

Firms and universities: a Portuguese view

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Firms and universities - outline

1. Portugal: improve resource allocation and productivity growth

- Firms produce to profit and to remunerate investment
 - Most SMEs lack the needed resources (human capital, financing, know-how) to make in-house applied and experimental research

2. There is a gap between firms and universities:

- Universities have a different aim (besides education):
 - To produce knowledge: fundamental and applied research

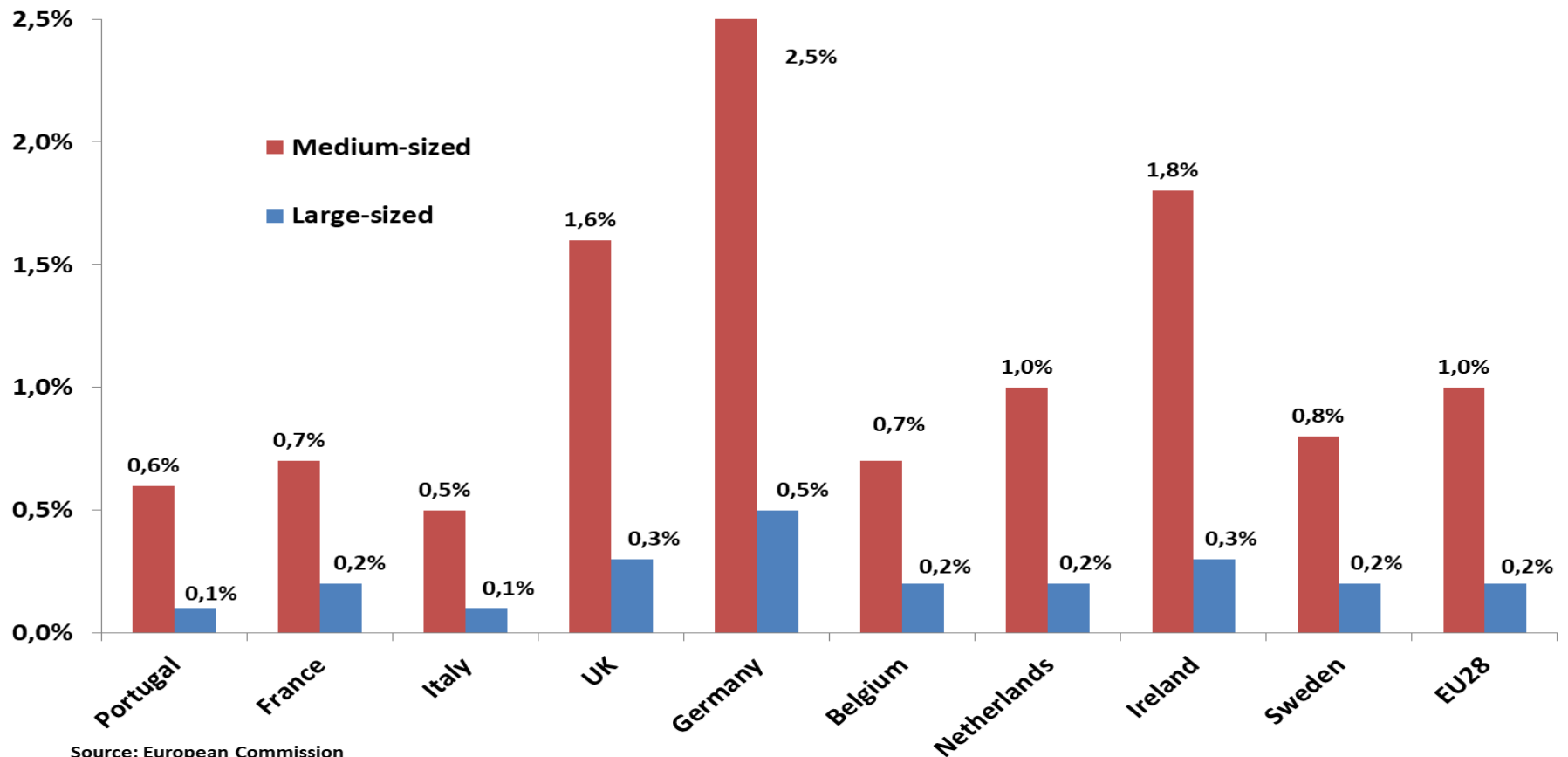
3. How to connect them: **common interest, market driven research, and appropriated public policy**

- Positive externalities justify innovation and R&D policies
 - As long as these externalities are correctly addressed
- Market failure in terms of coordination amongst economic agents

1 - Firms

Too few firms with more than 50 employees in Portugal, half (% of the total) of the EU28 average, one third of the UK and Ireland or one fifth of Germany.

