million in 2013), the government sector (EUR 5 416.4 million) and foreign funding (EUR 957.9 million).<sup>5</sup> The bulk of domestic direct public funding goes to public research-performing organisations (EUR 2 026.84 million) and HES (EUR 2 645.8 million). Business enterprises received a considerably smaller amount of public funding (EUR 740.2 million).

Table 2. Key Spanish public R&D indicators

| Indicator   | 2007 | 2009 | 2013 |
|---|------|------|------|
| GBAORD, as a percentage of government expenditure   | 1.90 | 1.76 | 1.22 |
| GERD, as a percentage of GDP                        | 1.23 | 1.35 | 1.24 |
| out of which GERD to public, as a percentage of GDP | 0.55 | 0.65 | 0.58 |
| Funding from GOV to:                                |      |      |      |
| Business, as a percentage of GDP                    | 0.11 | 0.12 | 0.07 |
| Public (GOV+HES), as a percentage of GDP            | 0.43 | 0.52 | 0.44 |
| Total, as a percentage of GDP                       | 0.54 | 0.64 | 0.52 |
| EU funding, percentage of GDP (%)                   | 0.09 | 0.07 | 0.05 |

Source: Eurostat.

<sup>5</sup> EU funding in 2012 was EUR 567.1 million. Data for 2013 is not yet available. Total foreign funding for 2012 was EUR 890.2 million.

### 3.2.2 Direct funding of R&D activities

Figure 2 shows the historical evolution of GERD financing in Spain in current prices.

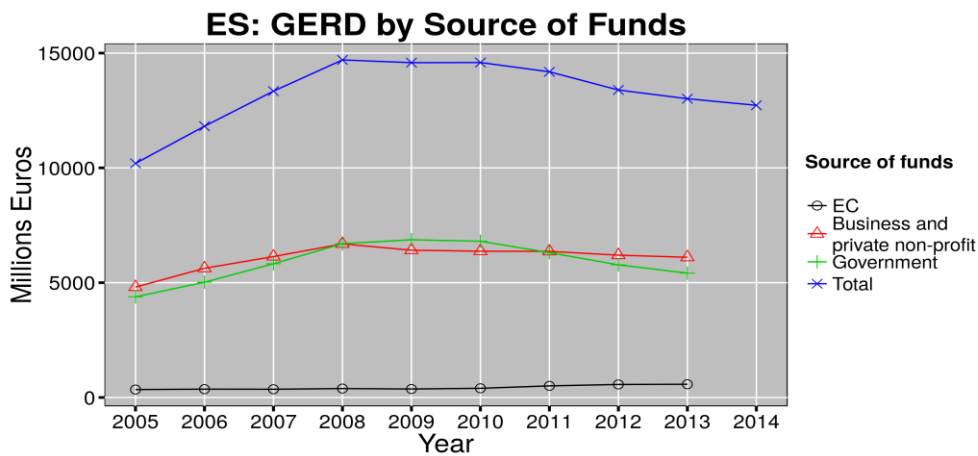


Figure 2. Funding of GERD  
Data source: Eurostat

The governments' and private sector's (i.e. the aggregated funding from business and private non-profit) contributions to the total GERD are the most relevant and are of a comparable nominal level, although the private sector slightly outperformed the government sector as a source of funds for Spanish R&I in 2012 and 2013. The effect of the crisis is apparent because of the negative growth of the overall GERD in Spain from 2009 onwards, and the 2014 levels are comparable to the 2007 levels.

Funding from the European Commission (EC) for Spanish R&D plays a very marginal role, despite the visible increase after 2010.

#### Direct public funding from the government

Direct public funding is usually the main component of the total governmental support to R&D. Figure 3 shows the evolution over time of total R&D appropriations (GBAORD) and the GERD directly funded by the government in millions of euros. The EC contribution, aggregated with the funding provided by the government, is also shown in Figure 3.

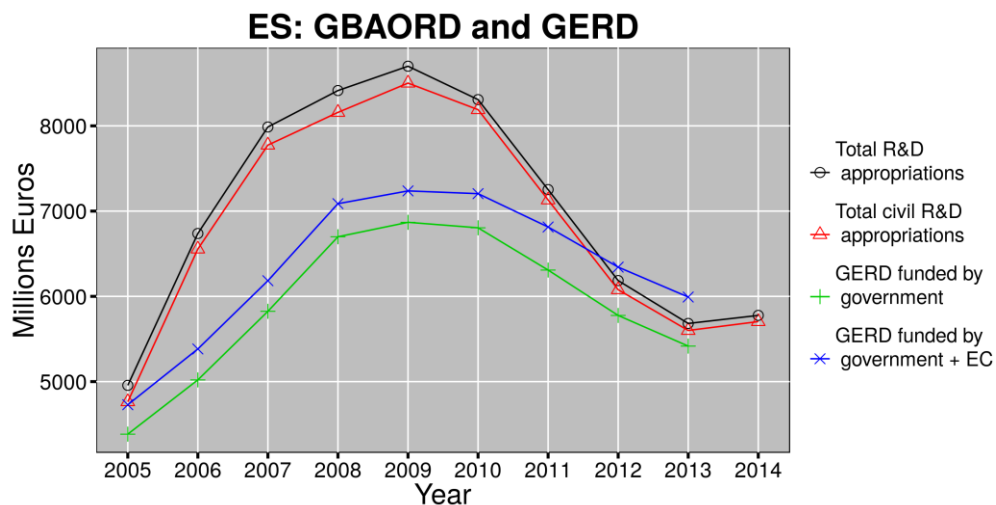


Figure 3. R&D appropriations and government-funded GERD in millions of Euros  
Data source: Eurostat

Both GERD funded by the government and the total (civil) appropriations (GBAORD) exhibit negative growth from 2009 to 2013. Although the total (civil) appropriations

show a small increase in 2014, they are still below the levels of 2006. The military R&D allocations play a marginal role in Spain, as can be seen from the small difference between the total and civil allocations. The gap between the appropriations and funding from the government started to close in 2009. Despite its marginality, the contribution from the EC increased monotonically from 2009.

Finally, if the allocations are expressed as a percentage of the government expenditure, then the decline in GBAORD predates the crisis, since it dates back to 2007. A similar argument applies to the government GERD as a percentage of government expenditure, the decline of which also started before 2009.

As a consequence, the negative trend of GERD and government GBAORD, particularly visible in nominal terms after the crisis, began before the onset of the 2008–2009 financial crisis.

### Direct public funding from abroad

The EC is the most important external public source of R&D funding for Spain. External public funding from other governments and higher education entities, as well as from international organisations, has been marginal, as shown in Table 5.

Table 3. Public funding from abroad for Spanish R&D

| Source from abroad                        | 2005   | 2006   | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   |
|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total (million EUR)                       | 585.74 | 701.43 | 935.52 | 838.10 | 795.97 | 836.64 | 947.49 | 890.19 | 957.89 |
| BES (million EUR)                         | 213.36 | 273.18 | 486.09 | 379.18 | 340.87 | 321.88 | 276.41 | 222.54 | 279.99 |
| EC (million EUR)                          | 345.05 | 362.91 | 358.87 | 388.12 | 368.45 | 400.34 | 505.23 | 567.11 | 575.76 |
| GOV (million EUR)                         | 15.74  | 44.22  | 45.92  | 39.02  | 69.15  | 87.67  | 138.31 | 61.07  | 75.37  |
| HES (million EUR)                         | 4.76   | 3.66   | 3.45   | 4.69   | 6.28   | 4.22   | 7.54   | 8.52   | 9.26   |
| International organisations (million EUR) | 5.40   | 12.82  | 38.08  | 22.84  | 7.07   | 13.16  | 13.92  | 21.55  | 8.51   |
| Total as a percentage of GERD (%)         | 5.74   | 5.94   | 7.01   | 5.7    | 5.46   | 5.73   | 6.68   | 6.65   | 7.36   |
| EC as a percentage of GOVERD (%)          | 7.87   | 7.23   | 6.16   | 5.79   | 5.36   | 5.88   | 8.01   | 9.82   | 10.63  |

Table 5 clearly shows that the percentage of EC funding has monotonically increased since the 2009 minimum. In 2013, it represented almost 11 % of the total GERD funded by the government. As a long-lasting effect of the crisis, we observe that funding from abroad decreased during the 2009–2012 period and only started recovering in 2013.

### Distribution of public funding

Figure 4 shows how the distribution of public funding among the various sectors has evolved over time.

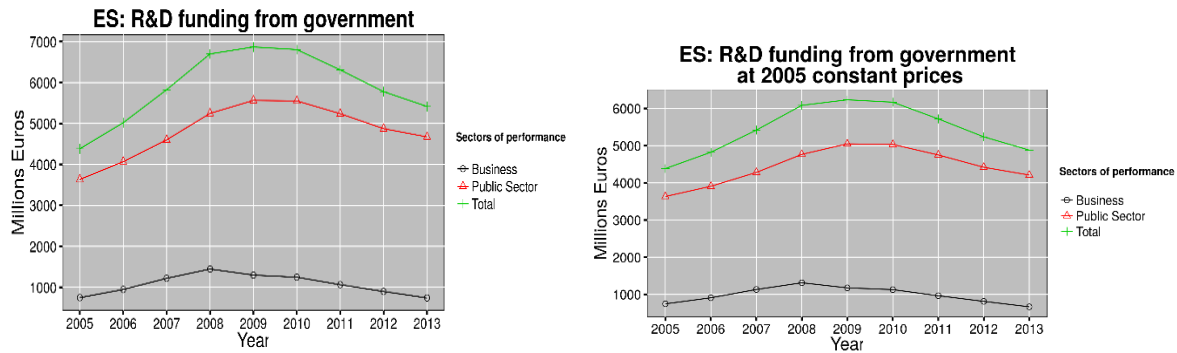


Figure 4. Government intramural expenditure by sectors

Data source: Eurostat

The public sector (GOV and HES) is the main recipient of government-funded GERD, but it is not the only sector affected by the cuts. The private sector was also affected and in 2013 the direct support received by the government was at a level comparable to the level in 2005.

### 3.2.3 Indirect funding – tax incentives and foregone tax revenues

The Spanish system of R&D tax incentives is one of the most generous among OECD countries. It is based on a combination of three different elements (Ministry of Science and Innovation, 2011: 12): (1) tax deductions for R&D and innovation activities (ex ante and ex post); (2) income reductions for transferring intangible assets ('Patent Box'); and (3) social security benefits for full-time R&D personnel. This system was first introduced by Royal Decree-Law 4/2004 and was further developed (recently through Royal Decree 475/2014) and provides a tax incentive to employers for personnel exclusively involved in research-, development- and innovation-related activities. The tax relief consists of a 40 % reduction of social security contributions made by employers to researchers.

Despite its formal generosity, the impact of these R&D tax incentives on funding for the Spanish R&D system remains limited. The evolution of forgone tax revenue (revenue loss) resulting from the R&D tax incentive scheme, as it appears in the Spanish budget, is presented in Table 6.



