Portugal 2015: *Who is against the future of science and the advancement of knowledge?*

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Summary

A new direction for science and technology policy is critical to strengthen counter-cyclical measures stimulating the necessary knowledge-driven conditions for Portugal to evolve and better use its strategic Atlantic positioning. In recent years, the Portuguese society was confronted in an unprecedented way with demonstrations of scholars and researchers in many parts of the country, as well as the formation of civic intervention platforms against nefarious science policies by the government. Urge now pursue this change effort of ongoing policies and chart a new course for Portugal with more science, more knowledge and more scientific culture.

After many years of recession and economic and budgetary problems, science policy formulation for Portugal, as well as in other peripheral European regions, must focus on advanced education of human resources and strengthening S&T in all branches of knowledge. The continuous qualification of the workforce at large is a persistent challenge that requires broadening the social base for advanced education, as well as for internationalizing the knowledge base.

1. Context

It is well known that Portugal, as well as other southern and peripheral European countries, have been seriously affected by recession and economic and budgetary problems since 2010, with a major impact in the budgets allocated to S&T and higher education. This has occurred after three to four decades of a serious attempt to reduce the knowledge gap in terms of an effective presence in "scientific Europe", with significant results, although still far beyond the status of developed regions in central and northern European regions.

In the last 30 years, between 1982 and 2012, the internationally recognized scientific production of Portugal multiplied by 35 (in terms of number of publications registered in the Web of Science), the number of patents registered in Europe increases 45 times and the technological balance of payments balances up since 2007(e.g., Heitor et al., 2014). The health system meets international reference levels, with the infant mortality rate to reduce more than 8 times. The number of PhD holders per thousand inhabitants more than doubles. The education system is modernized, although only in 2012 the PhD fraction in the faculty of public universities exceeds 70%. About 36% of all youngsters with 20 years old are now attending higher education. All these changes occurred along a significant increase in the Gross Expenditure in R&D, GERD, from 0.5% of GDP in 2000 to over 1.5% in 2010. In Europe, only Estonia, Luxembourg and Slovenia grew at a similar rate during that period.

However, this route of consolidation was interrupted in 2011, when the social and political commitment to science was, above all, politically broken by using the argument of financing only 'excellence' and enhance the selectivity of the access to science, together with dramatic changes in research assessment procedures. There is no scientific system that is sustainable if based only on a limited and exclusive group of scientists (Stilgoe et al., 2014). This is indeed a dangerously close view of all that prevented Portugal take on the challenge of early science before the 70s.

It should be noted that the political actions over the last few years has been (politically) promoted in association with the perception that former policies must be changed. In this regard, two types of arguments have been put forward, which are often conflicting to each other and may result from distinct political influences. On one hand, there is a recurrent argument in Portugal for targeting public support to companies and mostly to business competitiveness, and, on the other hand, the need for increasing selectivity criteria of public support based on the claim of overqualified personnel. This has resulted in the reduction of the share of public expenditure allocated to advanced education (i.e., reducing the doctoral and post-doctoral scholarships funded by the Portuguese Foundation for Science and Technology, FCT) and scientific employment (i.e., ending a large majority of PhD researcher contracts, directly supported by FCT).

Against to these observations, it should be noted that, over the last 30 years, business expenditure in R&D grew in Portugal (as well as in other regions) only after strengthening public investment (Heitor et al., 2015). It always reflects the impact of the accumulation of public investment in science and technology and private businesses efforts to use the installed technological capacity, particularly in terms of its potential for innovation, access to emerging markets and the development of exports. This has always been dependent, as expected, of the skills of new researchers and the level of advanced training of the workforce. Also, it had reflected the creation of new scientific institutions (public and private) and the structure of the economy in terms of the type and number of companies, hospitals and other institutions with research activity operating in Portugal.

2. Key findings

As a result of the recent policies mentioned above, the level of support for attracting young researchers from abroad to work in Portugal has been considerably reduced. Besides, the brain-gain effect, which had finally took place in 2009 after so many decades of outflows of talents, has probably faded away (i.e., brain-drain, as discussed in detail by Heitor et al., 2014). The argument of overqualified personnel and the related reduction of the level of support for advanced education have re-emerged the debate on the sustainability of doctoral and post-doctoral studies in Portugal, in a context of growing international competition for qualified human resources (OECD, 2012; Stilgoe et al., 2014; Heitor et al, 2015). The respective impact on the reduction of the scientific and technological capacity in Southern European countries and regions is not dully quantified or described, but has been recurrently debated by the scientific and academic community.