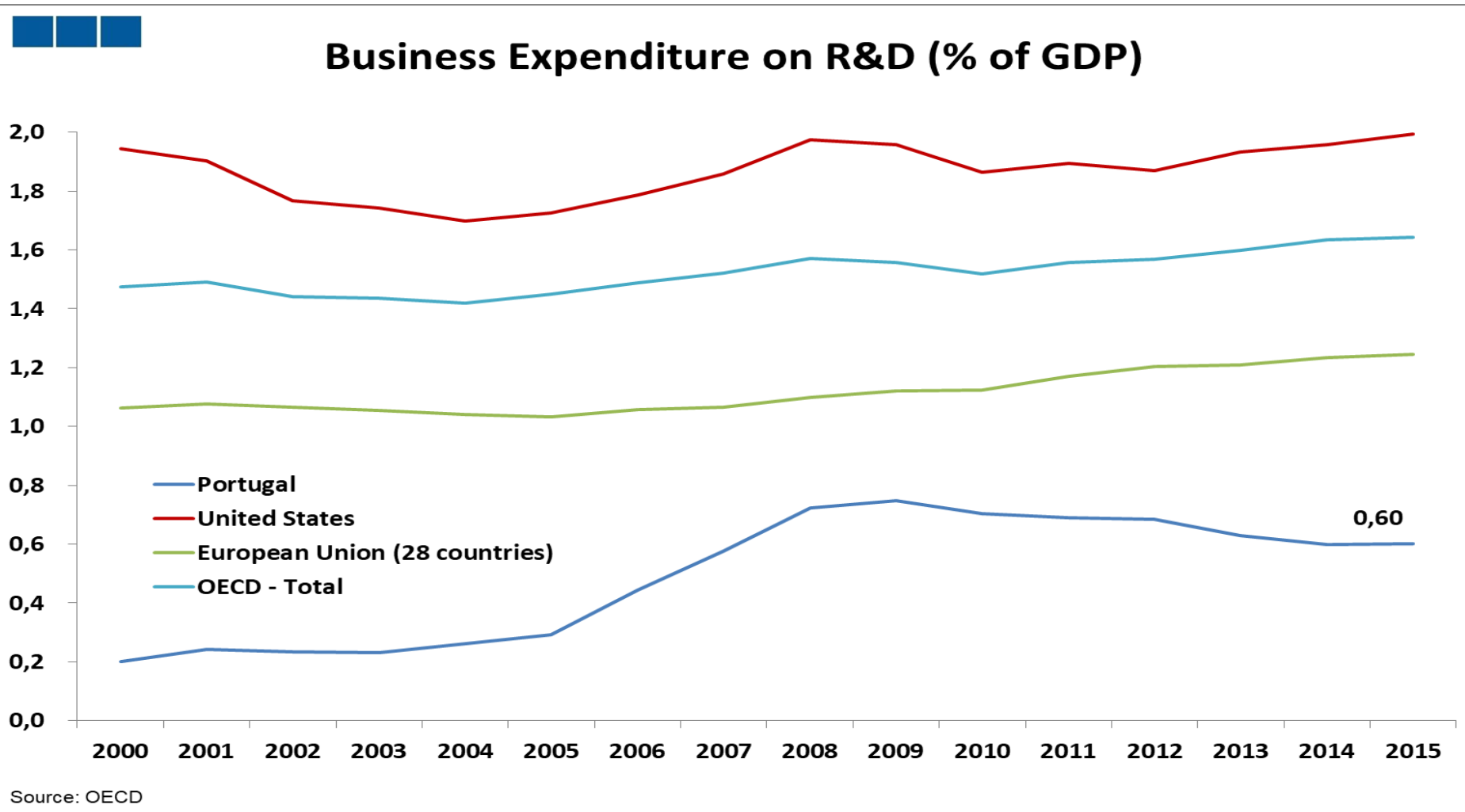
Share of enterprises by size in 2015



Source: European Commission

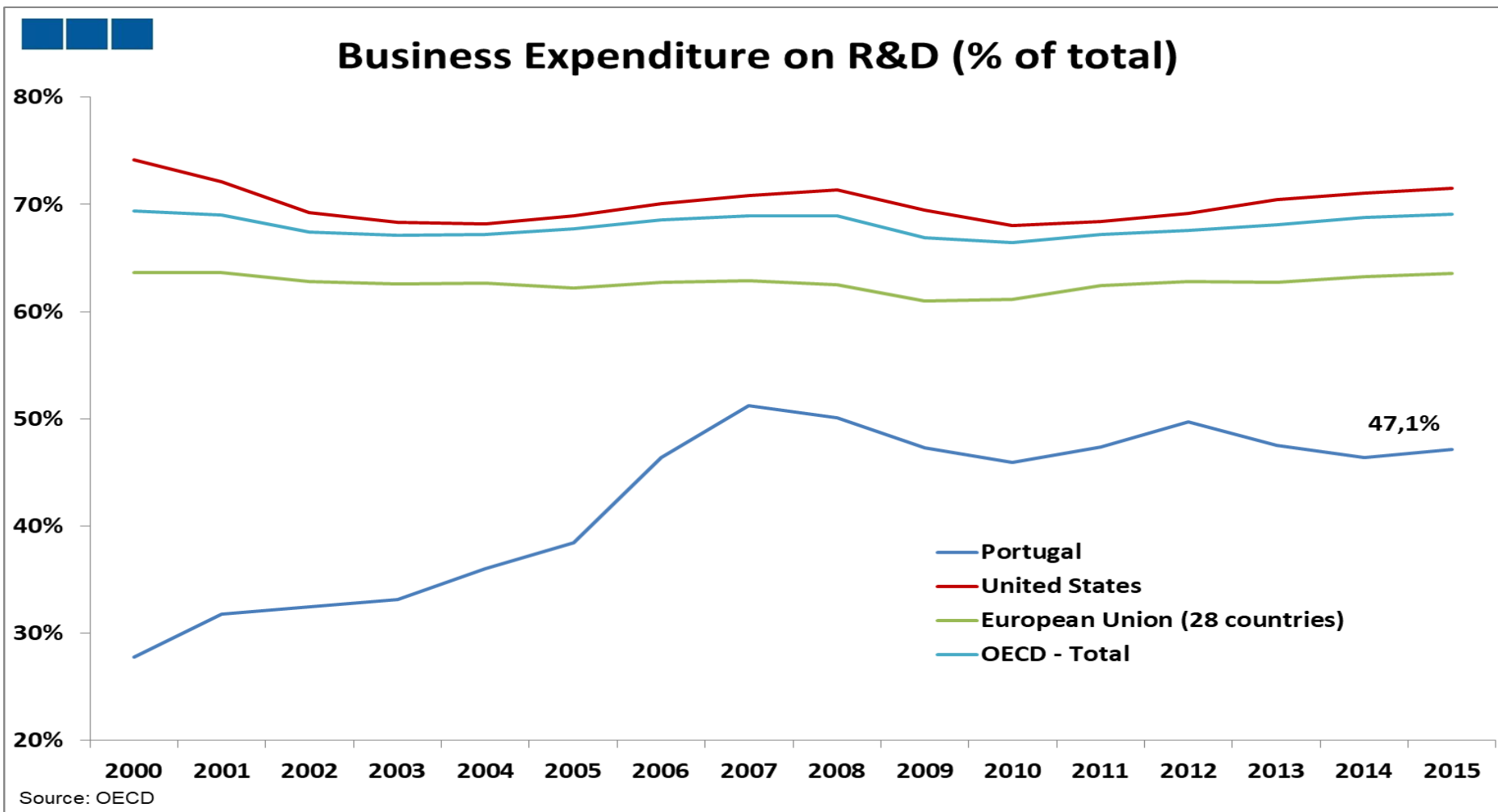
1 - Firms

Portuguese firms: Lower level of expenditure in R&D



1 - Firms

Firms represent **less than half of total R&D expenditure (47.1%)**