Table 4. Foregone revenue resulting from R&D fiscal incentives

| Amount (million EUR) | Year | Source                 |
|----------------------|------|------------------------|
| 382.74               | 2008 | MINHAP (budget office) |
| 253.14               | 2009 | MINHAP (budget office) |
| 175.50               | 2010 | MINHAP (budget office) |
| 221.68               | 2011 | MINHAP (budget office) |
| 271.64               | 2012 | MINHAP (budget office) |
| 281.09               | 2013 | MINHAP (budget office) |
| 243.27               | 2014 | MINHAP (budget office) |
| 639.91               | 2015 | MINHAP (budget office) |
| 693.65               | 2016 | MINHAP (budget office) |

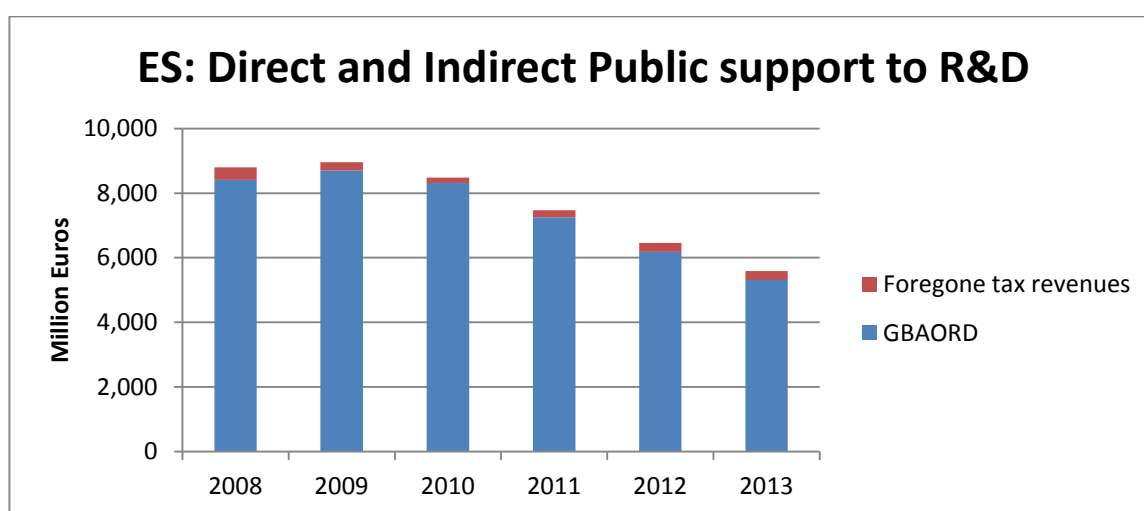


Figure 5. GBAORD and foregone revenue resulting from R&D tax incentives

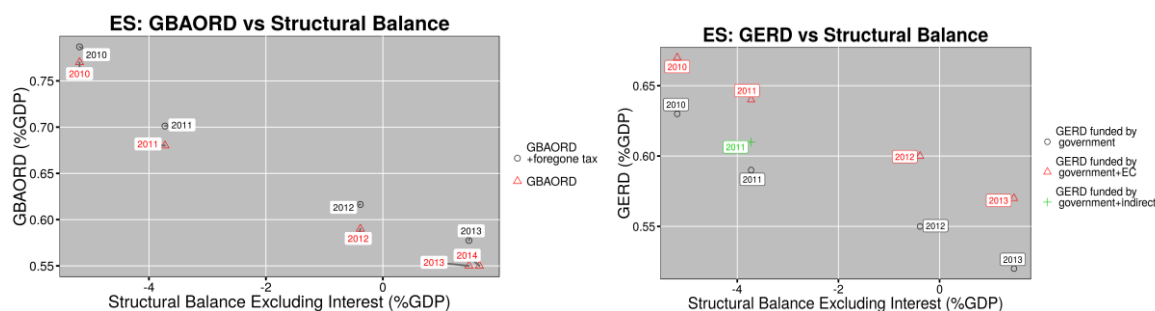
The evolution of the R&D tax incentives, from EUR 243.27 in 2014 to EUR 639.91 million in 2015 and EUR 693.65 million in 2016, can be explained by an 'improvement' of the tax relief regime that involves the possibility for companies to retroactively claim some tax relief that was not implemented in 2014 or 2015.

Tax incentives have increased in recent years, but they are still not sufficiently high to compensate for the cuts in the direct support to R&D before 2013 2013 (see **Error! Reference source not found.**). This conclusion may need to be partially revised if new data (i.e. after 2013) on the Spanish GBAORD become available, especially given the increase of foregone tax revenues in 2014–2015.

### 3.2.4 Fiscal consolidation and R&D

Based on the above discussion, it seems that the Spanish post-crisis fiscal consolidation process has come at the massive expense of public R&D expenditures. Figure 6 shows a scatterplot of the structural balance and a relevant measure of R&D (GBAORD as a percentage of GDP is shown in the left panel and GERD as a percentage of GDP is shown in the right panel).<sup>6</sup>

<sup>6</sup> Structural balance data are from the AMECO database; the other indicators are from Eurostat.



**Figure 6. Fiscal consolidation and R&D**  
Data source: AMECO, Eurostat

The key message from Figure 6 is that post-crisis fiscal consolidation had a significant negative impact on both GBAORD and GERD funded domestically by the government, as they both correlate negatively with the structural balance. Indeed, while the structural balance has progressively shifted to a minor surplus from a large deficit, GBAORD decreased by approximately 0.2 % and government-funded GERD decreased by approximately 0.1 %, both in terms of GDP. This may stem from the severe budget cuts for new projects and temporary contracts,<sup>7</sup> which are primarily reflected in the GBAORD. If EU funding for government-financed GERD is included (GERD and structural balance; see Figure 6), the picture improves only marginally, and there is still a negative correlation with the structural balance consolidation.

Despite the severity of the crisis that hit Spain in 2009, the Spanish economy has shown signs of recovery, particularly since 2012 (i.e. the deficit has decreased and government debt has built up at a slower rate).

On the other hand, direct government expenditure on R&D (i.e. government-funded GERD) has declined monotonically since the onset of the crisis in 2009. The contribution from the EC and indirect public support to R&D, despite having increased in recent years, is still too marginal to compensate for the decline in direct public funding.

During the 2010–2014 period, Spain significantly improved its structural balance, while reducing the proportion of GDP devoted to R&I appropriations and direct funding. For these reasons, notwithstanding the significant progress that has been made with regard to the Spanish economy since 2012, Spain cannot be said to have deployed a policy of smart fiscal consolidation with regard to R&I.

<sup>7</sup> The budget of the Spanish National Research Council decreased by 30 % between 2008 and 2013. It faced severe problems in meeting its financial obligations, which necessitated a financial rescue by the central government in 2012–2013. The recruitment of permanent researchers was reduced to very low levels. At the same time, several grants for temporary researchers were delayed, cut or reduced in scope, which provoked a loss of young researchers. This adds to the problem of the ageing profile of staff at universities and research organisations. A recent report that provided a peer review of the Spanish research and innovation system highlights that the age imbalance may have a significant long-term impact on scientific production. This could in turn affect the overall capacity of the economy to produce knowledge and reverse its downward trend (Source: ERAC, 2014. Available online: [http://www.mineco.gob.es/stfls/mineco/comun/pdf/140801\\_Final\\_report\\_public\\_version.pdf](http://www.mineco.gob.es/stfls/mineco/comun/pdf/140801_Final_report_public_version.pdf))

## 3.3 Funding flows

### 3.3.1 Research funders

MINECO, assisted by SEIDI, is responsible for the design and management of the main R&I funding instruments and the supervision of OPIs (see section 2.1). MINECO allocates 71 % of the public budget for R&D (PGE) for 2015 (EUR 6 406.5 million), MINETUR allocates 24.3 %, the MDEF allocates 2.5 % and MEDU allocates 1.5 %. Other ministries, such as MINHAP (which allocates 0.3 %), allocate percentages that are lower than 1 % (ICONO – MINHAP: 2015).

SEIDI is responsible for allocating research funds and implementing PECTI with the CDTI, but other bodies, such as the ISCIII, also allocate funds. The main managing with regard to the distribution of the provisional budgets of the PECTI working plan, distributed by AGE for 2015 project funding (see Table 1 and Annex 4), are MINECO (53 %), the CDTI (31.7 %), SETSI (7.1 %), the ISCIII (3.7 %), the MECD (2.9 %), INIA (0.5 %) and the FECYT (0.1 %).

The legal framework of the Spanish R&I system is set mainly by the LCTI [4/2011]<sup>8</sup> (see section 2.2). The institutions of AGE (e.g. MINECO) are also bound by the Law on Central Government Budgets (PGE) [22/2013], which sets the regulation for PGE R&I funding; and the General Law on Subsidies [38/2003], which establishes the procedures to grant financial help on a direct and competitive basis, and the rights and obligations of beneficiaries. In addition, the Entrepreneurship and Internationalisation Support Act [14/2013] (see section 2.2) and other legal frameworks for tax incentives complement the Spanish R&I legal framework (see section 3.5.2).

PECTI (2013–2016) clearly states that most of the funds will be distributed through competitive funding mechanisms: 'Public funds will be allocated on competitive bases. The selection of grants will take into account scientific and technical criteria. Additional technological feasibility and commercial value will be also considered supported by international standards. Criteria will follow transparent evaluation processes based on international peer review standards' (PECTI: 4). National programmes will be mainly allocated through competitive processes (PECTI: 14).

The specific call text mandates for granting funds from PECTI across programmes are

**The 'Recognition and promotion of talent and employability' programme:**

ECC/1402/2013, 22 July 2014;

ECC/1820/2014, 26 September 2014;

ECC/2483/2014, 23 December 2014.

**The 'Promotion of excellence' programme:**

ECC/1779/2013, 30 September 2013.

**The 'Business leadership' programme:**

ECC/1333/2015, 2 July 2015.

**The 'Promotion of R&D and innovation towards societal challenges':**

ECC/1780/2013, 30 September 2013. Amended by ECC/2483/2014, 23 December 2014.

Private not-for-profit funding for R&I was 0.2 % of total R&I funding in 2014 (EUR 21.5 million) (Eurostat, 2015). The health discipline accounts for the highest

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<sup>8</sup> The LCTI replaces the previous Law of Science (Law for the encouragement and general coordination of scientific and technical research [13/1986]).

proportion of the R&D funds executed by the PNP sector, with 57.4 % in 2014 (INE-2015). However, it is difficult to identify the main sources of PNP funding for public research performers in Spain. According to some studies on the not-for-profit sector, 36.6 % of the Spanish foundations have the promotion of research among their objectives (INAEF, 2011). Some important foundations that promote R&I activities should be mentioned, such as the BBVA, ONCE, Telefónica and the Ramón Areces foundation. However, it is not possible to identify the proportion of total R&D funding that these institutions represent because of the anonymous character of R&I surveys and the lack of more systematic studies of the sector.

### 3.3.2 Funding sources and funding flows

The distribution of GERD by funding sources and sectors of performance indicates that the BES and HES rely mainly on their own sources of funding (see Table 7). 'Own funds' represents the main funding source of GERD in Spain, and was 64.3 % in 2014. Public government funding provided 21.3 % of total GERD in 2014. Funds from abroad represented 7.7 % of GERD in 2014, while private sources funded a similar percentage (7 %) of GERD in 2013. PNP and universities provided a small proportion of funding for research, with percentages lower than 1 % in the same year.

