THE EXPLOSION OF DOCTORAL DEGRESS IN PORTUGAL

POLICY IMPLICATIONS

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Abstract: Portugal had the largest increase in graduation rates at doctoral level among OECD countries and reached a position among the top rates in the last 4 years. This is odd when viewed in the context of most human resource and development indicators. This “inflation” of degrees was observed mainly in diplomas granted domestically, which represent about 90% of total, but also in degrees of Spanish universities. When decomposed by field of knowledge, there was a large decrease in the Exact and Natural Sciences and an increase in Humanities. The share of foreign graduates dropped significantly, which in part limits the improvement in the competence of faculties. Moreover, the number of Science and Technology and Economics and Management degrees given by foreign universities, which are crucial to increase the technological capabilities of the economy, has not increased in the last four decades. We identify some distortions in educational policies, make some brief recommendations and need of further research.

Having benefitted from highly specialised research training and produced an original contribution to science, doctoral holders are expected to play a key role in the knowledge economy as they stand in a position to drive forward advances in science, technology and knowledge about society, thus playing a major role in innovation. In general, doctorate holders dominate jobs at universities for teaching and research[1] and occupy leading and large segments of research institutions in state laboratories or in private business firms.

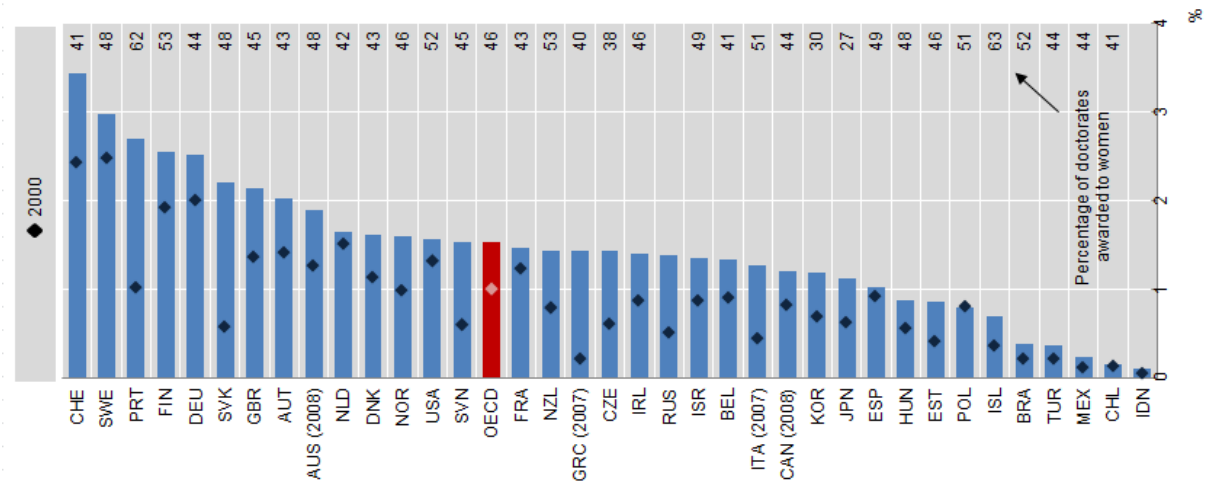
Statistical data shows an extraordinary increase in doctorate holders in Portugal since the second part of the 1990s until the early 2010s, among the highest (if not the highest) in the OECD and Partner countries. The purpose of this short paper is to investigate the composition and factors behind this evolution, using a data base of the Ministry of Education and Science. From this preliminary analysis we are already able to raise some important policy questions, but a larger research is needed to characterize the working of the job market for holders of doctorate degrees.[2]

1. Portugal had the largest increase in graduation rates at doctoral level among OECD countries in 2000-2009 and has been since the second half of the 2000s decade among the country with the highest graduation rate. Figure 1b gives data for 2012 distinguishing students that originate in foreign countries to study and take their doctoral degree in universities of the country indicated in the figure. Only Nordic countries, and Germany in some years, have graduation rates higher than Portugal.

This is odd when viewed in the context of most human resource and development indicators. Most of these indicators place Portugal still below the OECD average and stock levels are clearly among the lowest in the OECD.

