

Chapter 7

‘Pulled’ or ‘Pushed’? The Emigration of Portuguese Scientists



Ana Delicado

7.1 Introduction

The literature on international mobility of the highly skilled often makes the distinction between ‘pull’ (which attract skilled workers to a country) and “push” (which repel workers away from the country of origin) factors. These factors are associated with, among other conditions, differential material and symbolic resources between countries. Thus, migration in scientific professions largely occurs from the periphery to the centre of the world system of science.

Portugal, as a semi-peripheral country, has traditionally been a sending rather than a receiving country for scientists. Exit trends were actively encouraged throughout the last few decades by national science policies (training of human resources that provided opportunities for studying and working abroad) and by European policies (of intra-EU mobility), sustained by an objective of capacity building that would later be capitalised by scientific research in the country of origin, through the return of these scientists or the formation of diaspora networks. Similarly, the growth of resources in the Portuguese scientific system came to be a factor for attracting foreign scientists to Portugal.

However, the current economic crisis and reduced investment in science may be dictating an increase of outflows and a change in the factors of attraction or repulsion of Portuguese scientists in mobility.

This chapter aims to discuss some of these issues, based on a research project carried out between 2007 and 2009 on the international mobility of Portuguese scientists, in which a survey of Portuguese scientists abroad (N = 521) and semi-structured interviews with returning researchers (N = 32) were conducted.

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137

7.2 International Scientific Mobility

The international mobility of scientists is a particular type of skilled migration that has merited a great deal of attention from scholars in the past few decades. There is an abundance of studies commissioned or funded by supra-national entities such as the European Commission (such as the analysis of Marie Curie Grants performed by Ackers et al. (2001) and Van de Sande et al. (2005) or the FP7 funded project E*CARE – Ivancheva and Gourova 2011) or OECD (2001, 2002), as well as research on specific sending or receiving countries (see, for instance, the work coordinated by Louise Ackers on flows between Italy and the UK – Ackers 2005; Gill 2005; Morano-Foadi 2006) or on specific sectors (such as biomedical research – Diaz-Briquets and Cheney (2002) – or ICT and biotechnology – Casey et al. (2001)).

Even though the relative figures concerning the mobility of scientists may be small within skilled migration, it does have a significant socioeconomic impact. Public and private investment in science has grown considerably in recent years and research institutions compete for the best researchers and students.

Mobility trajectories in science tend to follow fairly predictable patterns: from the periphery to the centre of the science world system and between centres. Scientists are attracted to scientific systems which are large (measured by the number of researchers, for instance), wealthy (in terms of R&D expenditure), more productive (in terms of publications and patents) and highly internationalised, such as the UK and the US (Hirt and Muffo 1998; Alarcon 1999; Mahroum 2000; Casey et al. 2001; Diaz-Briquets and Cheney 2002; van de Sande Ackers and Gill 2005; Millard 2005; Morano-Foadi 2006; Szélenyi 2006; Baruch et al. 2007; Fontes 2007). However, exit countries can also receive scientists, but they usually come from even less scientifically developed countries.

Scientific mobility is also characterised by circulation (multiple movements) rather than linear flows (Mahroum 2000; Ferro 2004; Gill 2005; Morano-Foadi 2006; Ivancheva and Gourova 2011; Schiller and Diez 2012; Geddie 2013). Scientists often spend time in different institutions and countries throughout their career, either through successive work contracts or visiting fellowships. Mobility has many positive effects, such as the training of human resources, fostering the circulation of knowledge (Ivancheva and Gourova 2011; Schiller and Diez 2012) or building diaspora networks between the home and the host countries (Meyer and Brown 1999; Rizvi 2005; Thorn and Holm-Nielsen 2006; Meyer and Wattiaux 2006; Favell et al. 2006; Mahroum et al. 2006). However, it can also deprive some countries of their more valuable human resources, which has been characterised as ‘brain drain’ (Jalowiecki and Gorzelak 2004; Morano-Foadi 2006; Baruch et al. 2007; Ivancheva and Gourova 2011).

7.3 Scientific Mobility Trends in Portugal

Portugal has been mainly an exit country for researchers in mobility, although in the past decade the country has also attracted researchers from abroad. Public policies in place since the 1990s have favoured exit flows, in particular for advanced training of human resources (PhD and post-doctoral grants), thus aimed at temporary stays abroad. However, no specific incentives for the return of mobile scientists were included in these policies (other than the EU wide Welcome programme, aimed at European researchers working outside the EU). Conversely, some policy measures have also favoured the inflow of foreign researchers to Portugal, such as opening up PhD and post-doctoral grants to foreign nationals and the Invited Research Chairs Programme (2008).

Though official statistics are scarce, incoming and outgoing trends can be gleaned from proxy indicators, such as the grants allocated by the Foundation for Science and Technology (FCT) or the fellowships integrated in Marie Curie Actions.

Between 1994 and 2015, FCT has awarded 4599 grants for pursuing PhDs abroad (19% of the total grants) and 5476 grants for mixed PhDs (hosted by both a national and a foreign institution). However, during this period significant changes are noticeable (Fig. 7.1). Whereas in the 1990s PhD grants abroad represented close to half the total of grants, this ratio has been declining since the 2000s, reaching just 2% in 2015. Mixed grants show a reverse trend: fairly uncommon in the 1990s (below 15%), they almost doubled in later years (31% in 2015).