The distribution of public funding across administrative levels showed that the national government provided 58.2 % of public funding in 2014 (excluding 'own funds'), followed by regional governments (30.8 %) (see Table 7). Local authorities represented a small source of funds (1 %). Public funding allocated to the private sector represented the remaining 10 %.

Funding from abroad came mainly from EU programmes: 56.6 % of funding from abroad in 2014 was from EU programmes.

National funding decreased by 5.5 % between 2013 and 2014. Similarly, funding from abroad decreased by 0.8 % over the same period. Funding from EU programmes decreased over the last year by 6.6 %, while other funding from abroad from other sources increased by 7.9 %.

Because of the lack of regional breakdowns in national aggregates, the data in Table 7 might not provide an accurate picture with regard to the role of regions in public R&I investments. Regions represent an important part of Spanish public R&I investments. It is estimated that regions represent 60 % of GBAORD (ERAC, 2014).<sup>9</sup>

The distribution of the Spanish GBAORD by thematic social economic objectives<sup>10</sup> shows that, in 2013, more than 50.7 % of funds could be considered generic, while 47.8 % could be directly assigned to specific technological or scientific areas. With regard to thematic R&D priorities in 2013, the most important ones are 'Health', with 32.4 % of the funds being assigned to specific technological or scientific areas, and 'Industrial production and technology' (IPT) with 14.2 % of funds being assigned to this area, followed by 'Agriculture' (13.8 % of funds). If the last two years are compared with regard to funding distribution, an increase in Spain's participation in 'Health' and 'Agriculture' is apparent. According to the provisional budget for R&I distributed by the State Secretary of Research Development and Innovation for 2015, the state programme 'Promotion of R&I towards societal challenges' will distribute EUR 1 479.2 million of funds (19.7 % lower than the budget distributed by this programme in 2014) (MINECO, 2015).

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<sup>9</sup> The public budget for R&D (PGE) for 2014 (EUR 6 146.1 million) indicates that regions received 31.2 % of this budget (ICONO-MINHAP: 2015). R&I PGE for 2015 do not disclose information across regions.

<sup>10</sup> Information provided to the ERAC Panel for 2012. GBAORD is probably the most comprehensive approach for analysing the thematic priority setting of the Spanish policies for R&D and innovation. See ERAWATCH (2011) for different alternatives for analysing the thematic focus and the advantages and disadvantages.

Table 5. GERD by funding sources and sectors of performance, 2013–2014

| FUNDING SOURCES                          | 2013             | 2014           |                |                |              |                 |                | Average growth change |
|--|------------------|----------------|----------------|----------------|--------------|-----------------|----------------|-----------------------|
|  | Total            | BES            | GOV            | HES            | PNP          | Total           | %              |                       |
| <b>Non-abroad funding</b>                | <b>12 007.20</b> | <b>5 729.5</b> | <b>2 184.2</b> | <b>3 408.6</b> | <b>20.9</b>  | <b>11 343.2</b> | <b>92.3 %</b>  | <b>-5.5 %</b>         |
| <b>Own funds (including GUF for HES)</b> | <b>7 845.20</b>  | <b>5 091.5</b> | <b>333.8</b>   | <b>2 474.0</b> | <b>5.5</b>   | <b>7 904.7</b>  | <b>64.3 %</b>  | <b>0.8 %</b>          |
| Own funds                                |                  |                |                | 514.8          |              |                 |                |                       |
| General university funding (GUF)         |                  |                |                | 1 959.2        |              |                 |                |                       |
| <b>Public funding (GOV)</b>              | <b>3 158.20</b>  | <b>262.6</b>   | <b>1 668.9</b> | <b>677.8</b>   | <b>3.8</b>   | <b>2 613.1</b>  | <b>21.3 %</b>  | <b>-17.3 %</b>        |
| National                                 | 1 551.00         |                | <b>1 145.8</b> | 373.8          | 1.1          | 1 520.8         | 58.2 %         | -1.9 %                |
| Regional                                 | 845.5            |                | <b>511.5</b>   | 290.3          | 2.0          | 803.8           | 30.8 %         | -4.9 %                |
| Local                                    | 21.5             |                | <b>11.6</b>    | 13.7           | 0.6          | 25.9            | 1.0 %          | 20.6 %                |
| <b>Private funding (BES)</b>             | <b>944.9</b>     | <b>494.5</b>   | <b>139.8</b>   | <b>214.4</b>   | <b>9.7</b>   | <b>858.4</b>    | <b>7.0 %</b>   | <b>-9.2 %</b>         |
| <b>University funding (HES)</b>          | <b>20</b>        | <b>2.4</b>     | <b>8.4</b>     | <b>6.3</b>     | <b>0.1</b>   | <b>17.2</b>     | <b>0.1 %</b>   | <b>-14.1 %</b>        |
| <b>PNP</b>                               | <b>38.8</b>      | <b>9.7</b>     | <b>33.3</b>    | <b>36.1</b>    | <b>1.9</b>   | <b>81.0</b>     | <b>0.7 %</b>   | <b>108.6 %</b>        |
| <b>Funding from abroad</b>               | <b>957.9</b>     | <b>527.4</b>   | <b>224.5</b>   | <b>197.6</b>   | <b>0.6</b>   | <b>950.2</b>    | <b>7.7 %</b>   | <b>-0.8 %</b>         |
| EU programmes                            | 575.8            | 227.9          | 148.1          | 161.6          | 0.3          | 537.9           | 56.6 %         | -6.6 %                |
| Other funds from abroad                  | 382.1            | 299.5          | 76.4           | 35.9           | 0.4          | 412.3           | 43.4 %         | 7.9 %                 |
| <b>Total R&amp;D funding</b>             | <b>13 011.80</b> | <b>6 256.9</b> | <b>2 408.7</b> | <b>3 606.2</b> | <b>21.6</b>  | <b>12 293.4</b> | <b>100.0 %</b> | <b>-5.5 %</b>         |
| <b>%</b>                                 | <b>100.00 %</b>  | <b>50.9 %</b>  | <b>19.6 %</b>  | <b>29.3 %</b>  | <b>0.2 %</b> |                 |                |                       |

Source: Own calculations based on data from INE (2015).

Data for the period 2007–2012 indicate that European funds (Structural Funds and FP research funds) represent 19.6 % of public funding, with Structural Funds representing 12 % (ERAC, 2014: 21). The same sources indicate that the proportion of Structural Funds in Spain is very low (20 %, which is higher than only the proportion of Structural Funds allocated to Greece) and that the Structural Funds for R&D are heavily concentrated in less well-developed regions: Andalucía has the highest proportion of these funds (39 %), followed by Galicia (19 %) (ERAC, 2014: 59).

Funding for the private sector relies heavily on the 'own sources' of this sector. In 2014, the main sources of BERD were 'own funds' (EUR 5 091 million, which represents 81 % of the total) (see Table 7), government funding (4.2 %), other funds from other companies (7.8 %) and funds from abroad (8.4 %). Private funding from universities and PNP play a minor role in funding private R&D, with percentages lower than 1 %. Funds from abroad for private R&D (EUR 527.4 million) were not mainly from EU programmes; with regard to funds from abroad for private R&D in 2014, 56.8 % of funding was from 'other' foreign funds, while 43.2 % of funding was from European programmes. Spain was the second largest recipient of foreign direct investment (FDI) in 2014 (UNCTAD, 2015), but no information on R&I FDI appears to be available (see section 5.5).

## 3.4 Public funding for public R&I

### 3.4.1 Project vs. institutional allocation of public funding

The allocation of project funding through competitive funding mechanisms has been encouraged in Spain in previous years through the LCTI and PECTI. LCTI 2011 simplifies the allocation of competitive funding for R&I by giving the responsibility for the allocation of funds to two main bodies, the new research agency (to be created) and the existing CDTI. PECTI (2013–2016) clearly states that most of the funds will be distributed through competitive funding mechanisms. The legal framework for the allocation of institutional funding has remained quite stable over recent years and it is generally allocated through the form of non-competitively allocated block funding

The distribution of institutional funding is different between universities and PROs. Regions became responsible for university funding in 1995 and applied different mechanisms of distribution of institutional funding that are mainly based on the number of students and teachers, and other related criteria (see section 2.4.2). It is assumed that university academic personnel devote 66 % of their time to teaching and 33 % to research activities. Therefore, one-third of their salaries can be considered as institutional R&D funding. The state and regions provide little or no institutional funding for research (block funding), so the rest of the research funds come mainly from regional, national and international programmes based on project funding. This project funding is generally distributed through public tendering that is oriented to broad thematic fields. The proportion of GUF over all higher education institutions (HEIs) increased during the period 2011–2013, from 49.8 % in 2011 to 54.3 % in 2014. The institutional funding for PROs is mainly channelled through the state budget (PGE) by MINECO, although other ministries also distribute R&D funds for PROs (e.g. the MDEF channels funds for INTA).

Funding in 2014 for PROs was EUR 1 258 million (1.8 % higher than in 2013), which is 20.5 % of the total government public budget (PGE) (Molero and de Nó, 2014c). A substantial part of PRO funding is used for salaries (53.9 %), operational costs (19.2 %) and investments (24.1 %), while 'operational transfers' – which are mainly used for research – accounted for only 1.2 % of the received institutional funding in 2014 (Molero and de Nó, 2014c).<sup>11</sup> Although R&I funding for OPIs increased last year (by 1.9 %), total R&I funding for OPIs declined by 6 % between 2012 and 2014 (and has decreased by 15.9 % since 2010) (Molero and de Nó, 2014c). The percentage of funds used for each budget item (i.e. salaries, operational costs, investments and operational transfers) changed during the period 2012–2014: the proportion of funds used for salaries increased (from 50 % in 2012 to 53.9 % in 2014) at the expense of the other budget lines (the proportion of funds used decreased from 19.9 % in 2012 to 19.2 % in 2014 for operational costs; from 26.4 % in 2012 to 24.1 % in 2014 for investments; and from 2.2 % in 2012 to 1.2 % in 2014 for operational transfer) (Molero and de Nó, 2014c).<sup>12</sup>

Project funding has gained importance within the Spanish R&I system,<sup>13</sup> but the financial crisis and the reduction of the public budget for R&D has severely affected this

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<sup>11</sup> Based on PGE data allocated to the CSIS, which represented 47.7 % of total budget for PROs (OPIs) in 2014. Own calculations. For 'Operational transfers' (or *transferencias corrientes*), refer to Chapter 4.

<sup>12</sup> The proportion of operational costs fell from 19.9 % in 2012 to 19.2 % in 2014; investments fell from 26.4 % in 2012 to 24.1 %; and operational transfers fell from 2.2 % in 2014 to 1.2 % in 2014 (Molero and de Nó, 2014c).

<sup>13</sup> In 1989, this form of support accounted for 30 % of the R&D-related state budget, while at the beginning of this century, this percentage was approximately 23 % of all funds (Sanz, 2005). A more recent study on public research centres (OPIs and technology centres) from 2002 to 2007 (Castro et al., 2012) indicates that institutional funding represents about 71 % of their funding, while competitive funding represents a percentage of between 24 % and 34 %, although there is a high diversity in their funding portfolio. Competitive funding appears to have slightly increased,

funding scheme. Figures on the proportion of competitive versus institutional public funding for R&D are not usually publicly available. However, data provided to the ERAC panel show that competitive funding (grants and fellowships) from the state budget for R&D decreased by 62 % between 2008 and 2013 (ERAC, 2014: 20). Because of the more fixed character of institutional funding, state R&D cuts appear to have particularly affected funds allocated in a competitive funding mode. The approximate proportion of competitive funding decreased from 52.1 % in 2011 to 36.9 % in 2013.<sup>14</sup> In addition, several policy measures have tried to increase the competitiveness of the R&D system, for example the 'Severo Ochoa and María de Maeztu centres and units of excellence',<sup>15</sup> which promotes excellence in scientific research by recognising and granting performance-based funding to outstanding research institutions (see below section 3.4.3).