Figure 1a: Graduation rates at doctoral level (2009)

as a percentage of population in reference age group



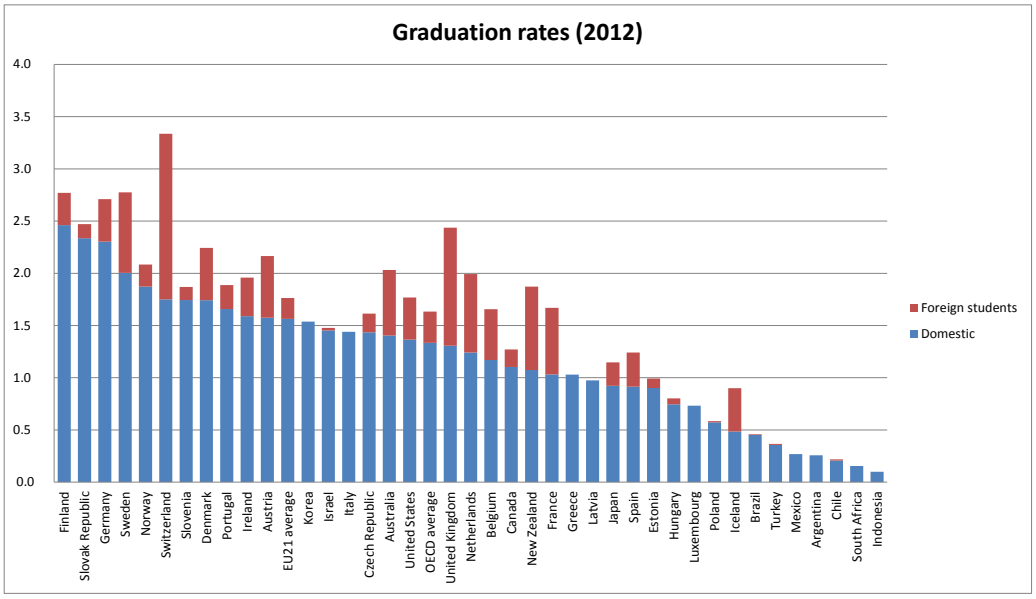
[1] Although a large number of these doctorates would claim that they do both: teaching and research, in reality, except for global leading universities, most of their time is spent in teaching and only part of the research contributes to advances in basic science or to innovation.

[2] Our analysis at the international level draws on the study by OECD, UNESCO and Eurostat (2013) that uses a consistent set of surveys carried in some OECD countries.

Source: OECD, Science, Industry and Technology Scoreboard 2011.

Figure 1b: Graduation rates at doctoral level (2012)

as a percentage of population in reference age group, by origin of student



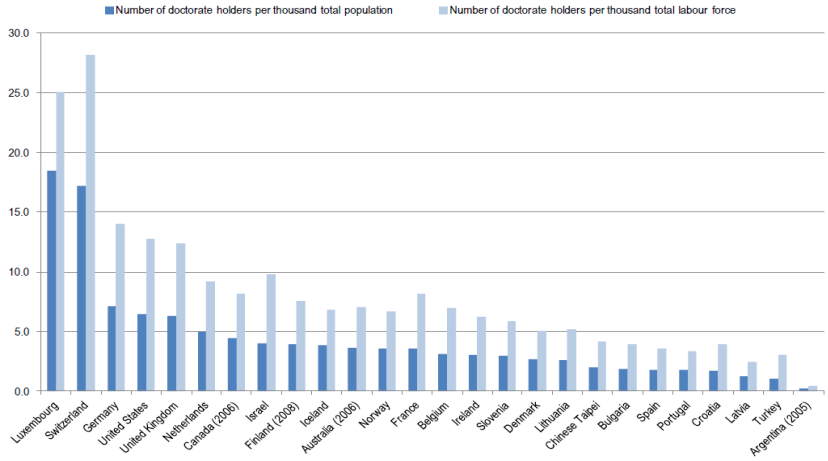
Source: OECD Education at a Glance, 2014

The number of holders of doctorate degrees (stock) increased from 5.8 thousand in 1980 to 28.2 thousand in 2014, an almost 5 fold increase.[3] However, as Figure 2 shows, Portugal was still among the OECD countries with the lowest ratio of doctorate holders per population, which is in line with most of the indicators of human resource endowments of the country.

Thus, the main problem is not that Portugal has at the moment too many doctorates but that the rates of increase are extremely high. Which raises several issues: (i) Is the education system training the right type of graduates? (ii) Is the market for doctorate holders working efficiently? (iii) Or are there distortions that led to that high increase?

[3] Estimate based on the stock for 2012 and flows given by the statistics of Thesis registered, and assuming a 1 per thousand mortality rate.