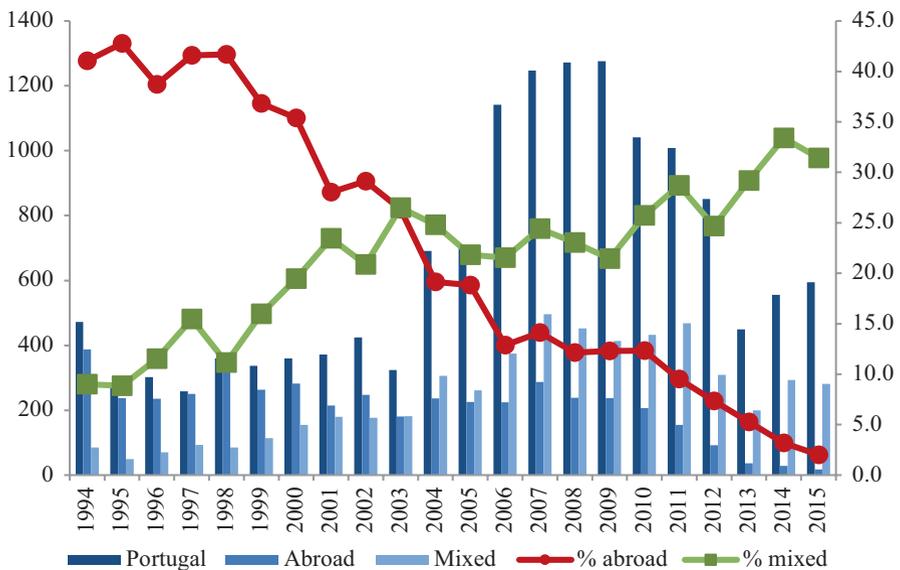


Fig. 7.1 PhD grants awarded by FCT (1994–2015).

Source: FCT, <http://www.fct.pt/estatisticas/bolsas/index.phtml.pt>. Accessed 26 April 2018

Post-doctoral grants abroad have always been less-favoured than those hosted by Portuguese institutions (Fig. 7.2): only 756 grants were awarded between 1994 and 2015, representing just 9% of grants in this period. The downward trend is quite visible and since 2009 this type of grant has dropped below 5%. No such grants were awarded since 2012 (other than one in 2015). Mixed post-doctoral grants have fared a little better, with 1696 grants (20% of the total), although the numbers have been decreasing also in the past few years.

Conversely, the number of grants awarded to foreign nationals to carry out their PhD or post-doctoral research in Portugal has been growing (Fig. 7.3). PhD grants have yet to reach the levels of outgoing grants: 2299 PhD grants were awarded to foreign nationals between 1994 and 2015, which represents less than half the PhD grants abroad. But the 2544 post-doctoral grants awarded to foreign researchers (29% of the total grants) almost treble the post-doctoral grants for doing research abroad. Also, regarding the Programme ‘Compromisso com a Ciência’, that between 2007 and 2008 provided 5-year contracts in Portuguese research institutions for about 1200 researchers, 41% of the beneficiaries were foreign researchers, but 35% already had a PhD from a Portuguese university and a few more were working at a Portuguese institution before these contracts. This shows that Portugal has become an attractive country for researchers in mobility, though mainly from other peripheries: most of these foreign researchers came from Brazil, southern Europe (Italy, Spain), Eastern Europe (Russia, Bulgaria, Romania, Byelorussia, Ukraine), Asia (India, China) (FCT 2009).

These figures leave out the unknown amount of researchers that leave the country outside the scope of FCT programmes, with grants from other institutions or hired

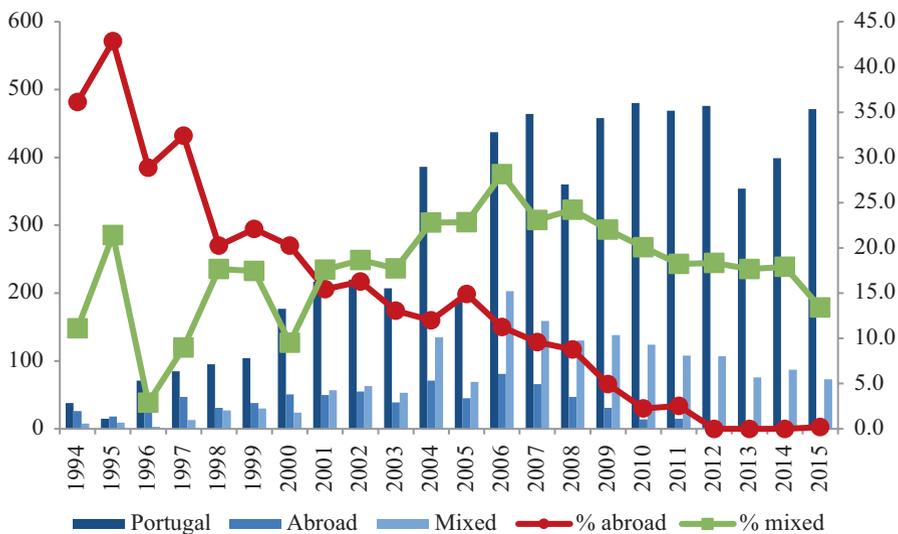


Fig. 7.2 Post-doctoral grants awarded by FCT (1994–2015).
 Source: FCT, <http://www.fct.pt/estatisticas/bolsas/index.phtml.pt>. Accessed 26 April 2018