Figure 1 quantifies the evolution of Gross Expenditure in R&D, GERD, over the last three decades, accounting for the increasing divergence against average European levels since 2011. Figure 2 quantifies the related evolution of the number of full time researchers working in Portugal and accounts for the changing pattern referred to above since 2011.

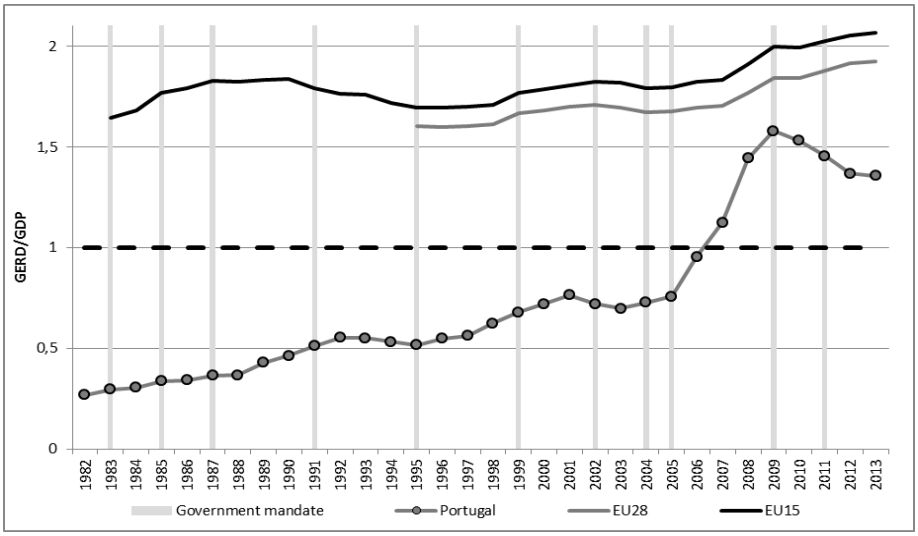

Figure 1 – Gross Expenditure in R&D, GERD, as fraction of GDP for Portugal and Europe, 1982-2013. Source: OCDE (9 April 2015, with GDP calculated following the European Systems of Accounts, ESA 2010 revision).

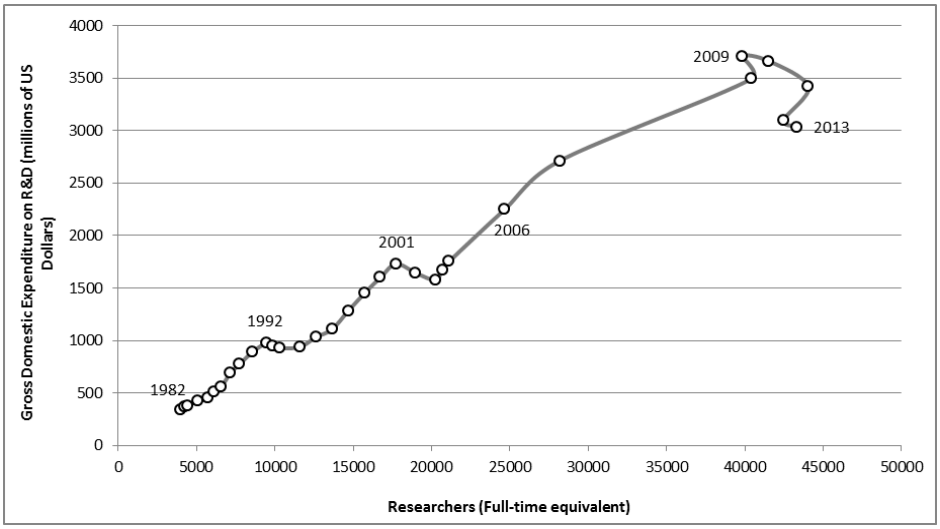

Figure 2– Gross Expenditure in R&D, GERD, versus number of researchers (FTE) Source: OCDE (9 April 2015).

Three main facts should be acknowledged, as described in the following paragraphs.

- By concluding in 2012-2013 about 1,200 contracts of doctorate researchers (including about 40% foreigners), which were selected on the basis of an international competition five years earlier, and open only 400 new positions, nearly a thousand doctorate researchers were forced to leave the country in the last two years. The number of contracts of doctorate researchers funded by the Portuguese Science and Technology Foundation was only partially maintained until 2013 and

strongly reduced in 2014, when it should have been significantly increased to avoid the forced emigration of the most qualified.