Figure 2. The relative importance of doctorate holders in the population
2009 or most recent year, doctorates per thousand

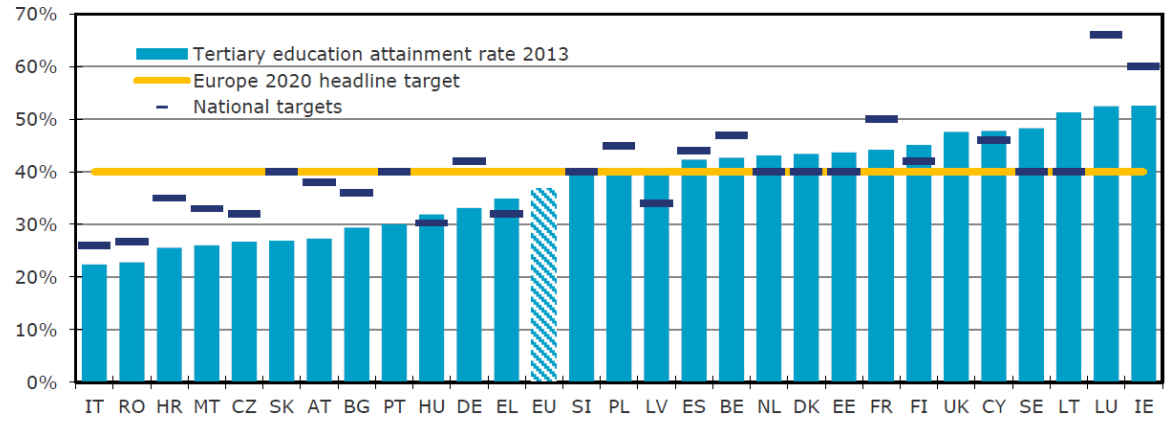


Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010; OECD Main science and technology indicators, OECD Education attainment database, US Census Bureau (ACS, 2009).
Notes: Data for the Netherlands and Spain refer to graduation years 1990 onwards. For Spain, there is limited coverage of individuals who graduated over the years 2007 to 2009. Data for Chinese Taipei only include those doctorates in National Profiles of Human Resources in Science and Technology (NPHRST) made by STPI, NARL, Chinese Taipei.

There is a clear disconnect between the graduation rates of doctorate holders with other education indicators. A simple comparison with the rate of tertiary education attainment, a measure of graduation at higher education levels (levels 5 and 6) suffices: Portugal is still far behind the EU average in 2013 (Figure 3).

Figure 3

Figure 2.2.1. Tertiary education attainment (2013) and target levels (%)