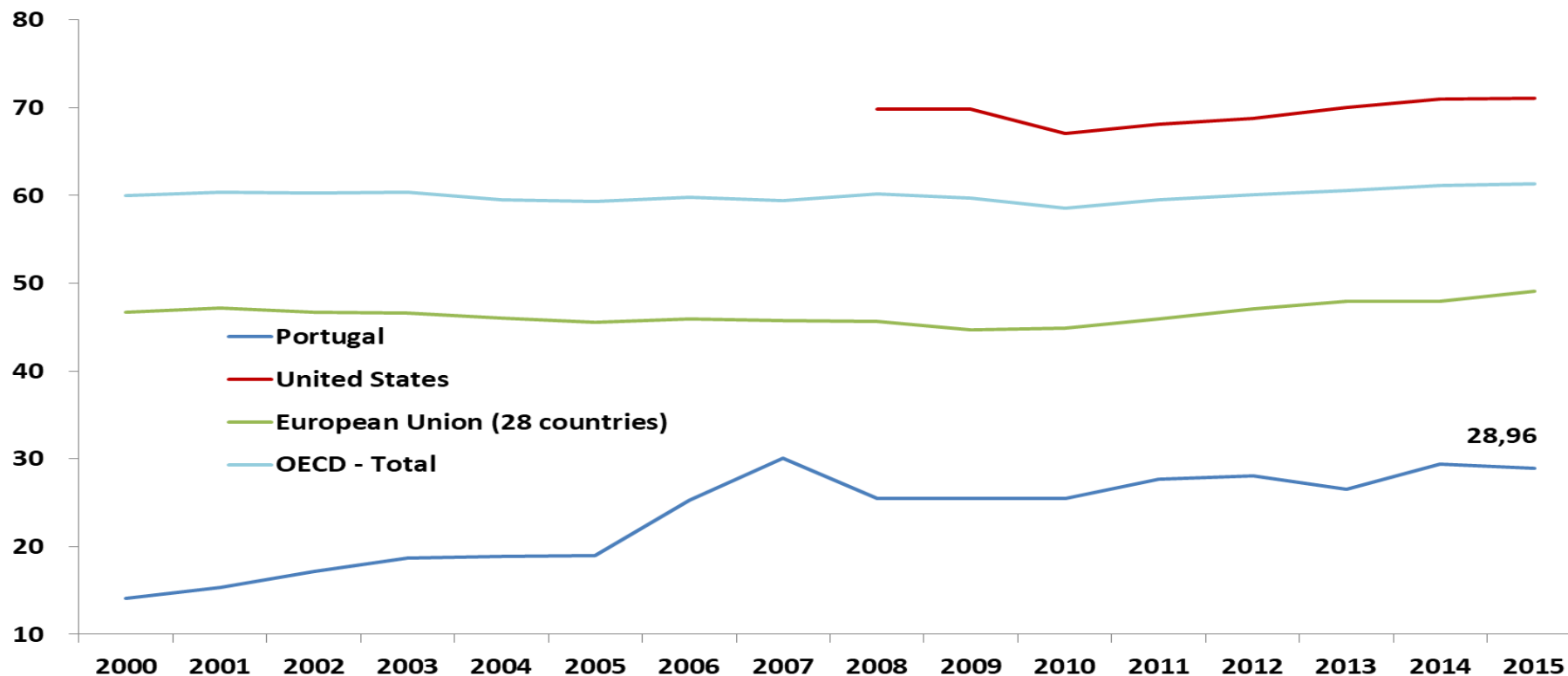


1 - Firms

Researchers are too concentrated in the state sector (businesses: 29%)

- 11,784 in firms, for a total of 38,672 (2015 - FTE)

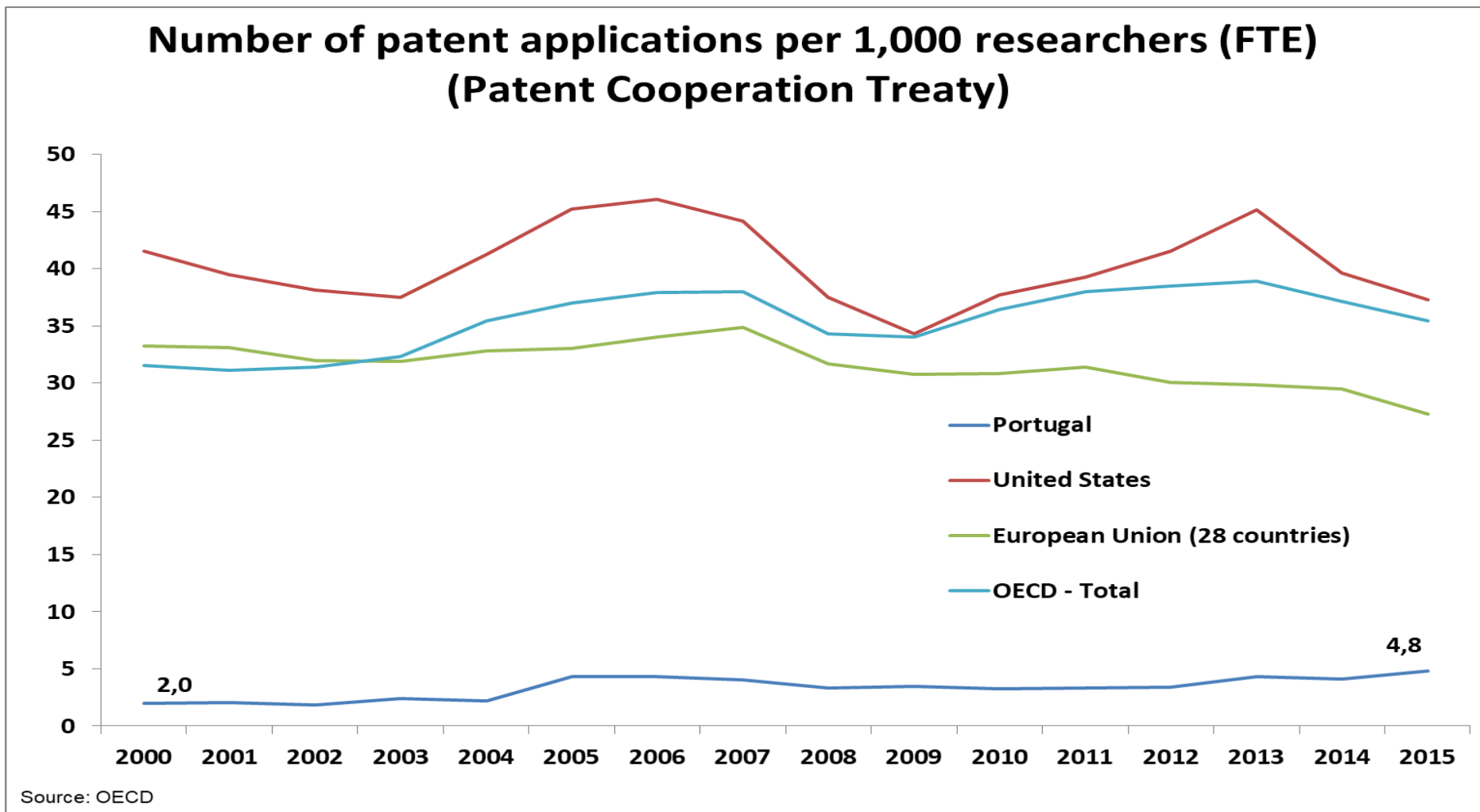
Researchers on businesses (% of total researchers)