The AEI might play an important role in the future allocation of project funding because it will be in charge of the funding and evaluation of R&D funding. With approximately 300 personnel, the AEI aims to manage the calls in a more flexible and autonomous way. It aims to provide a more reliable implementation time frame on R&D calls, as its budget and objectives will be set on a multiannual basis (MINECO press release 27.11.2015). However, the AEI was created without increasing public budgets, which might undermine the effectiveness of its objectives.

### 3.4.2 Institutional funding

As mentioned in section 3.4.1, the allocation of institutional funding in Spain is generally in the form of block funding. Research institutions do not receive a variable/competitively allocated institutional funding. The allocation of institutional funding is different between universities and PROs. Since regions (*comunidades autónomas*) became responsible for university funding in 1995, they have applied different variations of mechanisms for the distribution of institutional funding, which are mainly based on the number of students, personnel and other related criteria. From 1987 to 1993, allocation of university funding followed an 'incremental' criterion, based on previous year expenditures and changes in teaching and administrative personnel (*Personal Docente Investigador* (PDI) and *Personal de Administración y Servicios* (PAS)). From 1994, the *Modelo 92* based on the unitary cost of personnel in relation to the number of students was applied (Puerto Cela, 1994). Since 1995, regions have applied different versions of these mechanisms (Pérez Esparrells and Utrilla de la Hoz, 2008). The allocation of institutional funding to PROs does not seem to be based on an efficient and transparent mechanism. For example, despite the continuous improvement of its research performance, the CSIC suffered a budgetary crisis in 2013.<sup>16</sup>

Evaluation mechanisms for the allocation of institutional funding do not generally consider criteria related to research performance. Therefore, it is possible that these are not applied in an efficient, transparent and regulated manner (see section 2.2.1).

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although the great diversity in funding makes it difficult to estimate whether this variation is significant (Castro et al., 2012).

<sup>14</sup> Own calculations from ERAC (2014) report figures. The proportion of competitive funding was calculated using the figures for competitive funding (grants and fellowships) against a total (EUR 1 333 million in 2013) that includes 'Current transfers (OPIS)', 'Fees and current transfers (international infrastructures)', and 'Scientific and Technological Infrastructures (ICTs)'. This total does not include the least important in budget lines 'Non competitive funding and awards' and 'others' as they were not available in the ERAC (2014) report. Therefore, the proportion shown is approximated.

<sup>15</sup> Named 'Severo Ochoa centres and units of excellence' in the previous working plan.

<sup>16</sup> Since 2010, the CSIC has suffered large budget cuts from the government, resulting in a total reduction of approximately EUR 500 million. The yearly reductions ended up in a budget crisis in 2013. The CSIC is Spain's largest scientific organisation with about 15,000 employees and one of the most important research performers in the country, with about 20 % of the national scientific production (see country report for 2013 EW, 2014b).

Among other factors, this might be because of the limited strategic policy planning and evaluation culture (EECTI, 2013; ERAC, 2014), dominated by its accountability functions, instead of the learning and distributive ones (Molas-Gallart, 2012).

### 3.4.3 Project funding

The main programmes for allocation of project funding at national level are included in the national plan (PECTI 2013–2016) and distributed across programmes and sub-programmes. Table 8 shows the distribution of total funds and percentages for 2014 and 2015 across the main instruments (programmes and sub-programmes) of the current national policy framework set out by the current PECTI (2013–2016) and distributed by AGE. Data for 2014 and 2015 should be treated with caution as they have been taken from the PECTI (2013–2016) working plan; they are, therefore, estimates based on provisional budgets.

Table 8 indicates that total funds decreased by 8.8 % between 2015 and 2014. Funding for the 'Promotion of excellence' programme increased by 76.6 % over the same period. However, funding for the other programmes decreased: by 19.7 % for the 'Promotion of R&I towards societal challenges'; by 12.1 % for the 'Recognition and promotion of talent and employability' programme, and by 0.8 % for the 'Business and leadership' programme. Within programmes, the instruments that decreased most significantly between 2014 and 2015 were the 'Strategic action digital economy and society', by 63.8 %, and the 'Sub-programme of employability', by 24.3 %. By contrast, the 'Sub-programme of collaborative R&D and innovation' showed the highest increment over the same period (20 %).

Table 6. Distribution of total budget and percentages across instruments of PECTI (2013–2016) in 2014 and 2015 by AGE

| Instruments  | 2014 total (million EUR) | %             | 2015 total (million EUR) | %             | Average change 2014–2015 |
|--|--------------------------|---------------|--------------------------|---------------|--------------------------|
| Recognition and promotion of talent and employability programme        | 442.5                    | 14.4 %        | 389.0                    | 13.9 %        | -12.1 %                  |
| Sub-programme of 'Education and training'                              | 172.0                    | 5.6 %         | 180.3                    | 6.4 %         | 4.8 %                    |
| Sub-programme of 'Employability'                                       | 255.2                    | 8.3 %         | 193.2                    | 6.9 %         | -24.3 %                  |
| Sub-programme of 'Mobility'  | 15.3                     | 0.5 %         | 15.5                     | 0.6 %         | 1.1 %                    |
| <b>Promotion of excellence programme</b>                               | <b>197.0</b>             | <b>6.4 %</b>  | <b>347.8</b>             | <b>12.4 %</b> | <b>76.6 %</b>            |
| Sub-programme for knowledge generation                                 | 133.8                    | 4.3 %         | 139.1                    | 5.0 %         | 3.9 %                    |
| Sub-programme of Institutional strengthening                           | 63.3                     | 2.1 %         | 58.8                     | 2.1 %         | -7.2 %                   |
| Sub-programme for 'Scientific and technological infrastructures'       | 0.0                      | 0.0 %         | 150.0                    | 5.3 %         |                          |
| <b>Business leadership programme</b>                                   | <b>596.0</b>             | <b>19.4 %</b> | <b>591.0</b>             | <b>21.1 %</b> | <b>-0.8 %</b>            |
| Sub-programme for 'Business R&D and Innovation'                        | 345.1                    | 11.2 %        | 331.0                    | 11.8 %        | -4.1 %                   |
| Sub-programme of 'Enabling technologies'                               | 126.0                    | 4.1 %         | 110.0                    | 3.9 %         | -12.7 %                  |
| Sub-programme of 'Collaborative business R&D and innovation'           | 125.0                    | 4.1 %         | 150.0                    | 5.3 %         | 20.0 %                   |
| <b>Promotion of R&amp;D and innovation towards societal challenges</b> | <b>1 842.5</b>           | <b>59.9 %</b> | <b>1 479.2</b>           | <b>52.7 %</b> | <b>-19.7 %</b>           |
| Challenges and actions   | 1 194.6                  | 38.8 %        | 1174.5                   | 41.8 %        | -1.7 %                   |
| Strategic action in health   | 96.0                     | 3.1 %         | 104.6                    | 3.7 %         | 9.0 %                    |
| Strategic action digital economy and society                           | 552.0                    | 17.9 %        | 200.0                    | 7.1 %         | -63.8 %                  |



|              |                |                |                |                |               |
|--------------|----------------|----------------|----------------|----------------|---------------|
| <b>TOTAL</b> | <b>3 078.1</b> | <b>100.0 %</b> | <b>2 807.0</b> | <b>100.0 %</b> | <b>-8.8 %</b> |
|--------------|----------------|----------------|----------------|----------------|---------------|

Source: own calculations based on MINECO working plan 2014 and 2015.

The main instruments (i.e. those that received more than 1 % of the total budget) and the budget distribution percentages across programmes and sub-programmes for 2015 are outlined below (also see Annex 4 for more details):

**(1) Recognition and promotion of talent and employability programme (13.9 %):**

(1.1) Sub-programme of 'Education and training' (6.4 %):

- The 'Doctoral training programme' received EUR 94.4 million of funding (for 1 022 grants), which represents 3.4 % of the total budget. It provides university students four years of financial support so they can obtain a PhD degree. It is managed by MINECO.
- University doctoral training (FPU) received EUR 65.8 million of funding (for 800 grants), which represents 2.3 % of the total budget. It provides university students four years of financial support so they can obtain a PhD Degree. It is managed by the MECD.

(1.2) Sub-programme of 'Employability' (6.9 %):

- The 'Ramón y Cajal' programme received EUR 54 million of funding (for 175 grants), which represents 1.9 % of the total budget. It provides outstanding researchers with less than 10 years of career experience five years of financial support so they can start a tenure-track research position in a Spanish Institution.
- Emplea loans and grants for hiring R&D managers in companies received EUR 101.5 million of funding, which represents 3.6 % of total budget. It offers financial support to companies and other R&I-related institutions so they can hire R&I technicians for a period of between one and three years. It is managed by MINECO.

(1.3) Sub-programme of 'Mobility' (0.6 %).

**(2) Promotion of excellence programme (12.4 %):**

(2.1) Sub-programme of 'Knowledge generation' (5%):

- R&D projects received EUR 125.5 million of funding, which represents 4.5 % of the total budget. It provides research groups financial support to carry out R&D projects of three to four years. It is managed by MINECO.

**(2.2) Sub-programme of 'Institutional strengthening' (2.1%):**

- The 'Severo Ochoa centres of excellence' and the 'María de Maeztu units of excellence' received EUR 52 million of funding, which represents 1.9 % of the total budget. These funds provide grants based on research performance to outstanding research institutions and research groups so they can implement research strategic plans. This funding is managed by MINECO.

**(2.3) Sub-programme for 'Scientific and technological infrastructures' (5.3%):**

- Grants for the acquisition of R&D equipment amounted to EUR 150 million, which represents 5.3 % of the total budget. This provides public universities and public research centres funding to acquire and maintain scientific infrastructures. It is managed by MINECO.

**(3) Business leadership programme (21.1 %) (see section 3.5.1 on public funding for private R&I for more details):**

(3.1) Sub-programme for 'Business R&I' (11.8 %);

(3.2) Sub-programme of 'Enabling technologies' (3.9 %);

(3.3) Sub-programme of 'Collaborative business R&I' (5.3 %).

#### **(4) Promotion of R&I towards societal challenges (52.7 %):**

##### (4.1) Challenges and actions (41.8 %):

- 'Collaboration Challenges' R&I projects received EUR 573.9 million of funding, which represents 20.4 % of the total budget. This offers companies, universities, research centres, and other research and technology centres grants and loans for experimental development projects that are performed in collaboration in order to address societal challenges. It is managed by MINECO.
- Research Challenges' R&I projects are led by public sector research groups and received EUR 243.9 million of funding, which represents 8.7 % of the total budget. This funding provides public research centres and PNP research organisations financial support so they can develop research projects, of three to four years, that aim to address societal challenges. This funding is managed by MINECO.
- 'Firm Challenges' (see section 3.5.1 for R&I more details).
- 'FEDER interconnection' (See next section 3.5.1 for R&I more details).
- 'CDTI innovation direct line' (See next section 3.5.1 for R&I more details).