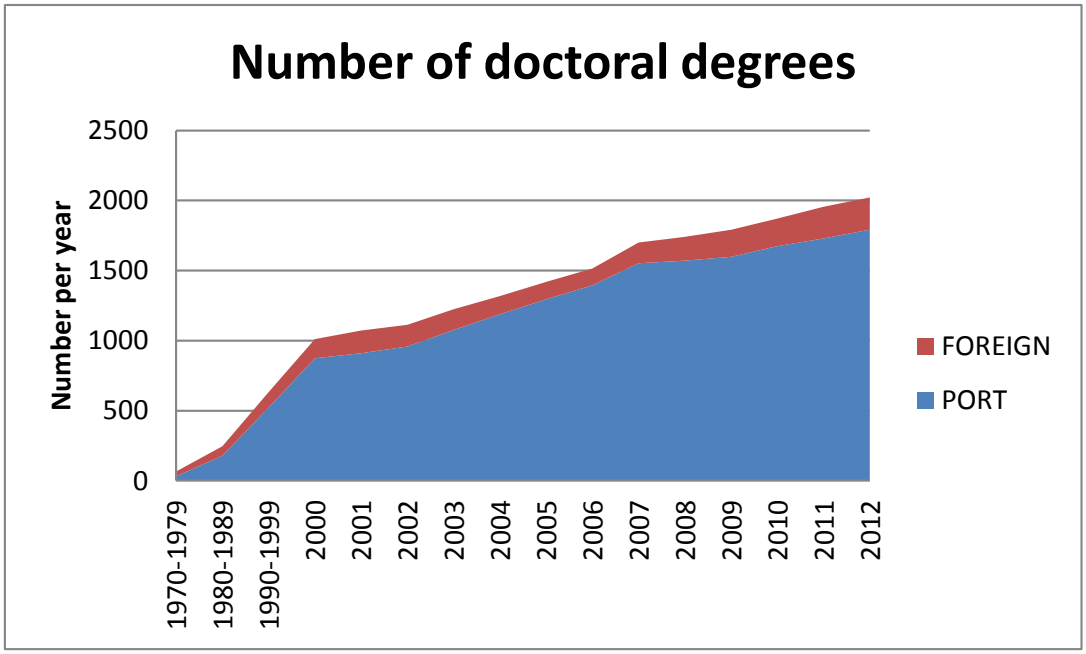


Source: Eurostat (LFS). Online data code: *t2020_41*. Note: The indicator covers the share of the population aged 30-34 years having successfully completed ISCED level 5 or 6. National targets follow different definitions of the indicator in some countries (see Table 2.2.1).

2. This “inflation” of degrees was observed mainly in diplomas granted by national universities, which represent about 90% of total doctorate degrees granted or foreign degrees certified. In the 1980s the number of doctorate degrees granted increased 5.2 times from the previous decade, but from a low level (Figure 4). In the 1990s decade it grew 2.9 times and doubled again from 2000 to 2012.

The share of graduates from foreign universities that was 38% in the 1980s dropped to 12% of the total in the 1990s. This is not encouraging because it means that the international transfer of knowledge and skills has decreased substantially.

Figure 4

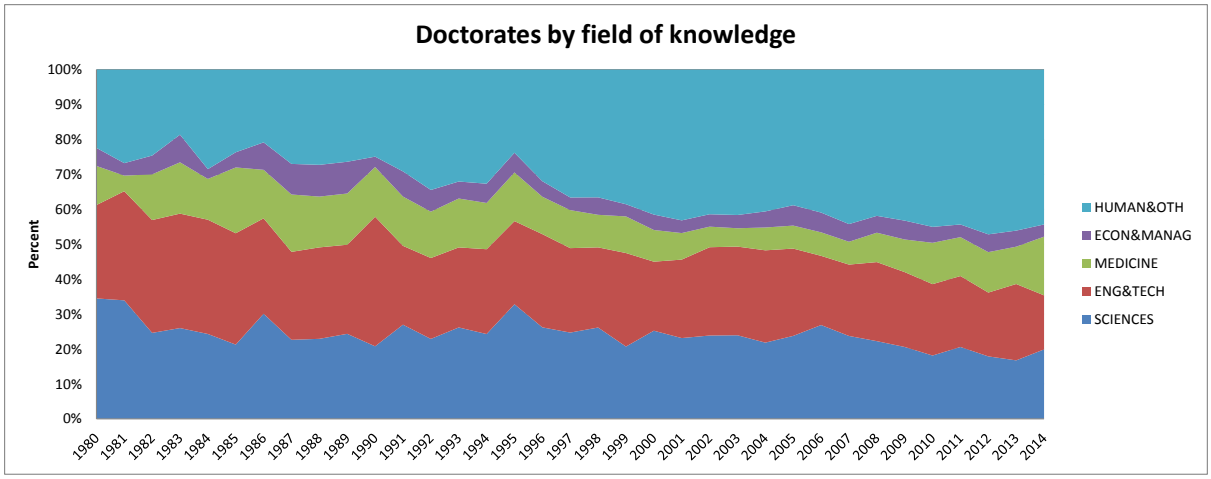


3. Another negative trend is the decrease in doctorate holders that have a more direct impact in the technological capacity of the economy. By field of knowledge, there was a large decrease in the Natural and Exact Sciences (12 pp from the early 1980s to 2010-2014), in Engineering and Technology (11 pp) compensated by an increase of about 20 pp in Humanities and others. Economics and Management and Medical and Health Sciences kept around the same share (Table 1 and Figure 5).

Table 1: Share of total doctorate degrees by field of knowledge

	1980-83	1991-93	2010-14	Change
NATURAL AND EXACT SCIENCES	31.01	25.34	18.64	-12.37
ENGENEERING AND TECHNOLOGY	30.09	22.89	19.27	-10.82
MEDICAL AND HEALTH SCIENCES	9.58	13.79	12.41	2.83
ECONOMICS AND MANAGEMENT	4.71	6.10	4.28	-0.43
HUMANITIES AND OTHERS	24.60	31.89	45.40	20.80

Figure 5



Source: DGEEC database: computations by the Author.