Source: OECD

1 - Firms

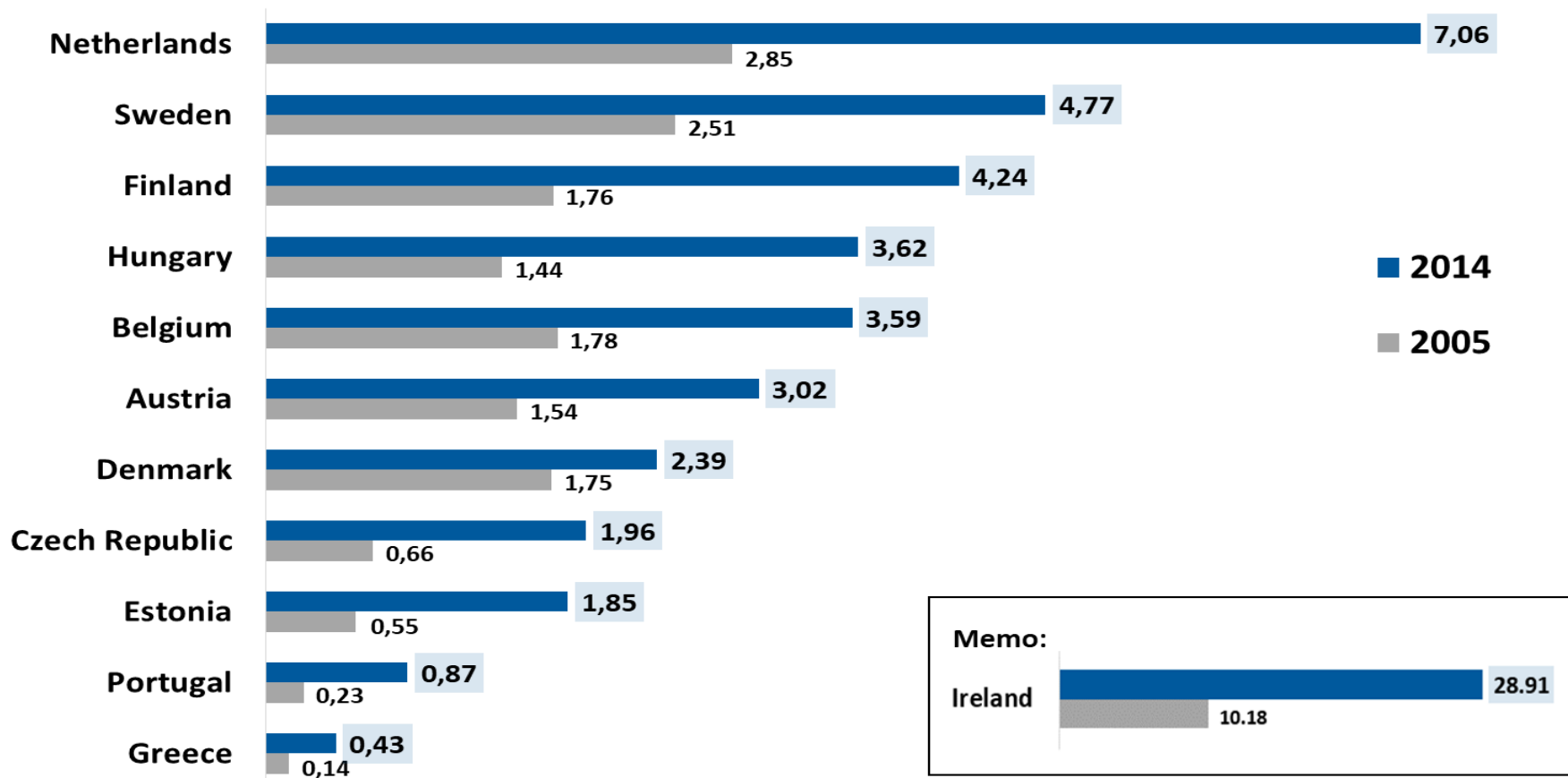
Portugal: insufficient international patenting