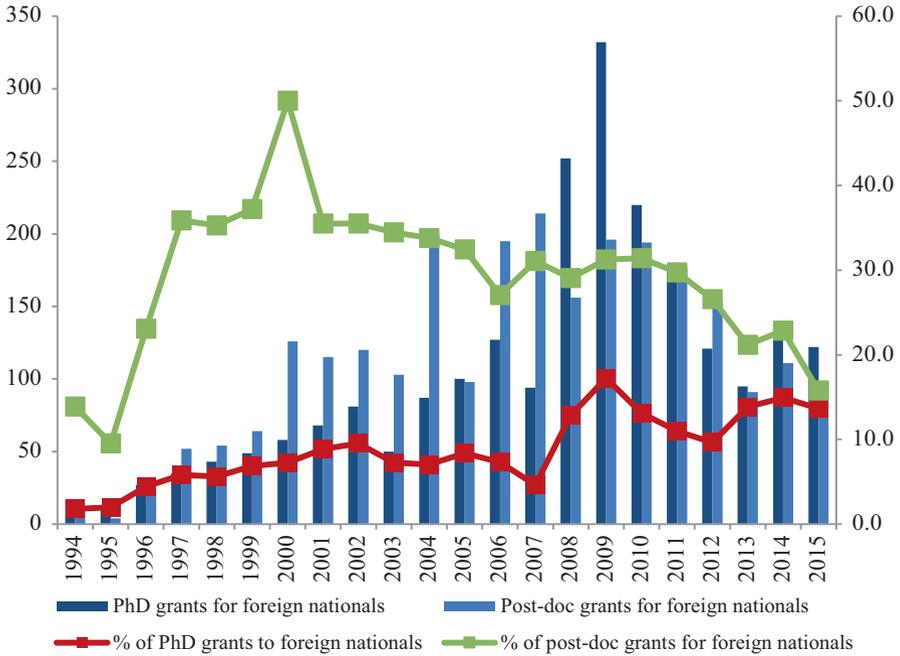


Fig. 7.3 PhD and postdoctoral grants awarded by FCT to foreign nationals (1994–2015). Source: FCT, <http://www.fct.pt/estatisticas/bolsas/index.phtml.pt>. Accessed 26 April 2018

by research centres abroad. But they also leave out foreign researchers hired by Portuguese research centres and universities. However, these figures do show that outbound mobility sponsored by the main government funder of research in Portugal has been significant in the past few decades but is slowing down, whereas foreign researchers are entering the system, stimulated by the availability of grants. Unfortunately, there is no publicly available data on the origin of these researchers that could shed some light on if they are coming mainly from other peripheral countries in Europe or from other continents.

A more accurate indicator of inbound and outbound flows may be the Marie Curie Programme, which in the past decades has played a significant role in funding intra-European mobility (Table 7.1). It is noticeable that although an imbalance persists (the number of outgoing fellows is higher than the number of incoming fellows), it has been significantly reduced in the most recent editions of the programme.

Table 7.1 Number of participants in Marie Curie Actions: incoming fellows (foreign nationals in Portuguese host institutions) and outgoing fellows (Portuguese nationals in foreign host institutions)

	Outgoing	Incoming
FP4 and FP5 (1994–2002) ^a	173	69
FP6 (2002–2006) ^b	24	10
FP7 (2007–2014) ^c	24	21

^aIncludes all Marie Curie Actions, Van de Sande Ackers and Gill (2005, 16, 69)

^bIntra-European Fellowships for Career Development (IEF) and International Outgoing Fellowships for Career Development (IOF), Pina (2009)

^cIntra-European Fellowships for Career Development (IEF) and International Outgoing Fellowships for Career Development (IOF), FP7-PEOPLE Marie Curie Actions, Country fact sheet: Portugal, 26 May 2014, http://ec.europa.eu/research/mariecurieactions/documents/funded-projects/statistics/eu-countries/marie-curie-actions-country-fiche-pt_en.pdf

7.4 Pull and Push Factors

Circulation flows are often explained in terms of ‘push’ and ‘pull’ factors (Todisco et al. 2003; Jałowiecki and Gorzelak 2004; Thorm and Holm-Nielsen 2006; Baruch et al. 2007; Ivancheva and Gourova 2011; Schiller and Diez 2012). In general, the first concern conditions less conducive to scientific activities in the country of origin and the latter the favourable conditions in the country of destination. Among the most common factors of ‘attractiveness’ are not only scientific conditions (the resources available for scientific activity, namely funding and equipment; the quality of the research environment; development in cutting-edge areas; the opportunity to work in the team of a prominent scientist) and professional conditions (training and employment opportunities, wages, career progression) but also political (democratic regimes, incentives granted to skilled immigration) and cultural (language, lifestyle, cosmopolitanism, the presence of communities from the country of origin) (Todisco et al. 2003; Jałowiecki and Gorzelak 2004; Rizvi 2005; Thorm and Holm-Nielsen 2006; Favell et al. 2006; Baruch et al. 2007; De la Vega and Vessuri 2008).

The results of the survey of Portuguese researchers abroad carried out in 2007 (for a more detailed analysis, see Delicado 2010a) show that indeed scientists are ‘pulled’ to core countries of the science world system, in particular English speaking ones (Table 7.2): 29% were working in the United Kingdom and 27% in the United States. Close to two thirds are located in European Union countries that lead in the science field, in particular France, Netherlands and Germany. 4% of Portuguese researchers abroad are in Spain, which is explained more by geographical proximity than by scientific reasons. There are a few variations by scientific disciplines: the proportion of natural scientists in the US, of engineering researchers in Switzerland and of social scientists in English-speaking countries is slightly above average.