4. Let us concentrate now on doctorate degrees given by foreign universities and certified by Portuguese institutions. Table 2 reports the total number of doctorate degrees earned in foreign universities by the Portuguese university of certification. First, the UK was the country with the largest source of graduates with 1.8 thousand (37% of total), followed by Spain (24%), USA and France (both with about 15%). The long standing universities of Lisbon, Porto and Coimbra certified about 41% of the total, with the largest share by University of Porto, followed closely by Tecnica de Lisboa. It is impressive how universities founded relatively recently have already certified (and most likely hired) already a number of doctorate holders similar to the long-standing ones, as we compare Minho and Coimbra.

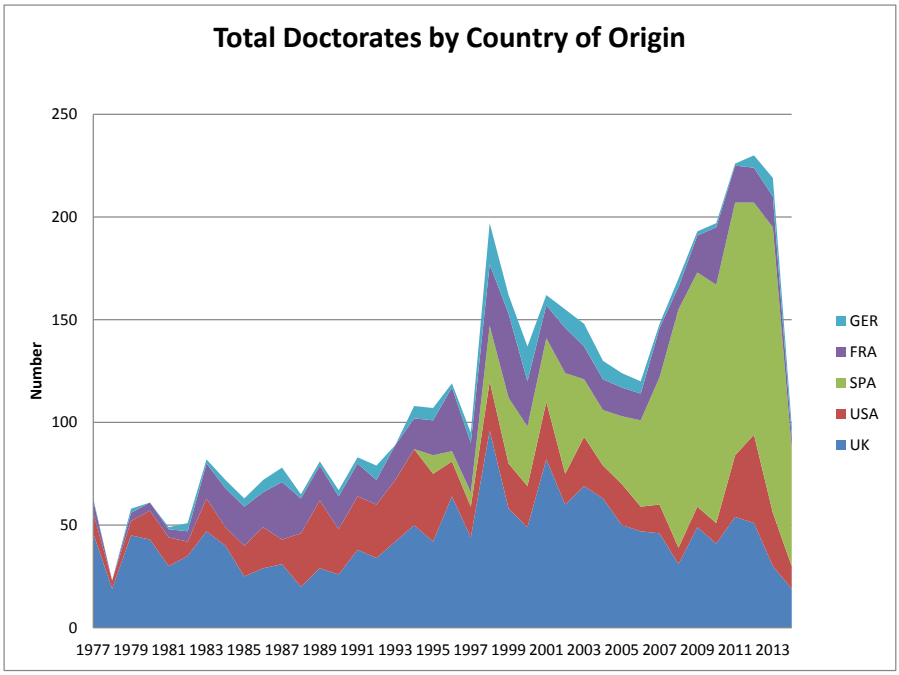
Table 2: Doctorate degrees by Foreign Universities recognized by Portuguese Universities (1970-2014)

	UK	SPAIN	USA	FRANCE	GERMANY	CANADA	NETHERLANDS	TOTAL
UNIV LISBOA	66	57	94	111	30	10	13	381
UNIV NOVA LISBOA	50	57	78	71	19	9	9	293
UNIV TECNICA LISBOA	147	60	196	95	19	5	12	534
UNI CATOLICA	2	7	24	4	1	7	0	45
UNIV PORTO	130	184	81	107	20	16	19	557
UNIV COIMBRA	91	46	28	45	19	4	10	243
TOTAL	486	411	501	433	108	51	63	2053
OTHERS, from which	1337	789	256	247	106	79	55	2869
UNIV AVEIRO	57	18	15	24	6	3	2	125
UNIV MINHO	83	34	37	33	6	5	8	206
UNIV ALGARVE	13	26	11	45	3	0	5	103
UNIV EVORA	8	29	13	11	3	4	0	68
TOTAL	1823	1200	757	680	214	130	118	4922

Source: DGEEC data base with Author's calculations

Foreign universities degrees increased by about 2 times in the 1980s relative to the 1970s and then by 1.6 times in the 1990s and again by 1.7 in the 2000-2014 period. However, the increase after 1998 was mainly due to diplomas from Spain, with large representation of "peripheral" universities.[4] The number of graduates from UK and USA, where the best rated universities are located has decreased since the beginning of this century (Figure 6).

Figure 6



5. Mimicking the trends in overall degrees, another negative trend is observed in terms doctorate degrees earned in foreign universities by field of knowledge (Figures 7a and b). The number of Science and Technology and Economics and Management degrees given by foreign universities has not increased in the last four decades. There was even a substantial decrease after the mid-2000s that is only being filled by the joint degrees between Portuguese and American Universities.