##### (4.2) Strategic action in health (3.7 %).

##### (4.3) Strategic action digital economy and society (7.1%).

The allocation of competitive funds usually follows a peer-evaluation process, but they normally involve domestic experts. International peer evaluation is less frequent. EECTI (2013–2020) includes the international evaluation of competitive funding as one of its five basic principles (principle number 3). In addition, one of its six articulation mechanisms (number 5) considers the 'harmonisation of criteria and practices of evaluation – ex ante and ex post', including international peer-review standards. PECTI (2013–2016), as it implements EECTI, also aims to increase the role of competitive funding and 'international peer review'. It states that most of the funds will be allocated through competitive mechanisms. The role of 'international peer review' is specifically mentioned in several programmes (e.g. 'Basic R&D', 'Human Resources for R&D' and 'Research Infrastructures'). For some important programmes (e.g. 'Promotion of R&I towards societal challenges'), researchers have to submit a summary in English and can choose to submit the proposal either in Spanish or in English. Some more internationally oriented specific sub-calls have to be submitted in English (e.g. within the previous working programme, the sub-call 'International Joint Programming Actions' had to be submitted in English). Success rates are not generally publicly available for most of these funding instruments. However, the CDTI reviews some of its funding programmes, including their success rates (see next section 3.5). Individual grants represented about 13.9 % of the total PECTI budget in 2015, as most of the calls included in the 'Recognition and promotion of talent and employability' programme are granted to individuals.

Considering the peer-review system, the 'Severo Ochoa' and 'María de Maeztu' sub-programme is also worth mentioning, as it supports excellent research centres and groups. This sub-programme was launched in 2011 within the framework of the Spanish National Plan for R&D and Innovation (NP) 2008–2011. It is aimed at existing centres and units that perform cutting-edge basic research and are among the world's best in their particular areas. The impact and international scientific leadership of these centres and units is essential for their recognition. Accreditation as a 'Severo Ochoa Centre of Excellence' or a 'María de Maeztu Unit of Excellence' is valid for four years and includes a grant of EUR 1 million per year during this period. This programme involves international peers and international evaluation panels.

### 3.4.4 Other allocation mechanisms

Contract research for governmental organisations is managed independently by each organisation according to a common regulation (Law of Public Administration Tendering RD 1098/2001 modified by RC 773/2015). The Platform of Public Tendering does not disclose information across R&D types of contract research. The Observatory of Public Tendering estimates that public tendering represents 18.5 % of GDP. However, it does not offer information on public tendering for R&I.

## 3.5 Public funding for private R&I

### 3.5.1 Direct funding for private R&I

The main programmes for the allocation of funding for private R&I at the national level are included in the national plan (PECTI 2013–2016) and are managed by CDTI. In addition, regional authorities implement regional strategies for innovation and direct funding for innovation.

The CDTI mission is to increase the competitiveness of Spanish companies by increasing its technological capacity. Its activities focus on (1) managing and financing research and technology development projects for companies; (2) managing and encouraging the participation of Spanish institutions in programmes of international cooperation; (3) encouraging technology transfer and public–private collaboration at national and international levels; and (4) supporting the creation and consolidation of technology-based enterprises (TBEs) (CDTI, 2014a).

The programmes managed by the CDTI function well from a policy-making perspective. CDTI programmes set priorities; respond to societal challenges (see below for details on the specific instruments that address societal challenges); include selection criteria; report results regularly including their impact on target groups (e.g. CDTI, 2014a); carry out evaluations (e.g. 'Cuadernos'; CDTI, 2014b); and publish other relevant private R&D studies that show financial additionalities of CDTI loans (e.g. Huergo et al., 2009; CDTI, 2014b).

The main national public programmes aimed at stimulating R&I in the private sector are included in the 'Business leadership' programme (21.1 % of the total provisional budget in 2015) and in the 'Promotion of R&I towards societal challenges' programme (11 % of the total budget managed by the CDTI or 52.7 % of the total budget for this programme). The distribution of percentages across programmes, sub-programmes and instruments (that are higher than 1 % of total provisional budget) for private R&I according to the provisional budget to be distributed by AGE in 2015 are outlined below (see Annex 4 for more detail):

#### **1) Business leadership programme (21.1 %):**

##### (1.1) Sub-programme for 'Business R&I' (11.8%):

- R&I projects received EUR 183 million of funding (for 375 projects), which represents 6.5 % of the total budget. This funding offers companies and consortia loans for industrial R&D projects of three years. It is managed by CDTI.
- 'CDTI innovation direct line' technology innovation projects received EUR 104 million of funding (for 210 projects), which represents 3.7 % of the total budget. This funding can provide loans to companies for development technology projects of 1.5 years. It is managed by CDTI.

##### (1.2) Sub-programme of 'Enabling technologies' (3.9 %):

- CDTI R&I projects received EUR 81 million (for 160 projects), which represents 2.9 % of the total budget. This funding provides loans to companies and consortia for applied technology projects of one to three years. It is managed by CDTI.

- CDTI innovation direct line funds innovation technology projects with EUR 29 million (for 60 projects), which represents 1 % of the total budget. This funding provides loans to companies for technology development projects of 1.5 years. It is managed by CDTI.

(1.3) Sub-programme of 'Collaborative business R&I' (5.3 %):

- 'CIEN' strategic private consortia for innovation received EUR 150 million of funding (for 21 projects), which represents 5.3 % of the total budget. This funding provides loans to companies and consortia for large-scale industrial research and technology development projects lasting three to four years. It is managed by CDTI.

## **(2) Promotion of R&I towards societal challenges (52.7 %):**

(2.1) Societal challenges and actions (instruments) (41.8 %):

- 'Firm Challenges' are R&I projects that received EUR 141 million of funding (for 284 projects), which represents 5 % of the total budget. This funding provides loans to companies and private consortia (AIE) for applied projects of one to three years that aim to address societal challenges. It is managed by CDTI.
- 'FEDER interconnection' received EUR 110 million of funding (for 58 projects), represents 3.9 % of the total budget. This funding provides financial support to private consortia (of two to six companies) in FEDER regions to develop experimental projects that aim to address societal challenges. It is managed by CDTI.
- 'CDTI innovation direct line' Firm Challenges received EUR 57 million of funding (for 100 projects), which represents 2 % of the total budget. This funding offers companies loans for technology development projects of 1.5 years so they can gain competitive advantages. It is managed by CDTI.

CDTI funding instruments, excluding FEDER Interconecta projects, NEOTEC and innovation line, provide loans at a fix interest rate (Euribor + 0.1 %) that are partially refundable up to a maximum of 20 % of CDTI support depending on the characteristics of the project and the company.<sup>17</sup>

Funding streams cover the entire value creation chain from fundamental research to market innovation, but these are distributed by different programmes (e.g. R&I projects and CDTI projects, respectively).

Different programmes require and stimulate public-private cooperation. These are:

- 'CIEN' strategic private consortia for innovation which requires the participation of between three and eight companies and at least one SME, and the collaboration with research centres for at least 15 % of the project;
- 'Collaboration Challenges. R&I projects' which require consortia of research centres and companies (at least 60 % of private participation);
- 'Firm Challenges. R&I projects' for businesses that contract research collaboration with public research centres. Therefore, innovative financing solutions, such as public-private partnerships, are implemented. Other innovative financing solutions include funding for projects that have been positively reviewed in EC programmes but not granted (e.g. PYME horizon), indicating that Spain complements EU R&I programmes with a focus on SMEs.

Measures to reduce the uncertainty of participation by private entities were taken, but these might have been at the cost of increasing the administrative burden to participation of private entities. In 2003, the national government introduced the 'Informes Motivados', which aims to reduce the uncertainty of private entities with

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<sup>17</sup> This criterion is periodically adapted to provide better access to companies.

regard to applying for national R&I support (Royal Decree 1432/2003). Through these reports, private entities get ex ante recognition from the national administration of the tax deductions that they are entitled to for carrying out nationally funded R&I projects. In 2007, Royal Decree 2/2007 modified this regulation, granting the CDTI the right to provide these documents. Since 2015, an 'Informe Motivado' can be obtained through an online procedure. The 'Informes Motivados' are a safe guard for companies, ensuring that they will receive a tax deduction for R&I projects, but they also imply an administrative burden to participation (see section 5.4). Funding support increasingly aims to tailor to the needs of companies, including SMEs. For example, the 'PYME Horizon programme' was launched in 2015 to target SMEs (see section 3.6).

Funding schemes for companies are regularly reviewed (e.g. 'Cuadernos'; CDTI, 2014b). Benchmarking exercises might exist, but there are no publicly available programmes that are recognised to have been benchmarked against comparable schemes in other countries.

### **3.5.2 Public Procurement of Innovative solutions**

According to the Spanish Observatory of Public Procurement, public procurement represents about 18.5 % of Spanish GDP<sup>18</sup> – or, in other words, EUR 194 billion a year.<sup>19</sup>

#### Legal public procurement framework

Existing regulation in Spain in the area of public procurement stems from Directive 2004/18/EC and Directive 2004/17/EC. In particular, and after the transposition of both directives, the fundamental rules in the area of public procurement in Spain at present are the Spanish 'Law on Public Sector Contracts'<sup>20</sup>, a consolidated text adopted by Royal Legislative Decree 3/2011 of 14 November (referred to as 'TRLCSP'), and, in the water, energy, transport and postal service sectors, Law 31/2007 of 30 October, regulating the procurement procedures in these sectors, which are referred to by this law as 'special sectors'. Finally, Law 24/2011 of 1 August 2011 regulates the public sector contracts in the fields of defence and security.

A number of laws emanating from some of the autonomous communities also need to be taken into account, for example Law 3/2011, of 24 February, on measures regarding 'Public Sector Contracts of Aragon, and Navarra' Law 6/2006, of 9 June, on Navarra public contracts.<sup>21</sup>

#### The PCP/PPI landscape in Spain

Public demand-driven innovation is one of the key pillars of Spain's renewed National Plan for R&D and Innovation.<sup>22</sup> This encompasses both an R&D procurement phase based on PCP and a phase of procuring innovative solutions ready for market deployment based on 'forward commitment procurement'. It also foresees the development of a financial support mechanism governed by a central government body, namely the CDTI, that encourages public procurers to undertake such procurements.

Public procurement of innovative goods and services has been increasingly encouraged in Spain. The Spanish legal framework differentiates two complementary mechanisms for

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<sup>18</sup> <http://www.obcp.es>

<sup>19</sup> Comisión Nacional de los Mercados y Competencia, *Pro/cnmc/001/15: analysis of public procurement in Spain: opportunities for improvement from the perspective of competition*, p. 3. The same document states that the evaluation of public procurement as 18.5 % of GDP may be an underestimate mainly because it does not include public procurement other than by contracting, such as in-house providing and agreements.