1 - Firms

Technological receipts: Portugal is improving, but still a long way to go

Technological receipts in % of GDP

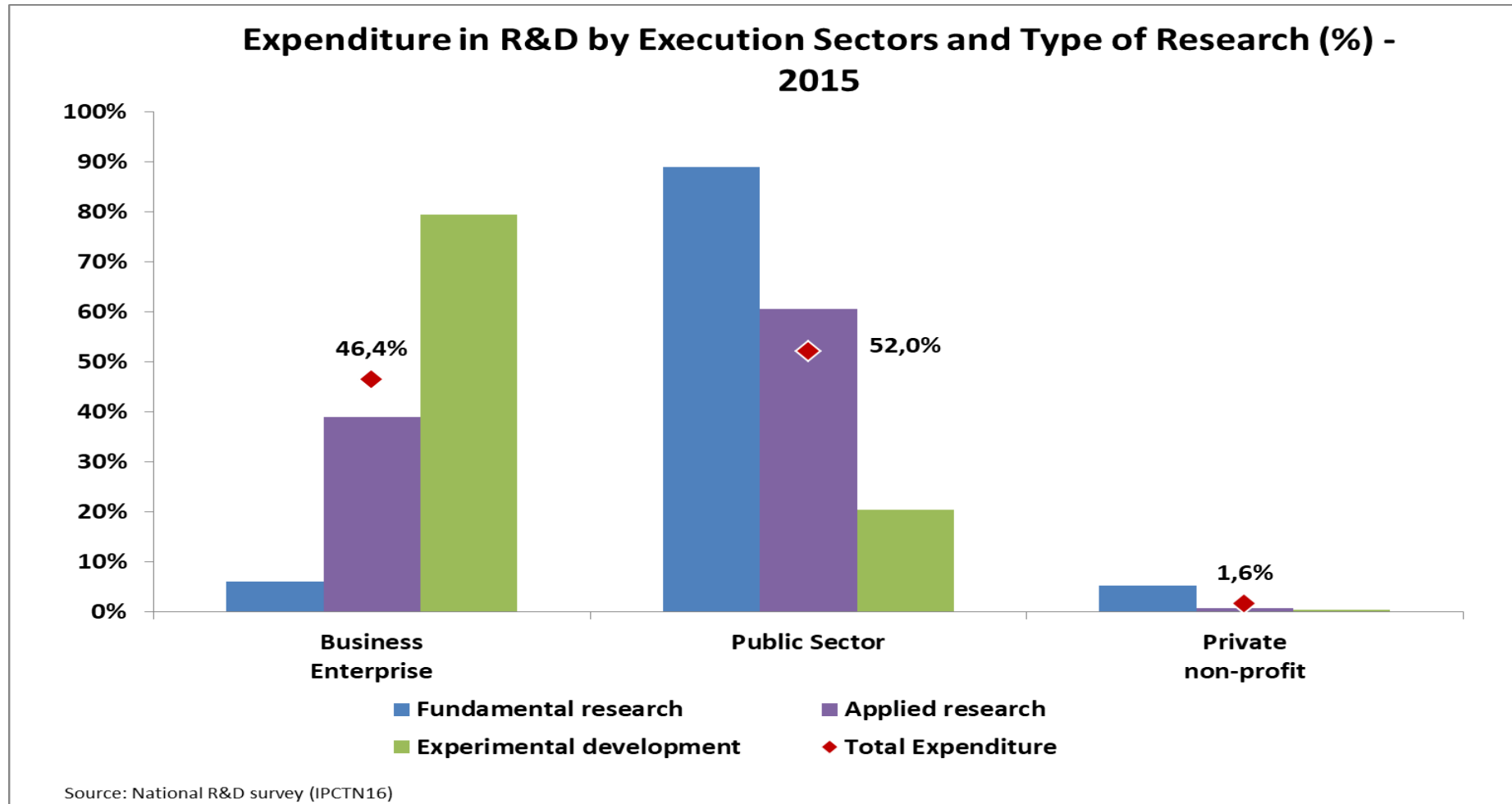


Source: OECD

2 - Firms and universities

Apparently, there is a good complementarity in research

- Total expenditure in R&D: fundamental 23%, applied 40%, experimental 37%

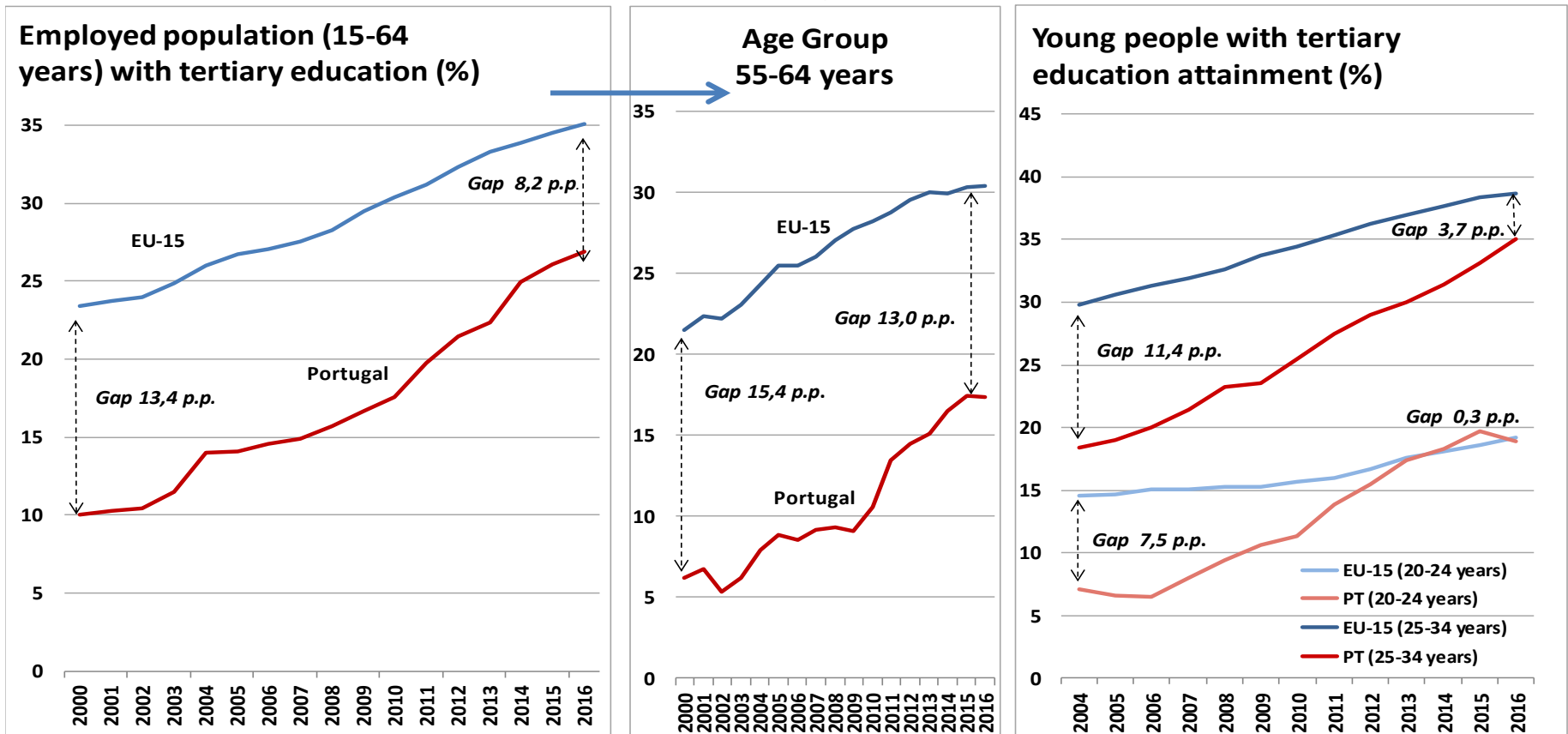


2 – Firms and universities

Portugal is converging in the level of education ...

- Expenditure in tertiary education (2013): Portugal and EU average (1.4% of GDP)

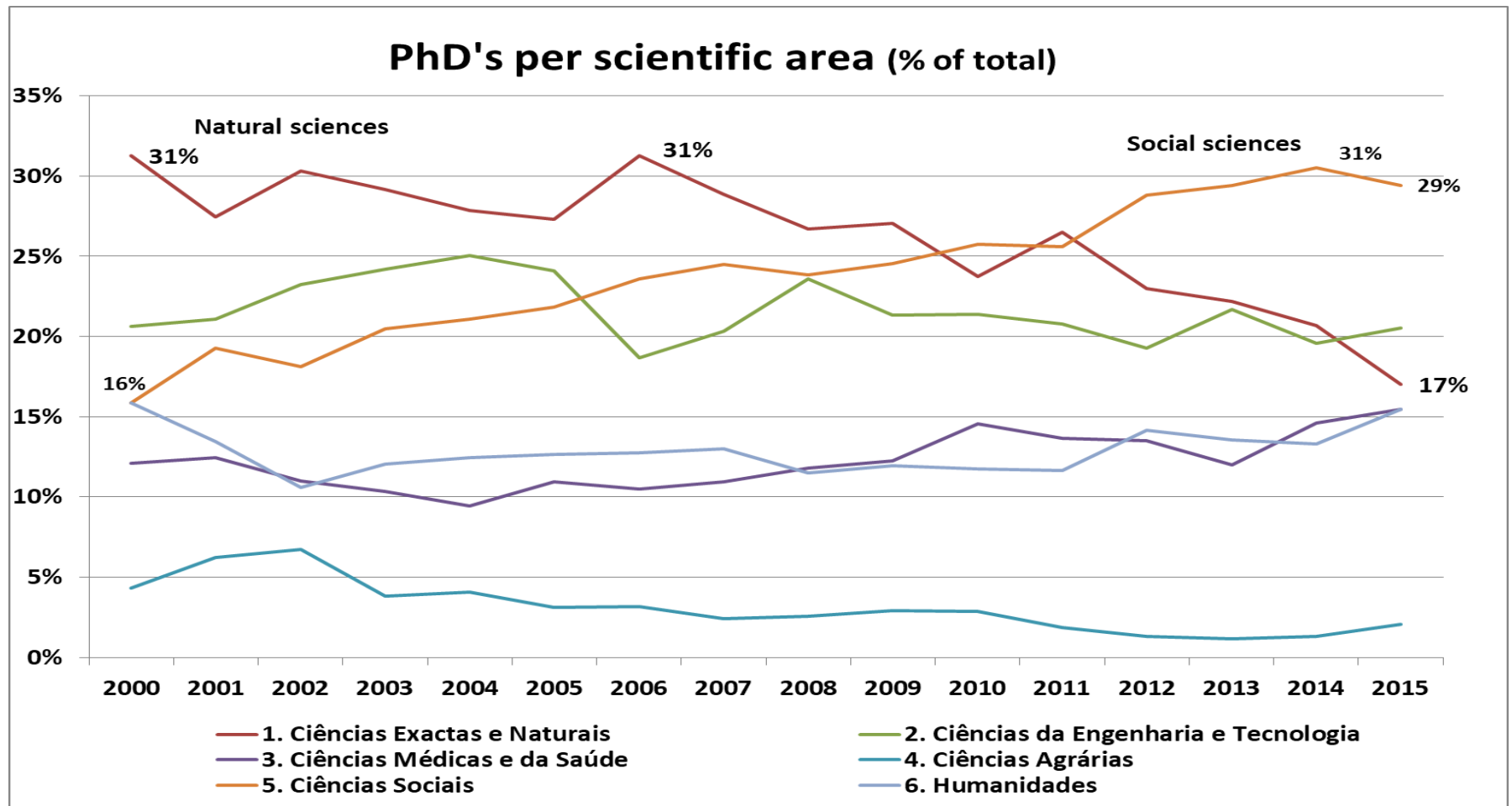
Level of education in Portugal and in the EU core *



Source: Employed Population (Labour Force Survey - Eurostat). EU core: 15 member states in 2003

2 – Firms and universities

... It is growing faster in **Social sciences and Humanities**: now almost half of new PhD's in Portugal (45%) and of new graduates with tertiary education (45% – 2015/16)



2 - Firms and universities

- **PhD's per scientific area (2012)**
 - Social and Humanities: **36%**

PhD's per scientific domaine	TOTAL	
	Nº	%
TOTAL	24 992	100%
Exact sciences	4 038	16,2%
Natural sciences	3 591	14,4%
Engineering and technology	4 773	19,1%
Medical and Health	2 808	11,2%
Agrarian sciences	932	3,7%
Social sciences	5 723	22,9%
Arts and Humanities	3 128	12,5%