- By reducing the number of post-doctoral grants awarded annually by FCT (Figure 3), forced emigration of the most qualified increased even more. By reducing to half the number of new PhD scholarships publicly funded and by reducing to the size of national contests, the Government declared that the best prepared young people had no future to do science in Portugal.

- By reducing the level of investment in R&D and by increasing the lack of transparency in research assessment exercises, the Government called into question the future of science and the future of Portugal. There were cases where the only expert in this evaluation would not resume to be hired by the institution evaluated.

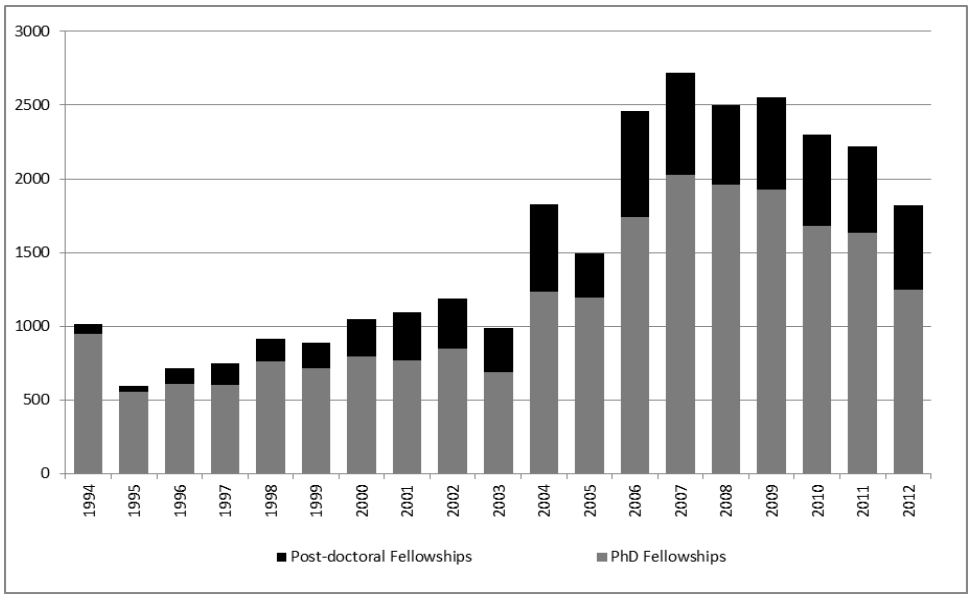

Figure 3 – Number of new fellowships granted per year by the Portuguese Science and Technology Foundation, FCT, 1994-2012. Source FCT (26 January 2015).

All, higher education institutions, teachers, scientists and students, have criticized policies implemented to destroy what had ensured the success of science and the overcoming of Portuguese scientific backwardness. But, beyond financial issues, a major action against the consolidation of the Portuguese research system has been implemented through the Portuguese Science Foundation in

terms of adopting new procedures for the national research assessment conducted every 4 years, as launched in 2013 and established during 2014 and early 2015.

Since fifteen years ago that all Portuguese research centers were evaluated by specialists from foreign research centers, organized in specialized panels. Their names and curricula were public and advertised in advance to make it possible to correct errors, add skills, avoiding conflicts of interest or monolithic opinions. The research assessment system in place in Portugal has gradually improved and has become a major factor of external credibility of scientific development and of confidence of scientists in Portugal and in their institutions. Several leaders and various political majorities helped consolidate it until the current government decided to subvert and fake. So far, all institutions classified with good, very good or excellent marks had multi-year institutional funding, indexed to the number of PhD researchers.

By the end of 2013, FCT and the current government decided to change procedures and concentrate funding in about half of the research units. This has been established by ignoring the widespread criticism of scientists and universities and using the trick of irresponsibility: hired in secret, without competition, an international institution today diminished and with reduced competence in the evaluation of institutions at any national scale was contracted to perform the national assessment exercise. It made use of a very reduced number of panels, and after a preliminary administrative assessment. The net result was a fully flawed evaluation, deeply criticised at national and international level (see enclosed list of sample references), as clearly discussed in “a call to those who care about Europe’s science” published in Nature in October 2014, among many other international journals.