<sup>20</sup> [http://europa.eu/rapid/press-release\\_IP-11-430\\_en.htm?locale=en](http://europa.eu/rapid/press-release_IP-11-430_en.htm?locale=en)

<sup>21</sup> <http://www.iclg.co.uk/practice-areas/public-procurement/public-procurement-2014/spain>

<sup>22</sup> <http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vgnnextoid=83b192b9036c2210VgnVCM1000001d04140aRCRD>

'Pre-commercial Procurement' and 'Public Procurement for Innovation',<sup>23</sup> as described below:

- Pre-commercial Procurement (*Compra Pública Precomercial*): this modality aims to provide the conditions for procurement of R&D to tackle issues defined by a public actor;
- Innovative Public Technology Procurement (*Compra Pública de Tecnología Innovadora*): the procurement of commercial end-solutions without procuring R&D; For CPTI, FCP using, in particular, the competitive dialogue is applied.<sup>24</sup>

In 2010, the Council of Ministries agreed to promote innovative public procurement through the elaboration of a Spanish *Guide on Innovative Public Procurement (Compra Pública Innovadora, CPI)*, published in 2011.<sup>25</sup> The document describes administrative action to foster the development of new innovative markets from the demand side, through public procurement. This guide was updated and a second version was released in December 2015.<sup>26</sup>

The 'Law 2/2011 on Sustainable Economy'<sup>27</sup> (2011) introduced the public procurement of innovative goods and service as a policy instrument to promote innovation, especially in some specific fields such as environmental protection and digitalisation of public services. Articles 37 and 38 of this law define, in particular, the conditions of public-private collaboration contracts and services that deal with R&I.

PECTI (2013–2016)<sup>28</sup> covers the public procurement of innovative goods and services within the 'Strategic Action of Economy and Digital Society', the programme of 'Business leadership', and the sub-programme of 'Business R&D and innovation'. A working group of the Spanish Ministry of Science and Innovation (MICINN) and the CDTI is developing the Spanish strategy for PPI in more detail.<sup>29</sup>

#### PCP/PPI Initiatives

Spain introduced a **3 % target** for the public procurement of innovative products and services in its procurement law of 8 July 2011.<sup>30</sup> Seven tenders have been listed on the CDTI website since 2013. The current state of progress towards the 3 % target remains unclear.

Of the seven tender procedures, two were still open at the beginning of 2016:

- The first of these deals with the identification of innovative solutions regarding the design and implementation of anti-fog highway protection systems.<sup>31</sup>
- The second is managed by the Port of Huelva and deals with the paving of the infrastructure.<sup>32</sup>

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<sup>23</sup> [http://ec.europa.eu/information\\_society/newsroom/image/document/2015-50/spain\\_12540.pdf](http://ec.europa.eu/information_society/newsroom/image/document/2015-50/spain_12540.pdf)

<sup>24</sup> [http://www.idi.mineco.gob.es/stfls/MICINN/Innovacion/FICHEROS/Políticas\\_Fomento\\_Innv./Guia\\_CPI.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Innovacion/FICHEROS/Políticas_Fomento_Innv./Guia_CPI.pdf)

<sup>25</sup> [http://www.idi.mineco.gob.es/stfls/MICINN/Innovacion/FICHEROS/Políticas\\_Fomento\\_Innv./Guia\\_CPI.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Innovacion/FICHEROS/Políticas_Fomento_Innv./Guia_CPI.pdf)

<sup>26</sup> <http://www.idi.mineco.gob.es/portal/site/MICINN/menuitem.7eeac5cd345b4f34f09dfd1001432ea0/?vqnextoid=281c12c94d364410VqnVCM1000001d04140aRCRD>

<sup>27</sup> <https://www.boe.es/boe/dias/2011/03/05/pdfs/BOE-A-2011-4117.pdf>

<sup>28</sup> [http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/Políticas\\_I+D+i/Plan\\_Estat\\_al\\_Inves\\_cientifica\\_tecnica\\_innovacion.pdf](http://www.idi.mineco.gob.es/stfls/MICINN/Investigacion/FICHEROS/Políticas_I+D+i/Plan_Estat_al_Inves_cientifica_tecnica_innovacion.pdf)

<sup>29</sup> [http://cordis.europa.eu/fp7/ict/pcp/docs/spain\\_pcp\\_v3.pdf](http://cordis.europa.eu/fp7/ict/pcp/docs/spain_pcp_v3.pdf)

<sup>30</sup> <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2011:0849:FIN:EN:PDF>

<sup>31</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2397&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2397&r=1366*768)

<sup>32</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2335&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2335&r=1366*768)

The other five tenders launched in 2013, 2014 and 2015 relate to:

- the identification of innovative solutions for the design, construction, equipment and management of the ultrashort pulse ultra-intense laser centre;<sup>33</sup>
- the development of a high repetition rate target system for proton production by a laser plasma acceleration; this project is managed by the University of Santiago de Compostela;<sup>34</sup>
- the design, construction, testing and delivery of infrastructure for a liquefied natural gas (LNG) carrier; this project is managed by the public company Navantia;<sup>35</sup>
- the design and implementation of a project on personalised medicine in psychiatry; this project is managed by the Catalan Health Service;<sup>36</sup>
- the design of an education project for the public company red.es.<sup>37</sup>

### 3.5.3 Indirect financial support for private R&I

The central government's budget (PGE) for R&D in 2015 was EUR 6 406.5 million, of which 62.4 % was for financial operations (loans) and 37.6 % for non-financial operations (subsidies) (ICONO-MINHAP, 2015). Considering the budget that had been planned for 2015 in the national plan for R&D (EUR 2 807 million), a total of 63.6 % was distributed through loans and 41.9 % through subsidies and repayable advances from the ERDF (MINECO, 2015).

In addition, the Spanish system of tax incentives (indirect government funding) for R&I has been one of the most generous among OECD countries for the past few years (MINECO, 2011; OECD, 2015). Spain ranks second, after Portugal, according to the tax subsidy rate<sup>38</sup> on R&D expenditures among 36 OECD countries for 2013 (OECD, 2015). However, despite the fact that tax incentives are formally generous, tax incentives for R&I represent a small and decreasing proportion of government funding for private R&I. Direct government funding of business R&D was 0.10 % of GDP in 2011, while tax incentives for R&D represented 0.02 % of GDP in the same year (OECD, 2015).<sup>39</sup> This percentage of tax incentives decreased from 0.03 % in 2006 to 0.02 % in 2011 (OECD, 2015). Spain ranks 22nd with regard to the percentage of indirect government support through tax incentives.

Spanish tax incentives include fiscal incentives for R&I projects and social security bonuses for full-time R&I personnel. These incentives target companies regardless of their size and economic activity area. There are three main types of R&D tax incentives for companies (MINECO, 2015): (1) tax deduction for R&D and innovation activities (ex ante and ex post); (2) income reduction for transferring intangible assets ('Patent Box'); and (3) social security benefits for full-time R&D personnel.

Since 2015, Law 27/2014, of 27 November, on corporate taxes (Art. 35 and 39) has set the legal framework for deductions. This law includes the changes included in Law

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<sup>33</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2334&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2334&r=1366*768)

<sup>34</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2264&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2264&r=1366*768)

<sup>35</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2156&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=2156&r=1366*768)

<sup>36</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=1908&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=1908&r=1366*768)

<sup>37</sup> [http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=1860&r=1366\\*768](http://www.cdti.es/index.asp?MP=4&MS=0&MN=1&TR=C&IDR=1860&r=1366*768)

<sup>38</sup> The tax subsidy rate is defined as '1 minus the B-index', a measure of the before-tax income needed by a 'representative' company to break even on USD 1 of R&D outlays (Warda, 2011).

<sup>39</sup> 'Estimates refer to the R&D and innovation tax credit, based on the R&D and innovation tax credit, based on the tax authorities data on claims, published by the Ministry of Economy and Competitiveness. Estimates include support for technological innovation. According to data from an no-random subset of firms (informes Motivados), this accounts for more than 45% of all qualifying expenditures and nearly 20% of all deductions. Estimates do not include the cost of allowances for employers' social security contributions, which was less than 1 million euros in 2007' (OECD, 2015).

14/2013, of 27 December, that is, the Entrepreneurship and Internationalisation Support Act (e.g. fiscal measures for R&I and 'Patent Box' changes). These could reach up to 42 % of direct costs. They have a yearly limit, but benefits can be claimed in successive fiscal exercises ('fiscal check').<sup>40</sup> Income reduction for transferring intangible assets (Patent Box) is set a limit of 40 %. Law 17/2012 and Royal Decree 475/2014 regulate social security benefits for full-time R&D personnel. They enable up to a 40 % reduction in social security taxes of R&D staff working for companies, make compatible certain deductions for 'innovative SMEs', and allow personnel to benefit from R&D deductions retrospectively.

Therefore, tax incentives are explored and adopted in Spain, but they have a limited impact (MINECO, 2011, 2012, 2014b; OECD, 2015). The lack of information, the complexity and the uncertainty about the tax deduction procedure might limit the effect of R&I tax incentives. Large companies appear to be more able to benefit from tax deductions (MINECO, 2011). 'Motivated reports' managed by the SEIDI and CDTI aim to reduce uncertainty and are increasingly used. A total of 1 318 companies applied for 2 567 motivated reports in 2009 and this increased to 1 857 companies and 3 900 reports in 2013 (51 % of which were SMEs) (MINECO, 2014b). Data for 2010 indicate that qualified reports accounted for EUR 1 599 million (52 % of R&D costs and 48 % of innovation costs), representing deductions of 21 % (MINECO, 2014b). Patent Box deductions represented EUR 250 million in 2013 (fiscal exercise of 2012) (see section 5.8 for more details on the impact of regulation).

## **3.6 Business R&D**

### **3.6.1 The development in business R&D intensity**

The intensity of the Spanish BERD is relatively modest (slightly more than 0.6 % of the GDP in 2014). An increasing trend during the 2005–2008 period is apparent, which was almost entirely reversed over the following years (in 2014, the intensity of the total BERD was close to the 2006 level). The economic crisis that affected all aspects of the Spanish economy had particularly negative effects on the overall business intensity.

No sign of recovery is observable, since BERD is still decreasing, that is, from 0.67 % of GDP in 2012 to 0.66 % in 2013 and 0.63 % in 2014.

A number of policy measures have been adopted in recent years to encourage private investments in R&D. However, their impact has not been translated into any modification of the abovementioned downwards BERD trend.

Among them, several policies and funding schemes (such as the NEOTEC programme) target young innovative companies to help them commercialise ideas rapidly and promote their internationalisation. Other support measures for SMEs target industries with a growing market. Policies and instruments to encourage cooperation and knowledge sharing, and to create a more favourable business environment for SMEs, also exist. For example, the 'CIEN Strategic private consortia for innovation' requires that consortia include, at least, one SME and collaboration with public research centres, in order to increase cooperation and knowledge sharing.

Spain has also developed fiscal incentives to increase business R&D expenditure (EVCA, 2013). The Entrepreneurship and Internationalisation Support Act (Law 14/2013) has

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<sup>40</sup> Law 3/2009 and Law 2/2011 and Royal Decree 475/2014 on the tax reform approved in November 2006 brought important changes. First, this legislation enabled up to a 40 % reduction in social security taxes of R&D staff working for companies. Second, following a trend of reducing corporate taxes, R&D and innovation corporate tax credits were also reduced. In 2009, the deduction procedure was simplified: the time limit of two years to deduce taxes for R&D investments was cancelled. Moreover, in 2011, the deduction for innovation was increased from 8 % to 12 %, but this increase has been cancelled for 2012 and 2013. Royal Decree 475/2014, which entered into force on September 2014, allows retrospective benefits from R&D deductions for 2013.



thus developed tax incentives for private companies. Similarly, Law 5/2015 on private funding includes regulations for investment lending and equity crowdfunding.