Table 7.2 Host countries of Portuguese researchers abroad (%)

European Union	64.9
UK	28.8
France	7.9
Netherlands	6.5
Germany	6.1
Spain	4.4
Other EU countries	11.2
Europe (non EU)	4.8
United States	26.9
Rest of the world	3.5

Source: Survey of Portuguese researchers abroad, 2007

Table 7.3 Motivations for leaving Portugal to work in research abroad (mean scores^a)

To learn new techniques/methodologies/theories	4.36
It is important for the scientific CV	4.24
Possibility to establish international scientific networks	4.19
To work in an underdeveloped area in Portugal	4.07
To use means or equipment unavailable in Portugal	4.00
To experience life in another country	3.77
Difficulties in enrolling in a PhD or finding a job in Portugal	2.70
Personal reasons (to be close to family and friends)	2.50
PhD students	
Quality of training is higher than in Portugal	3.73
To increase the possibility of working abroad after the PhD	3.52
To increase the possibility of finding work in Portugal	3.36
Senior researchers	
To obtain post-graduate training abroad	4.13
Getting a job in a foreign institution	3.55

Source: Survey of Portuguese researchers abroad, 2007

^aLikert scale: mean score between 5 (very important) and 1 (Not at all important)

The motivations for leaving Portugal (Table 7.3) and choosing a host institution abroad (Table 7.4) also shed light on the importance of pull and push factors. On the one hand, researchers are pulled by the opportunities to learn new things, to improve

Table 7.4 Motivations for choosing a host institution (mean scores^a)

Prestige of the institution	4.34
Available resources (labs, computers, library)	4.10
Having received an invitation to work at the institution (senior researchers)	4.03
Wish to work with a particular scientist	3.74
Multidisciplinary team	3.54
Country where is situated	3.35
Having previously met a member of the institution (PhD students)	3.28
Multinational team	3.10
Contacts with business companies	2.78
Recommendation from a professor or colleague in Portugal	2.76
Having already studied at this institution	2.40
Exchange or collaboration agreements with Portuguese institutions	2.29
Portuguese researchers in the team	1.51

Source: Survey of Portuguese researchers abroad, 2007

^aLikert scale: mean score between 5 (very important) and 1 (not at all important)

their CV, to join international networks, to work in a prestigious institution with specific material and human resources, to experience life in a new country. On the other hand, they are pushed abroad by the lack of means to perform research or lack of training opportunities in Portugal. However, this type of response was more common in researchers that had left the country longer ago, since the Portuguese scientific system has developed substantially in the past few decades and a wealth of PhD programmes in many scientific areas has been created.

The interviews with researchers that had returned to the country after doing their PhD abroad strengthen this argument.

Some mention as a motivation for leaving the country the lack of material resources:

The area I was working in (and still do) required very expensive equipment that didn't exist in the country at the time. We had very limited apparatus, it was really difficult to do innovative things, and that led me to leave (PhD in the UK in the 1980s, exact sciences, professor at a public university)

Others refer the lack of skilled human resources to act as supervisors:

There were very few people in Portugal with a PhD in Mathematics Education, less than a handful (...). I wanted to do my PhD in an area where we had nothing (...) one of my potential supervisors told me 'if you want to do it at this level, you have to go abroad because in Portugal no one knows anything about it (PhD in the UK in the 1990s, social sciences, lecturer at a polytechnic)

Others mention the scientific capital (Bourdieu 1975) they would earn through a PhD from a prestigious institution:

By being in this PhD Programme, we had the opportunity of going anywhere and even though, obviously, there were already good research groups in Portugal, we can't compare the conditions we have at the top world laboratories, in the top universities, with those we

have in Portugal. It never crossed my mind, since I had the opportunity to do the PhD anywhere in the world, not to do it in the best place, in a top place, so always outside Portugal. (...) it was an opportunity I must grab for what it would bring in terms of career, of human development, of professional development (PhD in the US in the 1990s, natural sciences, entrepreneur)

But not all researchers are solely motivated by scientific or career reasons. Living abroad in a pleasant city or a culturally stimulating country was also mentioned by some interviewees:

Paris, you know, remains a cosmopolitan city, symbolically was the city of lights, but its universities are still an international benchmark and therefore this was the motivation. Since I'm a researcher in history, as we know, France is a paradise for historians. (PhD in France in the 2000s, humanities, post-doctoral fellow at a research institute)

7.5 Return Mobility

As mentioned above, scientific migrations are often composed of multiple journeys, from and to different countries. A much discussed issue is the return flows to the home country after a period working and studying abroad. This is considered a prerequisite to avoid brain drain and draw benefits from scientific mobility, such as an accrued capacity to perform high quality research, to publish in prestigious journals, to train new practitioners, to take part in international networks, raising the scientific profile of the home scientific system.

Though difficult to estimate without official statistics, the return rate of Portuguese researchers has been significant. In 2006, 29% (3200) of the Portuguese PhD holders working in Portugal had obtained their PhD abroad (survey 'Career of Doctorate holders', GPEARI 2006). An analysis of the close to 1100 beneficiaries of the Programme 'Compromisso com a Ciência' (see above) shows that 12% were Portuguese researchers who had done their PhD abroad and a few others were working outside the country just before signing these contracts.

Here again push and pull factor may play a role in stimulating return mobility. According to the survey of Portuguese researchers abroad, close to half had the intention of returning to Portugal in the near future (Table 7.5). But the motivations were quite different from the ones mentioned as reasons for leaving the country. Family reasons are strongly predominant, followed by the wish to contribute to the development of the home scientific system or of the country itself. Scientific and career motivations, such as job opportunities and conditions to perform research, exert a reverse effect, justifying the decision of remaining abroad.