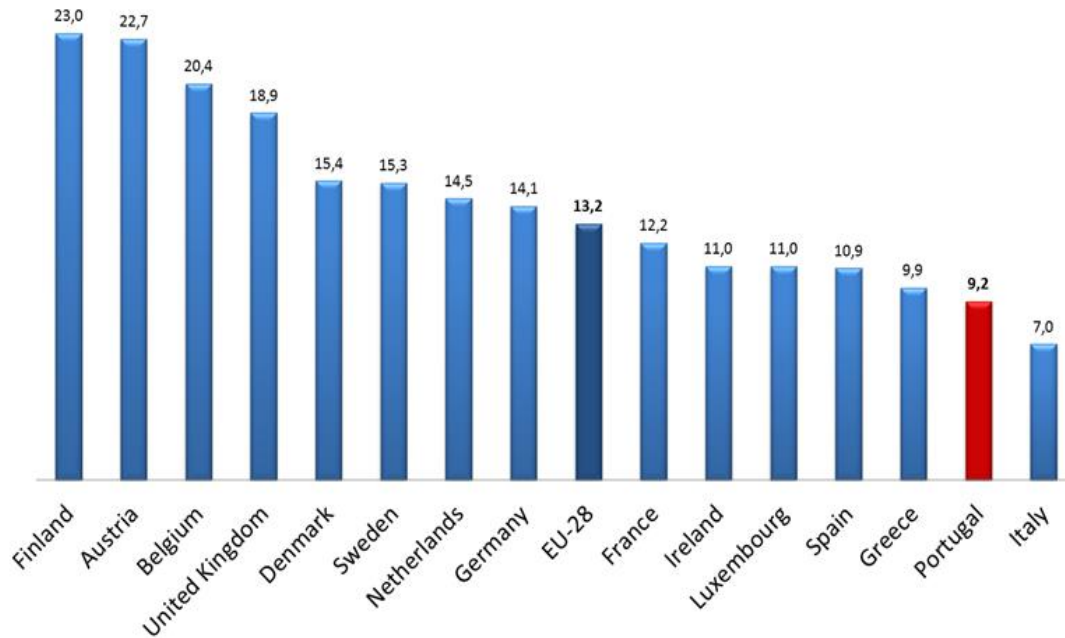
Incentives are biased for research in social sciences: higher earnings and job security but less market driven work and low mobility.

- University professors (with a PhD): 32,580 (59% - 19,163)
- PhD's living in Portugal: 24,992 (**13% employed as researchers**)
 - Tertiary educ.: 82.7% (20.6 th.)
 - State sector: 7.9% (2 th.)
 - Private nonprofit: 5.3% (1.3 th.)
 - **Firms: 4.2% (1,050)**
- **PhD's at university earn 20% more than at a firm**

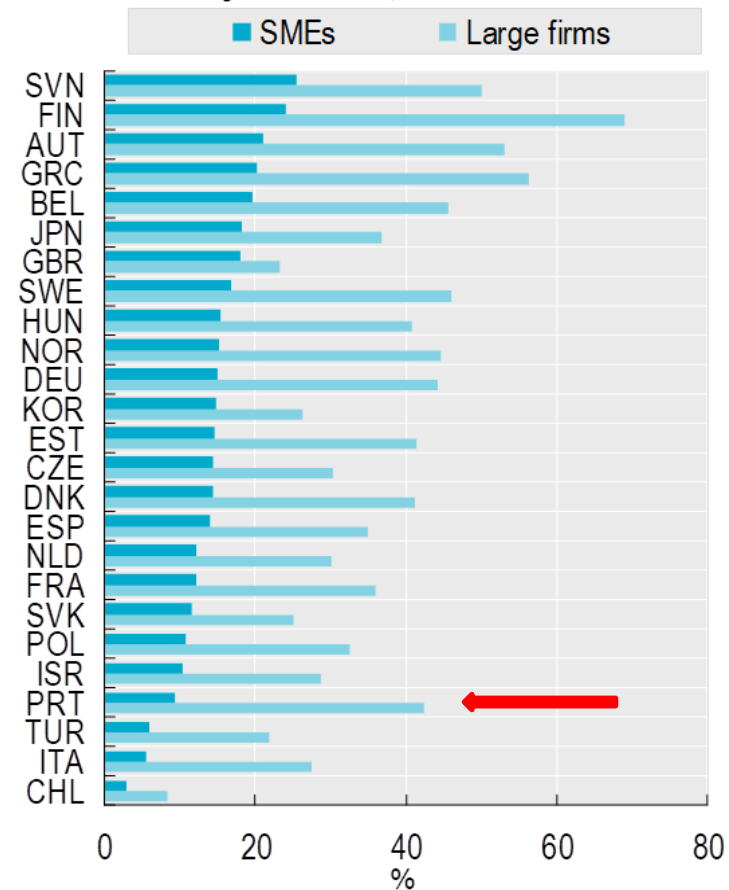
2 – Firms and universities

The **weak link between firms and universities** is seen by the **small share of SMEs collaborating with research institutions (9% - 2014)**

Enterprises co-operating with universities or other higher education institutions (%)