The economic sectors of services and manufacturing have remained at a low and relatively stable level since the beginning of the crisis in 2008. Manufacturing changed from 0.31 % of GDP in 2008 to 0.3 % in 2014, while services changed from 0.36 % to 0.32 % (see Figure 7). The sectors of construction; electricity, gas, steam and air conditioning supply; and sewerage, waste management and remediation activities remained at a negligible level, of between 0.1 % and 0.2 % of GDP, over the whole period.

Most business R&D funding comes from business itself. It has been very stable over the crisis and post-crisis period (0.55 % of GDP in 2008; 0.54 % in 2013). The funding from government is much lower and, after an increase between 2005 and 2008, followed a downwards trend until 2013 (0.07 %). Its 2013 level was below the level observed in 2005 (0.08 %). It should be noted that despite the severe economic crisis, the private part of business R&D has remained very stable over recent (albeit at a low level).

Figure 7 does not show the development in forgone tax revenues due to fiscal incentives (see section 3.2). This also declined between 2008 and 2010, although it increased again in the years after 2010. In 2015, the expected amount of forgone tax revenues suddenly more than doubled, but it is still unclear whether the actual forgone revenues in 2015 reached this projected amount (MINHAP budget office 2015 in RIO smart fiscal consolidation report Spain 2015). Nevertheless, it is clear that the government's contribution to BERD would appear considerably higher if these forgone revenues had been taken into account.

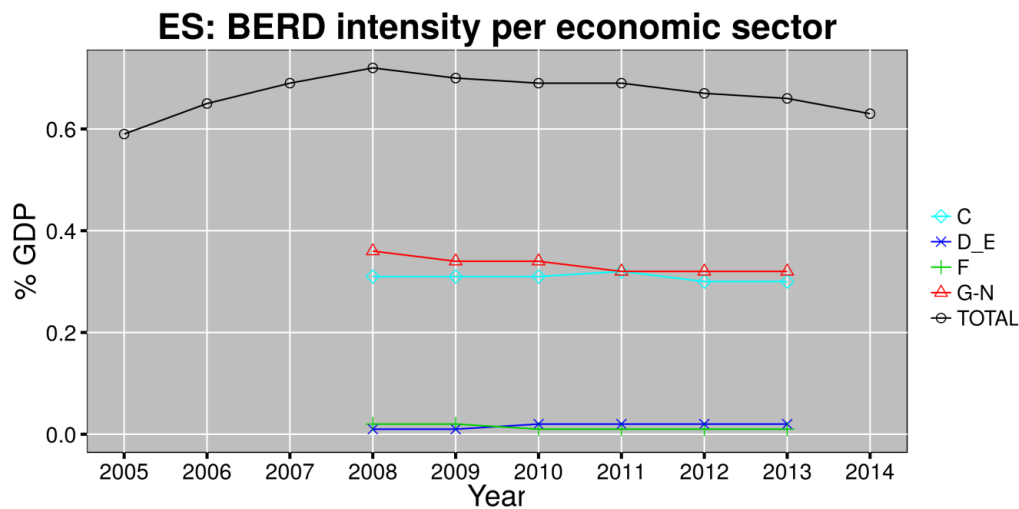


Figure 7. BERD intensity broken down by most important macro sectors (C, manufacture; G\_N, services; F, construction; D\_E, electricity, gas, steam and air conditioning supply, and sewerage, waste management and remediation activities)

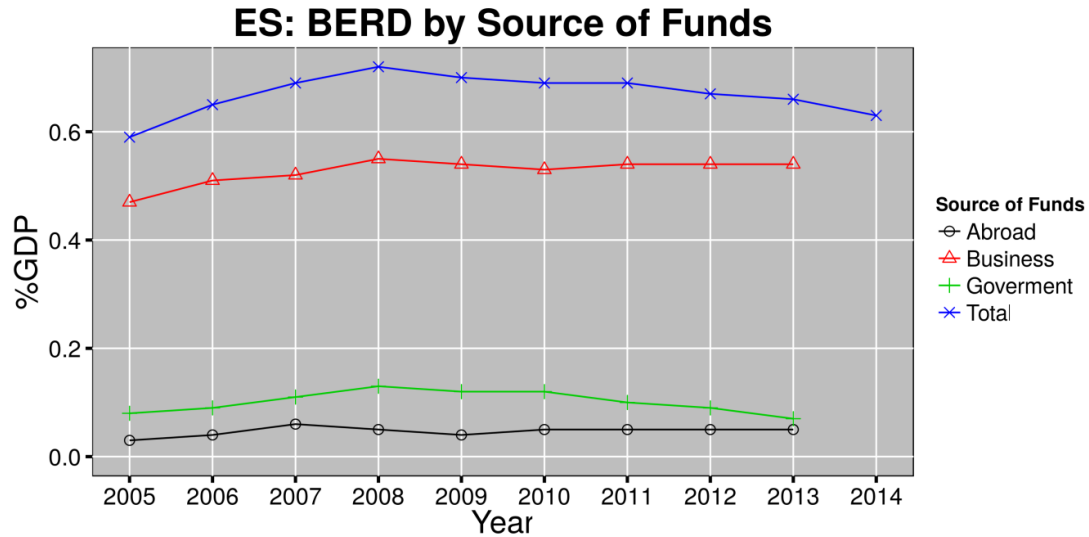


Figure 8. BERD by source of funds

### 3.6.2 The development in business R&D intensity by sector

In 2013, within manufacturing, the 'manufacture of other transport equipment' and the 'manufacture of basic pharmaceutical products and pharmaceutical preparations' sectors reached a similar level of R&D expenditure (around EUR 568 million; see Figure 9). However, while the former showed a continuous downwards evolution from 2010, the latter showed a remarkable increase between 2008 and 2011, before decreasing until 2013. The manufacture of motor vehicles followed a similar trend, with an increase between 2008 and 2010, and a decrease until 2013, at which point it reached EUR 328 million.

The manufacturing sector with the highest number of companies ranked in the top 1 000 R&D companies in the EU is the pharmaceutical sector, with Almirall (188th position), Grifols (189th position), Zeltia (352nd position) and Laboratorios Farmacéuticos ROVI (765th position).

With regard to services sector, all of the top services, in terms of R&D investments, showed a similar modest downwards trend, The 'professional, scientific and technical activities' is the top sector, with EUR 2085 million of R&D spending in 2013. It is followed by 'information and communication' (EUR 845 million of R&D spending in 2013) and 'wholesale and retail trade; repair of motor vehicles and motorcycles' (EUR 203 million of R&D spending in 2013) (see Figure 10).

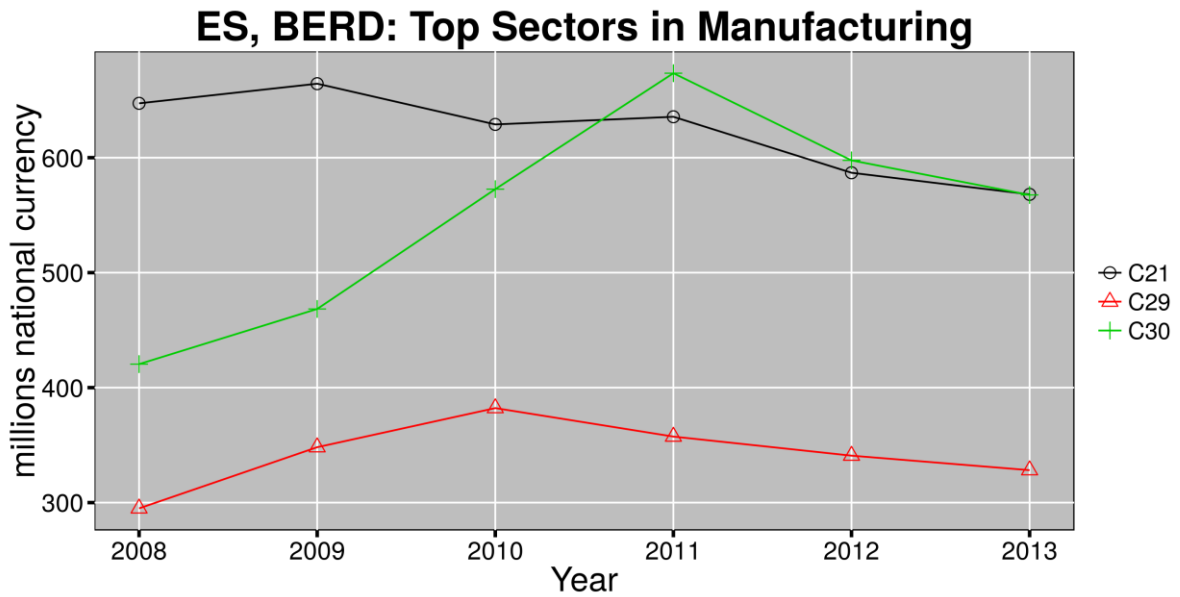


Figure 9. Top manufacturing sectors (C21, manufacture of basic pharmaceutical products and pharmaceutical preparations; C29, manufacture of motor vehicles, trailers and semi-trailers; C30, manufacture of other transport equipment)