The interviews with returnee scientists paint a not so different picture, albeit generational effects also have some impact.

Researchers that left the country in the 1980s often had a previous contract with a Portuguese institution (mostly universities), something that become much less common from the 1990s onwards, when government programmes supported PhD fellowships abroad for young researchers with no permanent positions (for details,

Table 7.5 Intention of returning to Portugal or remaining abroad and respective motivations (%)

Intention of returning to Portugal	49.3
Motivations	
Family reasons	80.5
Wish to contribute to the Portuguese S&T system	73.9
Wish to contribute to the development of Portugal	69.9
Quality of life in Portugal	62.4
Previous contract with a Portuguese institution	15.9
Job offer in Portugal	12.4
Good conditions for research in Portugal	6.4
Intention of staying abroad	50.7
Motivations	
Lack of job opportunities in Portugal	65.1
Difficulty in performing high quality research in Portugal	58.2
Wish to extend the research experience abroad	56.0
Difficulties in career progression in Portugal	51.7
Low salaries in Portugal	46.6
Quality of life in the host country	44.4
Family reasons	28.0
Job offer in another country	26.3
Contract with an institution in the host country	22.0

Source: Survey of Portuguese researchers abroad, 2007

see Delicado 2010b). For these older researchers, a return to the home country was not only expected but also came with a guarantee of a stable position:

I had a job here and I think it never crossed my mind [to stay abroad]. Since the Portuguese government paid for my training, I had a moral duty to return. It didn't even cross my mind to stay. (PhD in the UK in the 1980s, natural sciences, professor at a public university)

But most researchers interviewed, both younger and older, stated that the main reason to come back was family ties:

For purely personal reasons, there is no objective professional reason to return, both for me and my wife. Parents getting older, my siblings, missing them, missing some things in this country. We made this choice, just because of this. (PhD in the UK in the 1990s, health sciences, researcher at a research centre)

For those without the safety net of a permanent position, the return home was often marred with difficulties. Few employment opportunities, limited welfare and labour rights of fellowship holders and inbreeding in Portuguese universities generate professional and scientific instability.

Employment opportunities don't really exist (...) the situation abroad is nothing like this. Your wage can be bad, the benefits can be bad, but we are workers, we have a contract, pay taxes. (...) I am not asking for a job for life, you also don't get it abroad, the contracts are for three or four years, but there are more opportunities, after this term one has other opportunities, applies and eventually gets another job. (PhD in the UK in the 2000s, natural sciences, post-doctoral fellow at a research institute)

I tried a few Universities. I will not go into details but you ought to know already (...) I know that in this specific case were three vacancies, I know I was entitled to one of them thanks to my CV. I didn't get it because I think that anyone who is abroad and returns to Portugal has (...) less chances of getting a job here than those who stay and do a PhD here, especially if you do the PhD with someone you already have been working with for a long time and promises are made... (PhD in the US in the 2000s, engineering sciences, business company employee)

7.6 New Exit?

Since international scientific mobility is often composed of consecutive movements from one country to another, it is not guaranteed that returnees remain in Portugal. The interviews with researchers show that many are unwilling to leave again, mostly for family reasons,

I would not want to leave Portugal for family reasons, for reasons, again, not related to the professional dimension I would not leave Portugal. But if I had no ties to the country and to the family probably I would have thought of returning abroad. This is because here I still do not have a sense of job security (PhD in Germany in the 2000s, engineering sciences, assistant professor at a public university)

and some even consider leaving science rather than leaving the country,¹

I want to stay. No doubt about it. In science or outside science, if I'm unable to find anything in science. But to stay. I do not say that in five or ten years I wouldn't consider spending some time abroad (...) I really enjoyed living abroad and really enjoy touring and traveling, but for now definitely not (...) I think I really like science but I think the personal life is more important (PhD in the UK in the 2000s, exact sciences, post-doctoral fellow at a research institute)

Others though envisage returning abroad if the conditions for performing research in Portugal worsen.

I enjoyed doing science with some international impact, if that is possible in Portugal and since I'm being closer to the family, I do not mind staying in Portugal. If in order to do science with some international projection I have to go abroad again, I see no other choice (PhD in the United States in the 2000s, natural sciences, temporary contract researcher at a research centre)

¹In fact, in the case of the following citation, this researcher ended up abandoning her scientific career and now works in the private sector, in an area unrelated to her training, since she was unable to get employment after her post-doctoral fellowship.

7.7 Current Trends

Most of the evidence presented above pertains to a period of expansion in Portuguese science (see Delicado 2010b). Mobility rates, both outbound and return, were high and we have seen how push factors became less significant, as Portugal became more attractive for young researchers wishing to pursue advanced training and even for foreign researchers. However, the economic crisis and the austerity measures implemented to deal with it, as well as some changes in science policy, may have created favourable conditions for an increase in brain drain.

According to the latest official statistics, the impact of the crisis is clearly noticeable in R&D expenditure and human resources. After several decades of continuous growth, expenditure in R&D started decreasing in 2009, both in absolute terms and as a percentage of the gross domestic product (Fig. 7.4). The number of researchers also shows a downward trend, particularly between 2011 and 2013 (Fig. 7.5), which may be a result of a number of factors: emigration, retirement of older researchers, a decline in enrolment in advanced degrees.² From 2015 onwards these trends started to reverse again, as austerity policies were eased.