Figure 7a.

[4] Universities of the regions with rather low international standing.

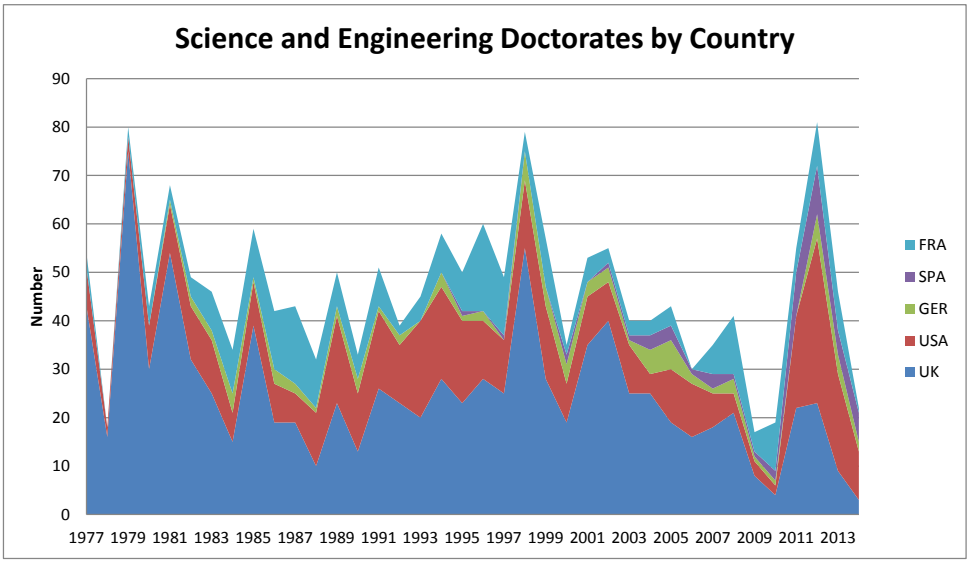
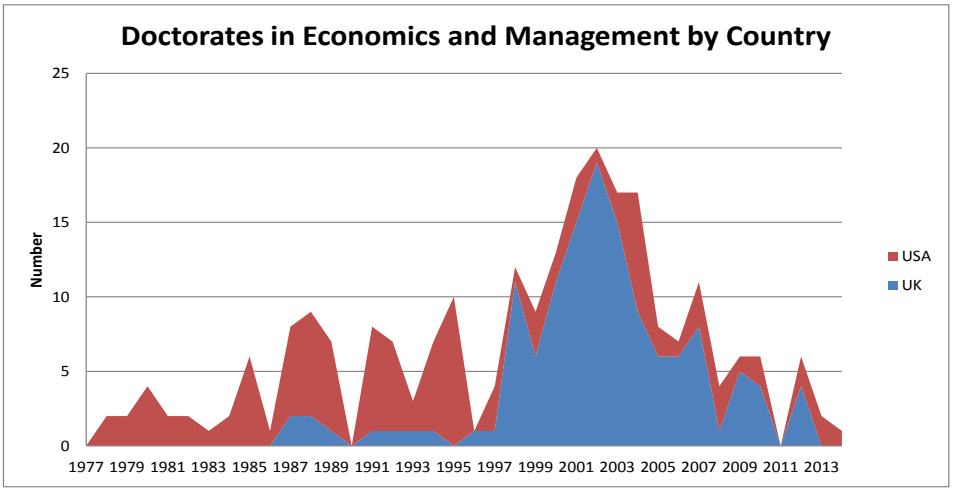