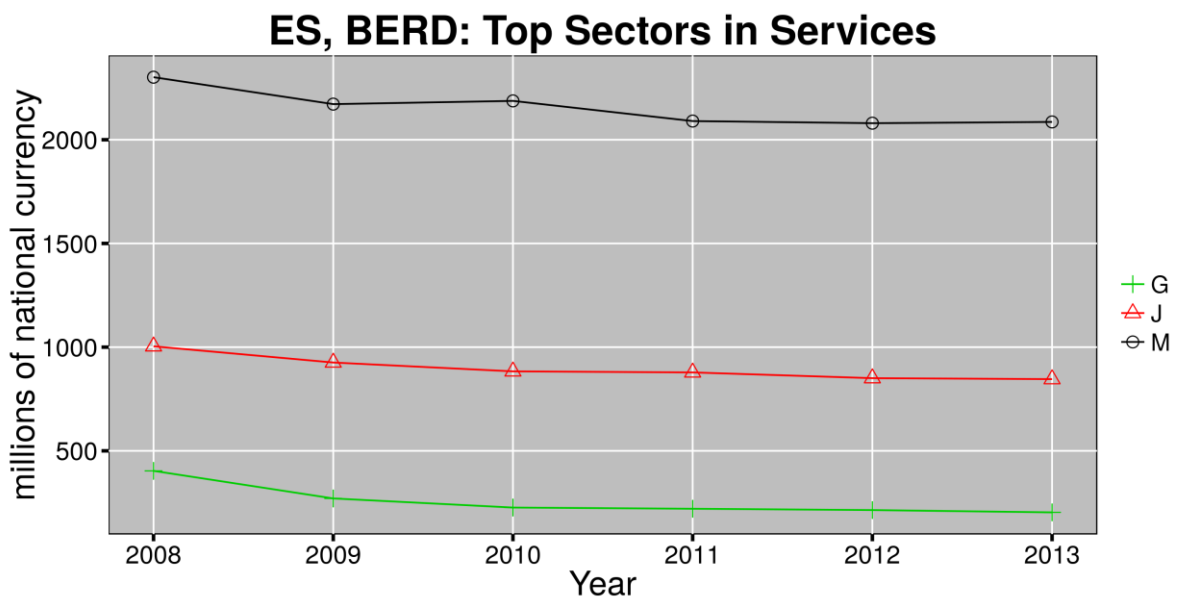
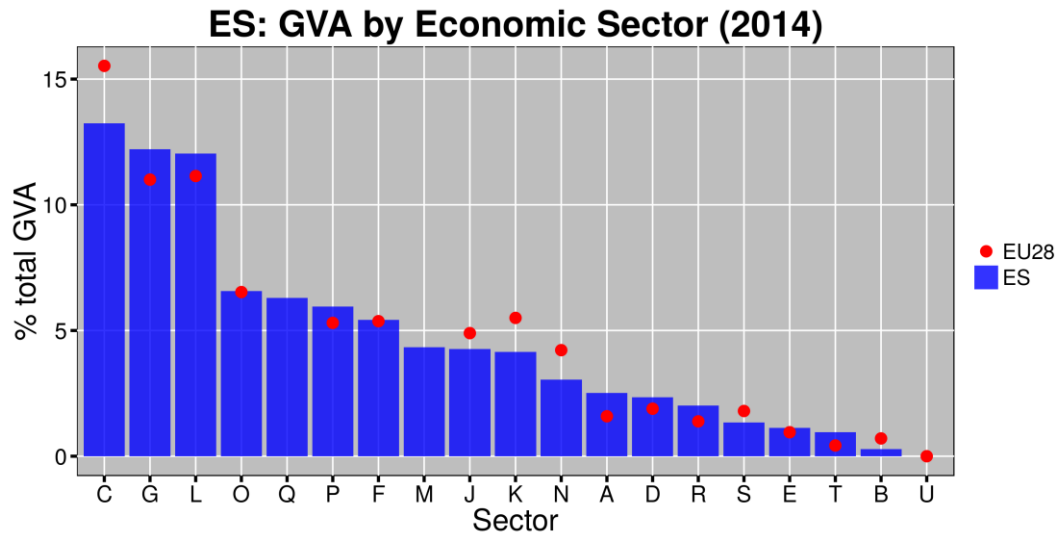


Figure 10. Top service sectors (J, information and communication; G, wholesale and retail trade; repair of motor vehicles and motorcycles; M, professional, scientific and technical activities)

### 3.6.3 The development in business R&D intensity and value added

Manufacturing is the biggest contributor to gross value added (GVA) in Spain (13.3 % of GVA). Its value is, however less than the EU-28 average (of 15.2 %). A top service sector in terms of BERD, namely the 'wholesale or retail trade; repair of motor vehicles and motorcycles', is also one of the most important sectors in terms of GVA (contributing 12.6 % of GVA). Its value in Spain is higher than the EU-28 average (of 11.2 %). Construction is the third most significant economic sector (8.6 % of GVA) and its contribution to GVA in Spain is much higher than the EU-28 average (of 5.9 %).



**Figure 11. Economic sectors as a percentage of total GVA.** The top six sectors in decreasing order: (1) manufacture (C); (2) wholesale and retail trade, repair of motor vehicles and motorcycles (G); (3) construction (F); (4) real estate activities (L); (5) accommodation and food service activities (I); and (6) public administration and defence, and compulsory social security (O)



**Figure 12. GVA by manufacturing sector.** The top six manufacturing sectors: (1) manufacture of food products, beverages and tobacco products (C10–C12); (2) manufacture of chemicals and chemical products (C20); (3) manufacture of machinery and equipment n.e.c. (C28); (4) manufacture of textiles, wearing apparel, leather and related products (C13–C15); (5) manufacture of coke and refined petroleum products (C19); and (6) manufacture of basic pharmaceutical products and pharmaceutical preparations (C21)

The breakdown of manufacturing activities shows that, as a percentage of GVA, most sectors are below or equal to the EU average. The most noticeable exception is the leading sector 'Manufacture of food products; beverages and tobacco products' (2.9 % of GVA, compared with 2 % for the EU-28).

The importance of SMEs for value added in Spain should also be noted. According to the Small Business Act 2015 (DG GROW, EC),<sup>41</sup> SMEs are more important in Spain than in other European countries because they account for a higher proportion of value added and employment than their European counterparts. SMEs provide almost three-quarters of all jobs and more than 60 % of value added. The proportion of SME employment in the manufacturing sector exceeds that of other EU countries by 11 percentage points, accounting for more than 70 % of all jobs in this sector. The situation is similar for value added, which is 14 percentage points higher than the EU average. Spanish SMEs have still not recovered from the crisis. In 2014, value added and employment were estimated at 29 % and 23 %, respectively, below their 2008 pre-crisis levels. This pattern is also

<sup>41</sup>[http://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/files/countries-sheets/2015/spain\\_en.pdf](http://ec.europa.eu/growth/smes/business-friendly-environment/performance-review/files/countries-sheets/2015/spain_en.pdf)

founded in the total number of active businesses registered, which has decreased by 11 % since 2008.

Value added in the retail sector increased considerably between 2005 and 2008. After a small dip in 2009, it continued to grow, although at a much lower rate. The modest pre-crisis growth in value added of the information and communication sector and the professional, scientific and technological activities sector (sector M) has also stalled since 2008. In sector M there was a modest growth again in 2011. A decrease in value added in the automotive and motorcycle manufacturing sector was visible after 2007. Unfortunately, there are no data after 2009. Value added in the pharmaceutical sector decreased by almost 15 % between 2008 and 2013.

While employment in the manufacturing sectors studied decreased, the number of scientists and engineers employed in the manufacturing sector increased, suggesting a process of 'upskilling'. A similar process is visible for all the top service sectors analysed.

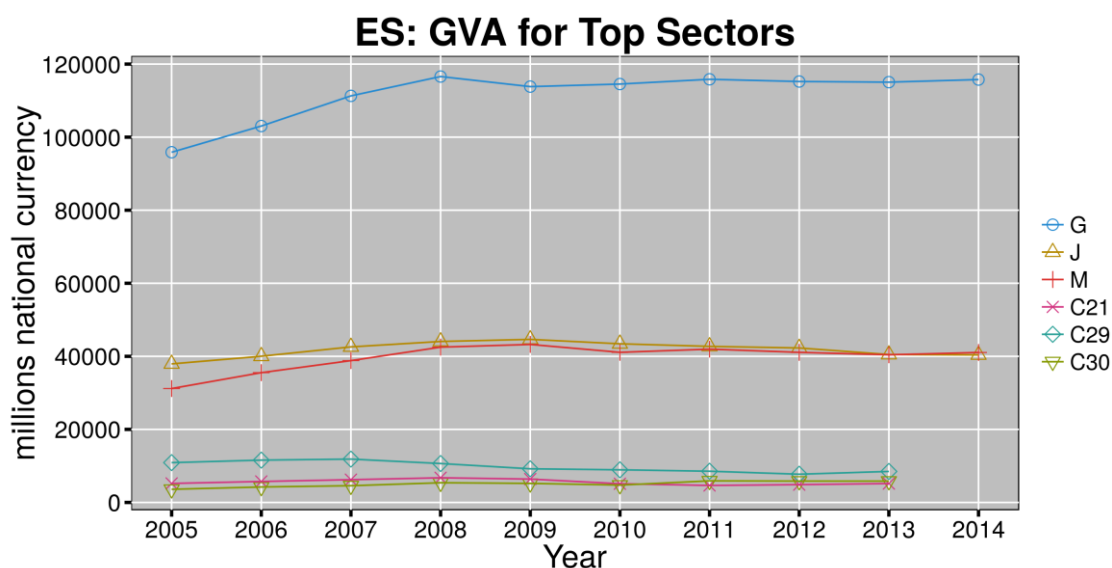


Figure 13. Value added at factor cost for the leading manufacture and service sectors in Figures 9 and 10

### 3.7 Assessment

Public R&I investment levels are worrisome (1.46 % PGE-46/PGE in 2015, compared with 2.7 % in 2008) (ICONO-MINHAP: 2015) and threaten to set back all the progress made in the previous period, 2002–2008. The system lacks reasonable alternative sources of funding, as research input from the private sector is nearly half of that of the European average and is also decreasing. In addition, the decrease in the execution of public R&I budgets (from 91.3 % in 2007 to 54.5 % in 2013 (FECYT, 2015a)) indicates that further efforts could be made to review programmes that appear not to be attractive enough.<sup>42</sup>

Despite the policy efforts to increase the proportion of project funding (e.g. EECTI and PECTI), the budget cuts for R&I have particularly affected project funding. The more fixed character of institutional funding has probably affected this negative trend. Institutional block funding includes salaries for researchers with permanent contracts (public officials) and other fixed operational costs such as infrastructure. Temporary researchers are usually hired through project funding programmes. Institutional funding is mainly allocated through block funding, and performance-based mechanisms are not usually taken into account to allocate these funds. This has increased competition for project funding among already research-active researchers. In addition, excluding the

<sup>42</sup> Molero et al. (2016) show that the low level of execution is mainly attributable to programmes based on loans and targeted at companies.

human resources calls, the access of researchers under temporary contracts (non-permanent staff) to project funding is very limited (see section 4.4.2). Measures to distribute institutional funding in a competitive mode could incentivise behaviour towards increased research quality and the achievement of critical mass. Recent trends indicate that the Spanish share of project and institutional funding is likely to be more affected by budget availability than by the need to incentivise behaviour towards increased research quality.

Spain implements a large set of direct and indirect instruments for funding R&I for business organisations. There is some evidence that suggests that direct financial support to business R&I leads to additional company R&I investments (e.g. Huergo et al., 2009). However, the low level of execution of R&I budgets indicates that R&I programmes for business organisations, mainly based on loans, might not be attractive enough to encourage companies to apply.<sup>43</sup> The limited use of tax incentives, despite its formal generosity, might indicate that indirect mechanisms for R&I funding could not be properly designed or that they are not effective at boosting innovation in the private sector.

New efforts to increase public-private cooperation, knowledge transfer and the involvement of SMEs in R&I activities are apparent in the evolution of the policy mix. New policy programmes, such as the 'CIEN Strategic private consortia for innovation', that offer funding for private consortia that include SMEs and OPIs and that aim to undertake large-scale technological projects, indicate that new efforts are being made to increase public-private cooperation and knowledge transfer. The 'Industrial PhD programme', which allows students to carry out PhDs in the private sector, indicate the efforts to encompass research, innovation and education. Both programmes were introduced in the 2014 working plan of PECTI. In 2015, the 'PYME Horizon programme' which targets SMEs was launched. These new programmes indicate an increasing attention to knowledge transfer and SME involvement in the policy mix (see section 2.3 and 3.4.3 for more specific measures). However, the low level of execution of public R&I funding indicates that the policy mix could be substantially improved.<sup>44</sup>

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<sup>43</sup> Internal comments from the national contact points (NCPs) indicate that the extensive deleveraging of Spanish companies might be the main reason behind the low level of execution.

<sup>44</sup> Internal comments from the NCPs suggest that the low level of execution reflects a policy mix driven by macroeconomic conditions, such as the fact that loans do not account for public deficit whereas grants do.