This decline in R&D expenditure and personnel can be attributed to a reduction in funding from its main sources (Fig. 7.6). If business companies were already reducing their support from 2009 onwards (with a slight increase in 2016), government investment declined abruptly in 2010 and have been lower ever since, with small fluctuations. Funds from abroad are slowly rising, from the higher education sector have remained more or less stable and from the private non-profit sector have decreased.

The same trend can be seen in government budget allocations for science (Fig. 7.7). A steady increase between 2001 and 2009 has been followed by a decline steeper from 2011 to 2012, followed again by a slight rise, more noticeable since 2016.

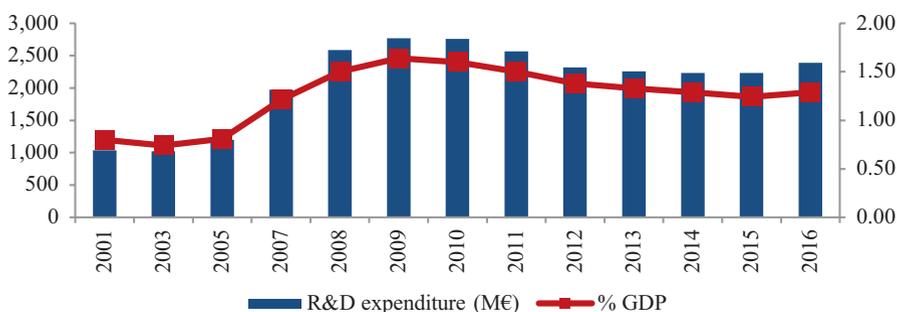


Fig. 7.4 R&D expenditure in Portugal 2001–2015.

Source: GPEARI (2010) and DGEEC (2014c, 2018b)

²For instance, the number of new enrolments in PhDs has declined from 5247 in 2011/12 to 4575 in 2012/13 (DGEEC 2013a, 2014a).

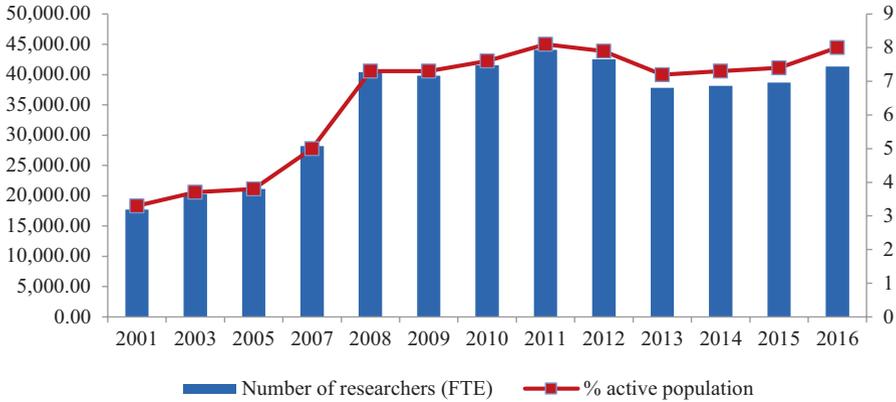


Fig. 7.5 Researchers in Portugal 2001–2015.
Source: GPEARI (2010) and DGEEC (2014c, 2018b)

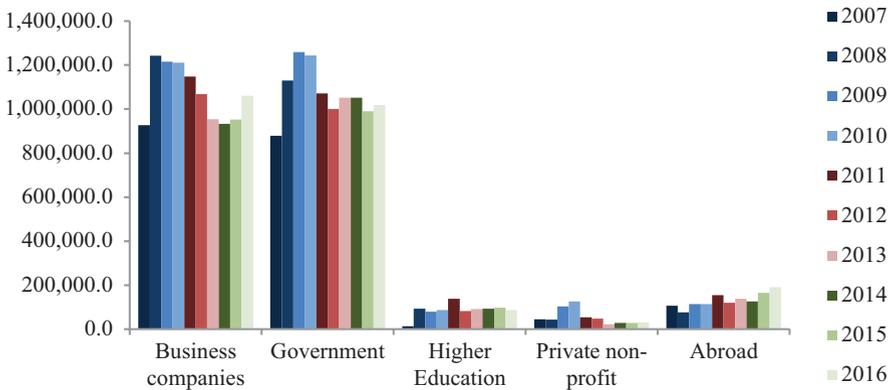


Fig. 7.6 R&D expenditure by source of funding in Portugal 2007–2016 (thousands €).
Source: GPEARI (2009a, b, 2011a, b) and DGEEC (2012, 2013b, 2014d, 2015, 2016, 2017b, 2018a)

This decrease in funding has been most noticeable in research units (the amount of money received is fairly unstable, but it reached a peak in 2008 of close to 90 M€ and its lowest point was in 2011, at 42 M€, rising again to 64 M€ in 2016), project grants (since 2012 general calls for projects have been infrequent and success rates have declined), training grants (declining since 2010) and fixed-term contracts (the Researcher FCT programme, announced as a replacement of the ‘Compromisso com a Ciência’ programme, hired only 802 researchers over 4 years). Additionally, other austerity measures also had an impact on the S&T system: salary cuts for researchers and university faculty, strict restrictions to hiring in universities and research centres, less support for PhD students. In the private university sector, a decline in enrolments has also led to reductions in faculty.