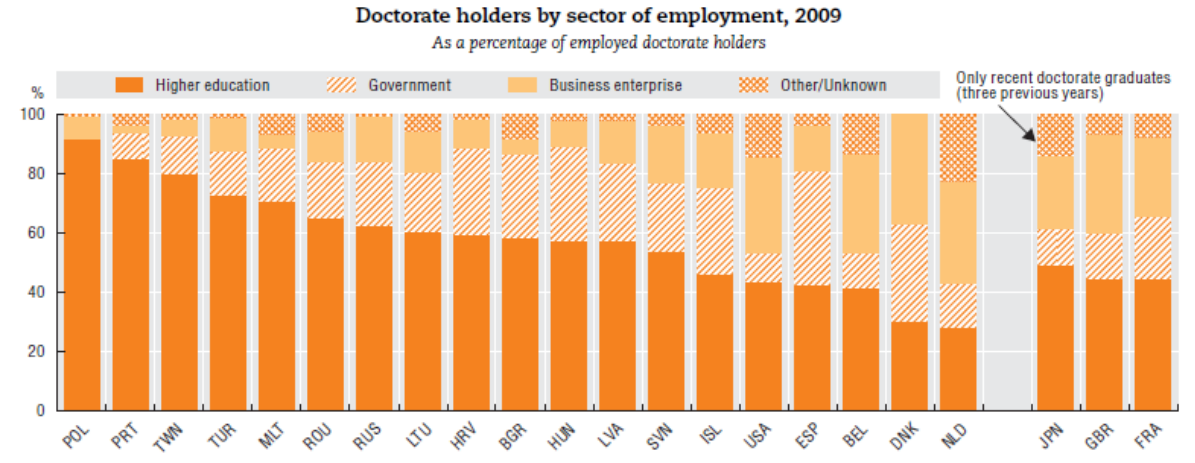
Figure 7b.



Source: DGEEC with Author's computations.

6. Portugal is among the OECD countries with the lowest level of doctoral graduates employed by enterprises. In 2012 the Higher Education sector occupied 19.5 thousand doctorate holders (82.7% of total), the State sector 1.9 thousand (7.9%), the Non-profit Organizations 1.2 thousand (5.3%) and the Enterprise sector 977 individuals (4.2%). According to the OECD (2013) study, at least one-third of employed doctorate holders in Belgium, Denmark, Netherlands, USA, Japan and UK are in the business sector which attracts those specialized in engineering as well as chemical scientists (Figure 8). Labour survey data for the USA and UK show that the education sector employs above one-third of the total population of doctorates, followed by the health, business and professional services sectors. Manufacturing is the fourth largest destination followed by public administration. Doctorates are not only employed in professional but also in management occupations (OECD (2013)).

Figure 8



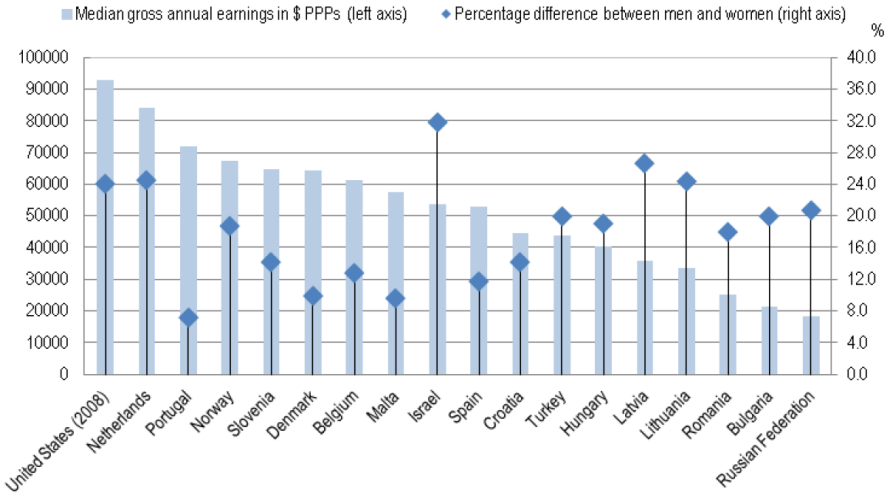
Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010, *www.oecd.org/sti/cdh*, June 2013. See chapter notes.

7. The supply and demand of doctorates seem to be in balance in Portugal. In fact, the unemployment rate for doctorate holders is quite low and below the national average. For engineering the rate of unemployed plus inactive was in 2012 4.4%, and the highest 8.8% for humanities. However, the market is strongly influenced by the state. First, the public higher education sector dominates the market, where salaries and other conditions are set by the government. The demand for graduates depends on regulations for attributing professorships and required structures by institution.

According to OECD (2013) international comparisons put Portuguese doctorate holders as the third best paid (Figure 9). Besides, in most of the OECD countries, doctoral researchers are better paid in the business than in the higher education sector. For the USA, taking into consideration other characteristics, the gap is about 25%, a country where academic jobs are relatively well paid. In Portugal the reverse happens (as in Spain). The business sector pays on average 17% less than higher education (Figure 10. The largest gap is in humanities where the gap is about 45%. These facts are also consistent with the low mobility between the business and higher education sectors. The same low mobility is observed between the higher education and state sectors.