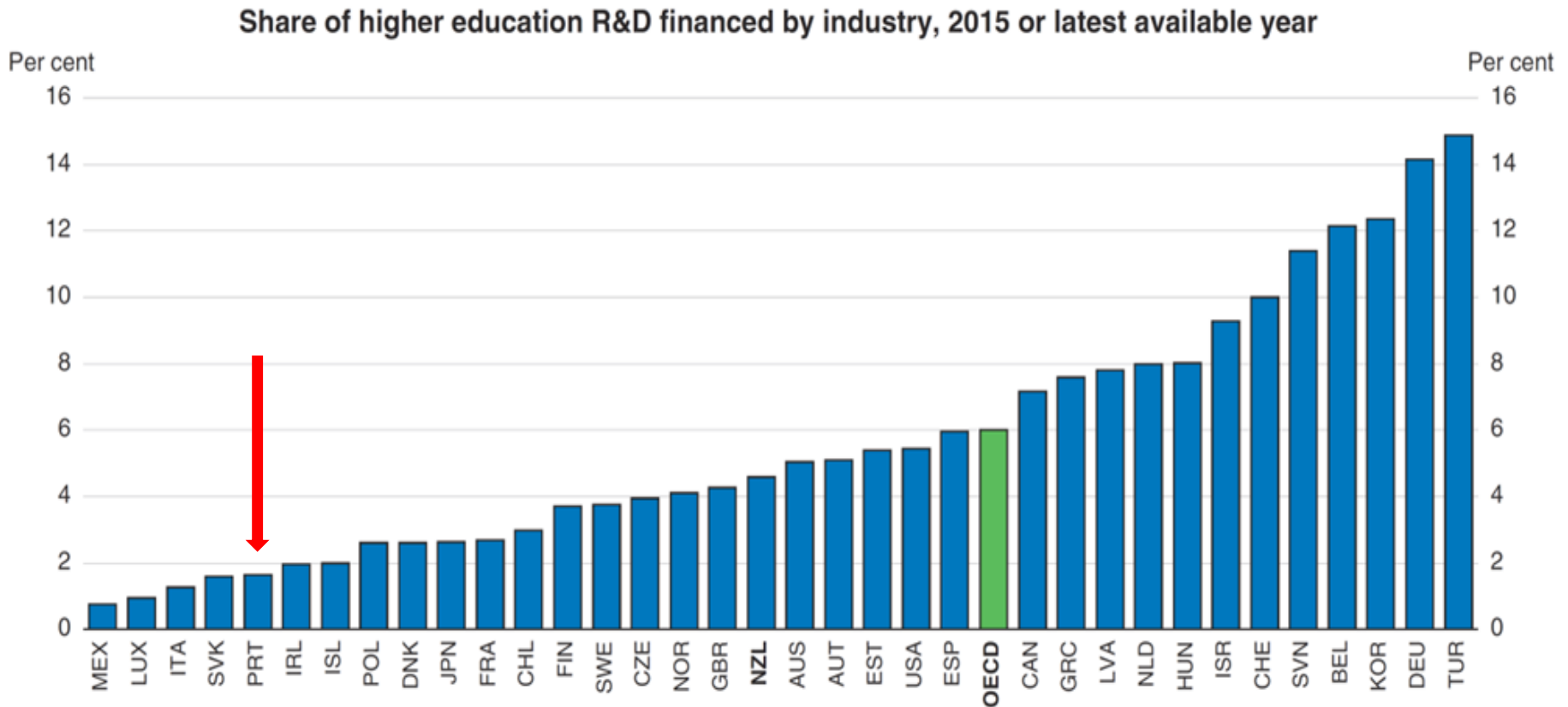


Firms collaborating on innovation with higher education or research institutions, by firm size, 2010-12



2 – Firms and universities

The weak links between firms and universities is confirmed by the small share of higher education R&D financed by businesses



2 - Firms and universities

Consequence of a weak link between firms and universities: Total factor productivity growth is not sufficient and Portugal is not converging

Multifactor productivity growth - Portugal, EU core and G7
1995 = 100, OECD



EU core: the 15 EU member states in 2003 except Austria, Greece and Luxembourg

3 - Firms and universities: a common interest

Workshop with stakeholders – Main Conclusions

a) **Weak links between firms and universities**

b) Portuguese **firms do not invest sufficiently** in innovation

- 99,8% are SMEs, a barrier to R&D dissemination
- No connection with S&T institutions

c) **Universities: market driven research is undervalued**

- Publications by researchers overvalued, often without evaluation
- Incentives for researchers to be associated with “start-ups” not sufficiently attractive

d) **Stronger links between firms and universities are thus needed**

- Matching supply and demand for knowledge, skills and technology

3 - Firms and universities: a common interest

Workshop with stakeholders - Suggestions

1 – Adequated incentives for universities are needed:

- **Performance based criteria** to evaluate research effects
 - To measure knowledge transfer on a medium to long term basis through e.g. employment creation or sales
 - To differentiate proactive researchers (towards business)
 - To mitigate redundant research and inefficient resource allocation
- Revision of the **labour law**
 - Flexible placement of university researchers in firms (part-time, temporary)
 - Labour contracts in line with society

3 - Firms and universities: a common interest

Workshop with stakeholders - Suggestions

2 - Firms and universities can jointly **prioritize research areas** (digital, health, sea, ...) to:

- Market screening to check the need and the desirability of research
- Patent database where research themes are listed in order to
 - Prevent frequent redundancy in research
 - Improve international patenting by Portuguese entities

3 – **Joint training** by researchers and managers

- Good research is necessary but not sufficient
 - Universities should complement traditional management courses with innovation and technology management
 - Knowledge and Technology Transfer Offices
- For CEOs and Managers on how to bring research to the market

3 - Firms and universities: a common interest

Workshop with stakeholders - Suggestions

4 – Adequated and oriented **financing**

- Given their small size, firms may prefer to get financing for a partnership with researchers rather than receiving it directly
- To finance business ideas from priority areas and not just “ideas”
- To reach an higher Technology Readiness Level

5 - **Digitalization of the economy is an opportunity:**

- Horizontal application to different industries
- Training may strenghten the links between firms and universities
- Digital platform where:
 - Firms may present research questions and problems to universities, in accordance with their business needs
 - Researchers may ask firms their needs in terms of research

3 - Firms and universities: Final comments

Interface: to bridge the gap between firms and universities in “old” and new areas: energy efficiency, circular economy, digitalization, etc.

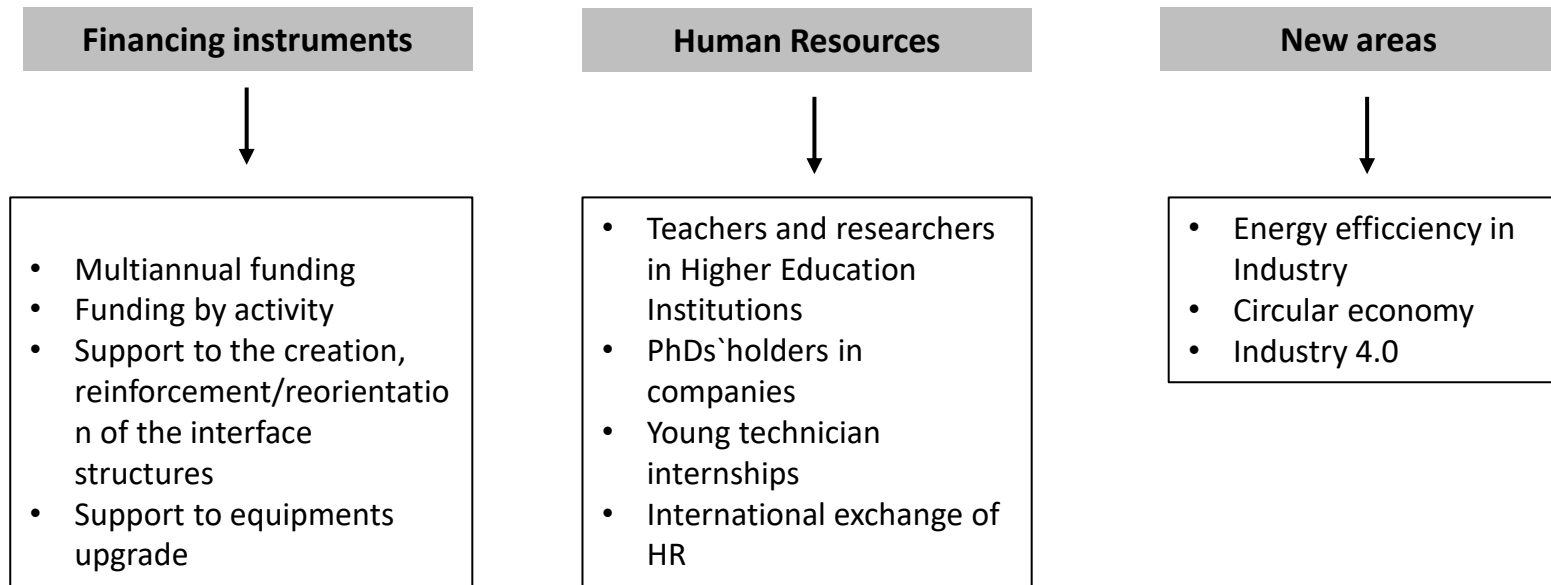
- To **further develop existing partnerships firms-researchers**:
 - Formally recognized **clusters** (20)
 - Research and Technology **interface centers** (135)
 - Mapping of technological centers, C&T parks, Incubators
 - Support on financing, human resources, new areas
 - **New partnership models**:
 - **Colaborative Laboratories** to define and implement a research and innovation agenda and to stimulate scientific employment and international activities
 - **Suppliers “clubs”** to promote the integration and participation of SMEs in international value chains and ensure better access to technologies and skills.