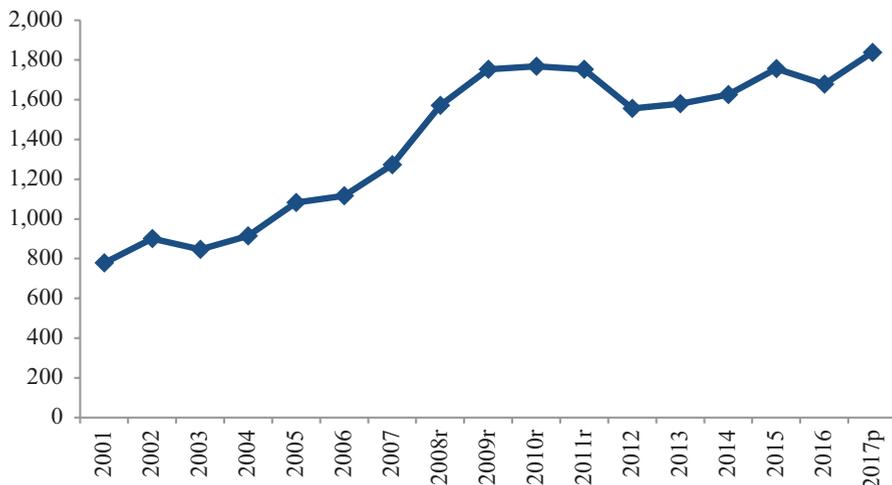


Fig. 7.7 Government budget allocations for R&D 2001–2017 (M€). *r* revised value, *p* provisional data.

Source: DGEEC 2014b, 2017a

The financial cuts, coupled with the instability and unpredictability of policies, are bound to have had an impact over push factors for mobility, since they cause degradation in professional and scientific conditions.

Again, there is no official data on mobility trends that can help measure the impact of the crisis. But an exploratory analysis of the career paths of ‘Compromisso com a Ciência’ researchers³ shows that 19% of the researchers hired in 2007 and 2008 are no longer in Portugal. The vast majority (over 80%) of the researchers who left the country are foreign nationals and half of the Portuguese ones had done their PhD abroad. Thus, it is the most mobile researchers (presumably the more internationalised) that are leaving the Portuguese scientific system. The situation of those who have stayed is unknown. Though some have managed to obtain new contracts (FCT Investigador, post-doctoral grants or as higher education lecturers) or to prolong the old ones (through funds from their host institutions), other may be unemployed or have abandoned research altogether.

7.8 Final Remarks

Scientific mobility is vital in science. It is barely possible to maintain a scientific career without spending time at different institutions, preferably in different countries. And mobility has many fruitful impacts on science, from the circulation of knowledge to the creation of international networks.

³Based on data available in the publication FCT 2009 and google searchers to ascertain the current positions of researchers.

However, mobility can also deprive some scientific systems of their best researchers. The huge disparity between countries in terms of R&D resources and labour conditions draws researchers to the centres and away from the peripheries. Though insufficient to turn the country into a “centre”, in recent years the investment in science has made Portugal more attractive for some mobile researchers, both Portuguese trained abroad and foreign nationals. Nonetheless, slowing down this investment can have the reverse effect, pushing researchers to seek better professional and scientific conditions elsewhere.

References

- Ackers, L. (2005). Promoting scientific mobility and balanced growth in the ERA. *Innovations*, 18(3), 301–315.
- Ackers, L., et al. (2001). *The participation of women researchers in the TMR Marie Curie fellowships*. European Commission: Brussels.
- Alarcon, R. (1999). Recruitment processes among foreign-born engineers and scientists in Silicon Valley. *The American Behavioral Scientist*, 49(9), 1381–1397.
- Baruch, Y., Budwahr, P. S., & Khatri, N. (2007). Brain drain: Inclination to stay abroad after studies. *Journal of World Business*, 42, 99–112.
- Bourdieu, P. (1975). La spécificité du champ scientifique et les conditions sociales du progrès de la raison. *Sociologie et Sociétés*, VII(1), 91–118.
- Casey, T., Mahroum, S., Ducatel, K., & Barré, R. (2001). *The mobility of academic researchers: Academic careers and recruitment in ICT and biotechnology*. Seville: IPTS-JRC-EC.
- De la Vega, I., & Vessuri, H. (2008). Science and mobility: Is physical location relevant? *Technology in Society*, 30, 71–83.
- Delicado, A. (2010a). Going abroad to do science: Mobility trends and motivations of Portuguese researchers. *Science Studies*, 23(2), 36–59.
- Delicado, A. (2010b). The international mobility of Portuguese researchers: Policies, trends and impacts. In D. Belyaev & Z. Roca (Eds.), *Portugal in the era of the knowledge society* (pp. 155–188). Lisbon: Edições Lusófonas.
- DGEEC. (2012). *IPCTN10: Sumários estatísticos*. Lisbon: DGEEC.
- DGEEC. (2013a). *Estatísticas da educação 2011/12*. Lisbon: DGEEC.
- DGEEC. (2013b). *IPCTN11: Sumários estatísticos*. Lisbon: DGEEC.
- DGEEC. (2014a). *Estatísticas da educação 2012/13*. Lisbon: DGEEC.
- DGEEC. (2014b). *Dotações orçamentais para C&T e I&D – 2014*. Lisbon: DGEEC.
- DGEEC. (2014c). *IPCTN12: Principais resultados*. Lisbon: DGEEC.
- DGEEC. (2014d). *IPCTN12: Sumários estatísticos*. Lisbon: DGEEC.
- DGEEC. (2015). *IPCTN13: Sumários estatísticos – Dados globais*. Lisbon: DGEEC.
- DGEEC. (2016). *IPCTN14: Dados globais*. Lisbon: DGEEC.
- DGEEC. (2017a). *Dotações orçamentais para C&T e I&D – 2017*. Lisbon: DGEEC.
- DGEEC. (2017b). *IPCTN15: Dados globais*. Lisbon: DGEEC.
- DGEEC. (2018a). *IPCTN16: Dados globais*. Lisbon: DGEEC.
- DGEEC. (2018b). *IPCTN16: Principais resultados definitivos (2012–2016)*. Lisbon: DGEEC.
- Diaz-Briquets, S., & Cheney, C. C. (2002). *Biomedical globalization: The international migration of scientists*. New Brunswick: Transaction Publishers.
- Favell, A., Feldblum, M., & Smith, M. P. (2006). The human face of global mobility: A research agenda. In M. P. Smith & A. Favell (Eds.), *The human face of global mobility* (pp. 1–25). New Brunswick: Transaction Publishers.