Overall, the use of the results of the research assessment exercises for strategic management within the institutions has become infeasible. As a result, the scientific community now suspects of science policy agents and this is harmful to the healthy development of science and Portugal. It is now vital to regain confidence in those agents and ensure predictability of public incentives, ensuring proper planning of institutions and the management of research careers, as well as the restoration of

transparency and regularity in the functioning of scientific policymaking. This is a priority, along with ensuring that science is considered an inalienable right of all Portuguese.

It should also be noted that the considerations made above must consider that the number of researchers grew in Portugal over the last thirty years with relatively low levels of R&D funding per researcher (Table 1), together with relatively low accumulated levels of science investment over the past few decades. Building up the nation's scientific development to a position similar to European average requires a sustained investment in science, at a rate faster than those in remaining EU countries, and over a long period.

R&D Expenditure per Researcher (000' Dollars - PPP / Researcher, FTE)				
	Total	Business Enterprises	Higher Education	Government
Austria	223,40	246,49	173,90	281,90
Belgium	191,99	264,57	99,48	227,00
Czech Republic	143,28	158,49	121,60	142,14
Denmark	138,46	147,10	125,78	112,17
Finland	148,17	179,71	103,65	115,63
France	172,34	185,09	128,05	213,66
Germany	238,60	286,76	149,90	222,79
Greece	63,99	142,07	38,22	82,50
Hungary	98,70	119,85	59,89	76,97
Iceland	128,32	145,27	104,21	125,09
Ireland	173,00	200,94	117,90	292,07
Italy	172,70	230,00	125,48	147,97
Japan	214,18	221,79	139,46	419,68
Republic of Korea	200,93	192,13	132,22	308,62
Luxembourg	161,03	257,40	72,49	136,12
Netherlands	177,26	170,69	192,20	173,10
New Zealand	89,09	129,40	49,73	173,53
Norway	152,05	165,99	135,43	148,43
Poland	87,32	132,10	49,13	123,37
Portugal	70,06	115,13	48,16	108,86
Slovak Republic	66,63	186,36	33,75	76,29
Slovenia	149,99	214,28	61,83	93,11
Spain	124,07	181,06	74,34	138,46
Sweden	184,29	183,48	188,85	177,20
Switzerland	275,81	409,75	148,77	174,53
Turkey	112,29	118,13	98,88	165,66
United Kingdom	139,70	249,74	61,96	342,59
EU28	164,80	216,08	99,22	173,83
EU15	174,87	223,50	106,30	196,42
OCDE	215,21	245,77	120,17	321,98
China (People's Republic of)	198,53	244,63	78,14	164,90
Romania	51,13	54,99	28,12	71,52
Russian Federation	56,25	73,10	25,05	51,81
Singapore	208,80	251,29	137,18	406,30
South Africa	199,56	414,76	95,38	350,24
Chinese Taipei	186,56	211,78	88,77	240,09
Portugal/OECD	33%	47%	40%	34%

Table 1 – R&D Expenditure per Researcher (FTE), for last year available (2011 or 2013). Source: OCDE, April 2015

3. Implications and Recommendations

Three main recommendations for science policy in Portugal emerge from the analysis above, including counter-cyclical measures that should be implemented in association with the upcoming Structural Funds for Portugal for the period 2014-2020.

People: A human potential building program in science and technology in all areas of knowledge and including doctoral and post-doctoral fellowships, as well as strengthening the hiring of PhDs and scientific employment. The number of scholarships and research contracts to be awarded in national public contests should not decrease compared to 2012. The motto should be "Doing science in Portugal", in a way to give everyone who was recognized absolute merit opportunity to continue working in science in Portugal.

Institutions: enhancing autonomy and modernizing scientific and higher education institutions should be considered as a matter of priority, to guarantee an institutional framework of international reference and to facilitate its diversification along with specialization and the rejuvenation of the teaching staff of our institutions. Strengthening the autonomy of scientific and higher education institutions is a prerequisite for modernity of our societies that has to be valued by the State, especially in times of great financial constraints.

Incentives: strengthening competitive grants for projects and R&D ideas, including ideas added by SME's to support for business R&D in cooperation with scientific institutions. The implementation in Portugal of international best practices in the commercialization of scientific research should be further revisited by adopting mechanisms to support scientific employment in companies and include ways to support exploration projects , technology licensing and demonstration projects by SMEs.

The future of Portugal requires more knowledge and more scientific culture, ensuring access to science and education as an inalienable right of all. More science and the systematic democratization of access to knowledge means more equal opportunities, more social mobility and a new stimulus for entrepreneurial activities in Portugal.

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