Thank you!

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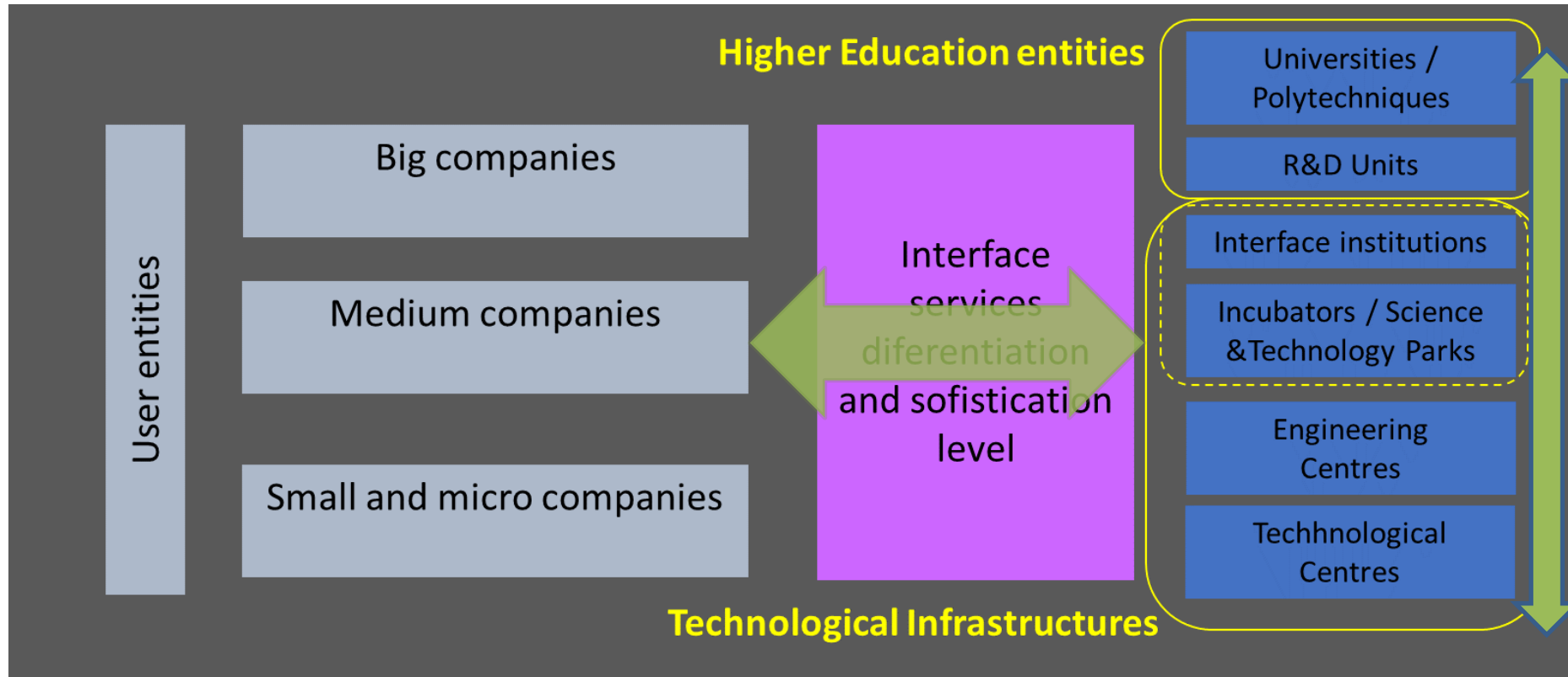
Research and Technology Interface Organizations

Empowerment of the Research and Technology Interface Organizations: Measures and Intervention Areas



Financial instruments	Multiannual funding	Project funding	Human Resources	Equipments	Firms
FITEC European Structural Investment Funds	✓	✓	✓ ✓	✓	✓

RESEARCH AND TECHNOLOGY INTERFACE ORGANIZATIONS



COMPETITIVENESS CLUSTERS

- **Knowledge and innovation platforms** - partnerships and networks that integrate companies, business associations, public entities and relevant support institutions;
- **Goal:** to stimulate and support the emergence and consolidation of **strategies of collective efficiency** in the Portuguese economy;
- Clusters play a key role in **supporting SMEs** in their competitiveness strategies and to boost collaborative networks involving S&T and R&D entities;
- Clusters are a key instrument of public policy to **implement the smart specialization strategies**, diagnosing on the ground the difficulties of companies in a given sector, providing responsible entities with the data needed to design and implement effective policies that benefit business growth.

February 2017: the Portuguese Government recognized 20 clusters in several economic areas: industry, agroindustry and services



- Forest Industries Cluster
- Cluster AEC - Architecture, Engineering and Construction
- Automotive Cluster
- Aeronautic/Space/Defense Cluster
- Portuguese Railway Platform Cluster
- Cluster of Vine and Wine
- Cluster of Petrochemical, Industrial Chemistry and Refining
- Cluster of Competitiveness of Creative Industries
- Footwear and Fashion Cluster

- Cluster of Mineral Resources
- Sustainable Habitat Cluster
- Cluster Smart Cities Portugal
- Cluster Textiles: Technology and Fashion
- Engineering & Tooling Cluster
- Health Cluster Portugal
- AgroFood Cluster
- PRODUCECH - Technologies of Production
- TICE.PT – ICT Cluster
- Tourism Cluster
- Sea Cluster

Financial instruments	Coordination and networking	Project funding / Internationalization	Firms / S&T Institutions / Collaborative projects
SIAC (Portugal 2020)	✓	✓	✓
Structural Funds (financial incentives)		✓	✓

CoLABS - COLLABORATIVE LABORATORIES

Association or consortium of several national and/regional institutions:

- Research units, higher education institutions, enterprises, intermediate and interface institutions, technology centers, companies, business associations and other relevant partners in the productive, social or cultural area - State laboratories, municipalities, local organizations, hospitals, museums, etc.
- Flexible geometry / Integrated Action Plan / Programmatic funding

Main objectives:

- To define and implement **research and innovation agendas** aimed at creating economic and social value, including processes of internationalization of the national scientific and technological capacity in relevant intervention area (s);
- To stimulate scientific employment and R & D activities to strengthen synergies with higher education institutions, in particular through specialized, vocational or advanced training programs in close cooperation with social and economic partners.

In preparation the legal framework of this programme

SUPPLIERS “CLUBS”

- Aims to promote the integration and participation of Portuguese companies, especially SMEs, in **international value chains**;
 - **More cooperation** to ensure better access of SMEs to global markets, technologies and skills.

Mains goals:

- Empowering SMEs to integrate globally competitive and innovative **global supplier networks**;
- Leveraging the integration of technologies that facilitate adaptation to **Industry 4.0** and to the framework of the Circular Economy;
- Promote **adaptation to the technological requirements** of processes and products that provide specialized know-how, resources and critical knowledge, increased productivity, more flexibility and higher product quality;

In preparation the legal framework of this programme

KNOWLEDGE & COLLABORATIVE INNOVATION: Integrated approach to the R&I cycle