- FCT – Foundation for Science and Technology. (2009). *Mais cientistas para Portugal*. Lisbon: FCT/MCTES.
- Ferro, A. (2004). Romanians abroad: A snapshot of highly skilled migration. *Higher Education in Europe*, XXIX(3), 381–391.
- Fontes, M. (2007). Scientific mobility policies: How Portuguese scientists envisage the return home. *Science and Public Policy*, 34(4), 284–298.
- Geddie, K. (2013). The transnational ties that bind: Relationship considerations for graduating international science and engineering research students. *Population, Space and Place*, 19, 196–208.
- Gill, B. (2005). Homeward bound? The experience of return mobility for Italian scientists. *Innovations*, 18(3), 319–337.
- GPEARI. (2009a). *IPCTN 2008: Resultados provisórios*. Lisbon: GPEARI-MCTES.
- GPEARI. (2009b). *Sumários estatísticos IPCTN 07*. Lisbon: GPEARI.
- GPEARI. (2010). *IPCTN09: Resultados provisórios*. Lisbon: GPEARI.
- GPEARI. (2011a). *Sumários estatísticos IPCTN 08*. Lisbon: GPEARI.
- GPEARI. (2011b). *Sumários estatísticos IPCTN 09*. Lisbon: GPEARI.
- Hirt, J. B., & Muffo, J. A. (1998). Graduate students: Institutional climate and disciplinary cultures. *New Directions for Institutional Research*, 98, 17–33.
- Ivancheva, L., & Gourova, E. (2011). Challenges for career and mobility of researchers in Europe. *Science and Public Policy*, 38(3), 185–198.
- Jalowiecki, B., & Gorzelak, G. J. (2004). Brain drain, brain gain, and mobility: Theories and prospective methods. *Higher Education in Europe*, XXIX(3), 299–308.
- Mahroum, S. (2000). Scientists and global spaces. *Technology in Society*, 22, 513–523.
- Mahroum, S., Eldridge, C., & Daar, A. S. (2006). Transnational diaspora options: How developing countries could benefit from their emigrant populations. *International Journal on Multicultural Societies*, 8(1), 25–42.
- Meyer, J. -B., & Brown, M. (1999). *Scientific diasporas: A new approach to the brain drain* (MOST Discussion Paper 41). <http://unesdoc.unesco.org/images/0011/001163/116330eo.pdf>. Accessed 26 Apr 2018.
- Meyer, J.-B., & Wattiaux, J.-P. (2006). Diaspora knowledge networks: Vanishing doubts and increasing evidence. *International Journal on Multicultural Societies*, 8(1), 4–23.
- Millard, D. (2005). The impact of clustering on scientific mobility. *Innovations*, 18(3), 343–359.
- Morano-Foadi, S. (2006). Key issues and causes of the Italian brain drain. *Innovations*, 19(2), 209–220.
- OECD. (2001). *Innovative people: Mobility of skilled personnel in national innovation systems*. Paris: OECD.
- OECD. (2002). *International mobility of the highly skilled*. Paris: OECD.
- Pina, D. G. (2009). *FP7 people programme: Marie Curie actions*. Slide presentation.
- Rizvi, F. (2005). Rethinking “Brain Drain” in the era of globalization. *Asia Pacific Journal of Education*, 25(2), 175–192.
- Schiller, D., & Diez, J. R. (2012). The impact of academic mobility on the creation of localized intangible assets. *Regional Studies*, 46(10), 1319–1332.
- Szelenyi, K. (2006). Students without borders? Migratory decision-making among international graduate students in the US. In M. P. Smith & A. Favell (Eds.), *The human face of global mobility* (pp. 181–209). New Brunswick: Transaction Publishers.
- Thorn, K., & Holm-Nielsen, L. B. (2006). *International mobility of researchers and scientists – Policy options for turning a drain into a gain* (Research Paper n. 2006/83, UN-WIDER). http://www.wider.unu.edu/publications/working-papers/research-papers/2006/en_GB/rp2006-83/. Accessed 26 Apr 2018.

- Todisco, E., Brandi, M. C., & Tattolo, G. (2003). Skilled migration: A theoretical framework and the case of foreign researchers in Italy. *Fulgor*, 1(3), 115–130.
- van de Sande, D., Ackers, H. L., & Gill, B. (2005). *Impact assessment of the Marie Curie fellowships under the 4th and 5th Framework Programs of Research and Technological Development of the EU (1994–2002)*. https://ec.europa.eu/research/evaluations/pdf/archive/fp6-evidence-base/evaluation_studies_and_reports/evaluation_studies_and_reports_2005/impact_assessment_of_marie_curie_actions_fellowships_in_fp4_and_fp5_2005.pdf. Accessed 26 Apr 2018.

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