Figure 9

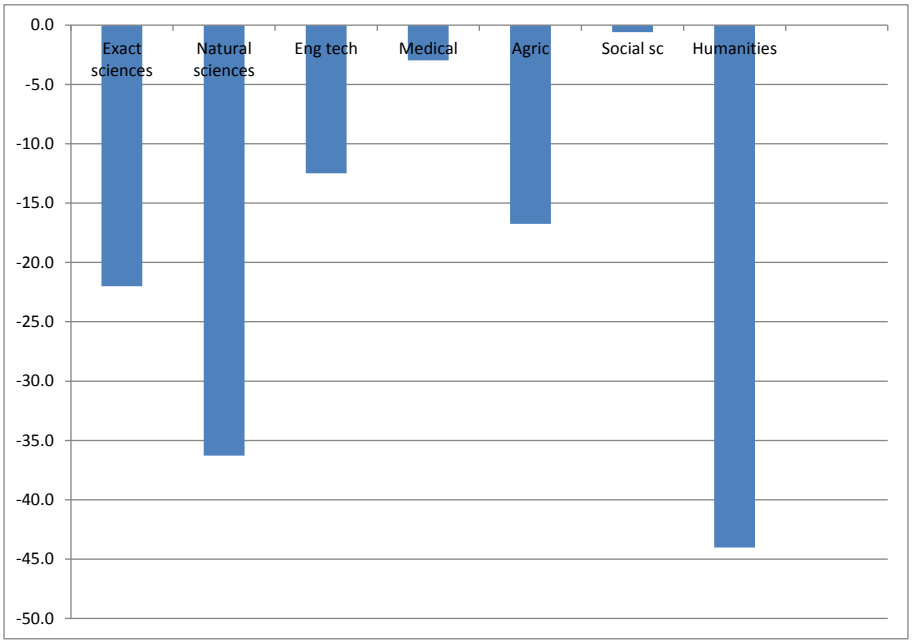
Figure 13. Median gross annual earnings of doctorate holders
USD PPPs, 2009



Notes: Figures are in US dollars adjusted for differences in purchasing power (parity) (PPP). Data for Hungary, the Netherlands and Spain refer to graduation years 1990 onwards. For the Russian Federation, data relate only to those doctoral graduates employed as researchers and teachers. In this case, earnings for doctorates working as managers would be excluded for example. For Spain, there is limited coverage of doctorate holders who graduated between 2007 and 2009. Data for Turkey exclude foreign citizens. Data for the United States exclude doctorate holders who received degree abroad and who received a doctorate in humanities.
Source: OECD, based on OECD/UNESCO Institute for Statistics/Eurostat data collection on careers of doctorate holders 2010.

Figure 10

Differentials in pay between business and higher education



8. Policy recommendations. This “inflation” of degrees represents to a large extent a waste or misallocation of resources, if a large of these resources are either not qualified to have a doctoral degree, the standards for attributing the degree are rather low since they transmit the wrong signal, or the economy is not able to absorb them into productive jobs.

(i) There should be a revision in education policies to tighten the criteria for attributing the doctoral degree. Similarly, wage policies and performance evaluation should be subject to periodic market

tests. The uniformity of salaries across all specializations in public universities introduces substantial distortions.[5]

(ii) There should be more information on the market for doctorates by field of knowledge. There should be an improvement of market mechanisms and creation of platforms for information on the situation and prospects for students that are contemplating a doctorate degree.

(iii) To discourage the high rate of increase of doctorates in humanities and others there should be a close control of the positions for professors in these specializations at public universities.

(iv) To facilitate the integration of doctorates in enterprises there should be some joint programs by universities-laboratories-enterprises to avoid waste of resources.

(v) The current program to transfer them from the public sector to enterprises can be useful, but more needs to be done to improve the value for money of these policies. We have serious doubts about its effectiveness, since it targets about 1.5 thousand doctorate holders, a large number in the Portuguese market – it is larger than the number in the State. The business sector needs mainly engineering and applied science graduates, the qualification with the lowest increase in terms of supply. The other factor is the persistent gap against remunerations in the private sector.

Further research is need in terms of exploiting the data of doctorate holders by university giving the degree and its employment. Using the international classification system of universities it will allow the study of the ratings of faculties. Another important question is to determine why the level of employment by enterprises is among the lowest in OECD, evaluating the role of state led distortions and demand factors.

[5] E.g. humanities has a similar pay scale to medical doctors or specialists in engineering or sciences, although the relative surplus in the supply of humanities and scarcity of S&T graduates.

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