

Brain drain/brain gain from the perspective of a semi-peripheral state: Portugal

By Isabel Estrada CARVALHAIS
NICPRI (FCT R&D Unit), School of Economics and Management,
University of Minho, Portugal

Abstract

This paper analyses the recent Portuguese governmental answers to deal with its semi-peripheral position in the science and technology market in general, and in the international market of brain circulation in particular. The management of brain circulation is understood thus as only a small part of a wider public policy regarding the management of scientific and technological production and dissemination, as well as the management of access to education and training resources.

This paper's analysis of the public policy built to manage the country's position in the international market of scientific and technological knowledge suggests that the country's semi-peripheral condition in regard to various markets (economic, as well as cultural, scientific and academic) has been the dominant pillar of its policy's structuring. It is thus through the lenses of its semi-peripheral condition that much of the country's governmental answers become intelligible. A second dominant pillar is the European context and the consequent need to comply with the expectations raised by the Agenda of Lisbon. But, as the paper suggests, Lisbon's Agenda has worked over the last years mostly as a political binder that has enabled the implementation of measures otherwise financially too heavy, while very much needed to bring the Portuguese scientific system closer to an increasingly competitive international market of science and technology¹.

Key-words: Portugal; brain circulation; semi-periphery; policy-making

Introduction

This paper analyses the recent Portuguese governmental answers to deal with its semi-peripheral position in the scientific and technological market, and specifically in the international market of brain circulation². To enter such analysis presupposes three initial steps.

¹ This paper was first written in early 2010 and it analyses data collected during that period of time.

² Between 2010 and 2012, profound changes have been occurring in Portuguese society as a consequence of the economic crisis it faces. For that reason, and although nothing has changed from a legal-political stand in regard to the governmental approach to brain gain strategies, attracting high skilled laborers has become politically less relevant than the debate around the emergence of new waves of Portuguese emigration. The governmental policy here presented,

First, it is important to clarify how we read the concepts of brain gain/brain drain in light

has not been altered since we first wrote this paper (initially as a briefed report), but Portugal is becoming far less attractive both to its Diaspora and to foreigners. The present Secretary of State for the Portuguese Communities, José Cesário, underlined in a recent interview (December 2011) that around one hundred thousand to one hundred and twenty thousand Portuguese have left the country in 2011 (TSF, 2011). While most emigrants back in the 1960's – the period of highest Portuguese emigration in the 20th century – were mostly composed of non-skilled or low skilled people, today's emigration is composed of high-skilled people who happen to be also the youngest. Ironically, thus, the country has been investing on advanced training of its human resources that now menace to leave.

of the existent literature, as well as the positions of states in regard to brain gain/brain drain phenomena. Instead of brain gain/brain drain, we prefer the term *brain circulation* as one that better translates the very nature of science as human activity, and the position of states, which are neither full losers nor full gainers in the entire process of scientific and technological creation.

Second, it is important to stress that a governmental policy for brain circulation plays only a part in the wider context of public policies regarding the education of human resources and the production/dissemination of scientific and technological knowledge. This step implies thus locating the Portuguese policy of brain circulation in the context of a more complex public policy meant to manage the country's relation with science, technology and education. In parallel, any policy of brain circulation must take into account other relevant domestic public policies such as policies of citizenship and nationality, and policies of integration and immigration. A policy of brain circulation, composed of its various measures, impact indicators and milestones, is therefore the result of a complex set of variables determined by other public policies in the first instance.

Third, the paper contextualises the specific case of Portugal as a semi-peripheral country in regard to the scientific and technological markets. This step presupposes a short encounter with Wallerstein's classic World-System Theory (1996), and with its basic concepts of centre, periphery and particularly of semi-periphery. In light of this theoretical frame, it becomes much evident the identification of Portugal as a semi-peripheral country as far as its scientific system is concerned.

The reasons that have set the semi-peripheral condition of the country are far too complex and quite out of this paper's purposes, for which reasons we will not go into their analysis (Santos, 1994; Gonçalves, 1996; Gonçalves 2000; Pereira 2001). We analyse though what this semi-peripheral condition has meant in regard to the country's long term relationship with science and technology. We will proceed with the analysis and balance of some of the most recent

strategies that Portuguese governments have been implementing to change the course of that relationship, and bring the country closer to the standards of central countries as far as the production and dissemination of science and technology are concerned.

Questioning the conceptual pertinence of brain gain/brain drain

Circulation is always a condition necessary to brain's vitality (Teferra, 2003), being international mobility a *sine qua non* condition for any scientific activity (Ackers et al, 2001, Delicado, 2008b). This said, the brain drain/brain gain discussion becomes rather misplaced. It is misplaced from the point of view of the individual, of her need to circulate as a highly skilled person and of her interests as a competitive professional. But it is also misplaced from the point of view of states (Teferra, 2003) as it places the phenomenon of mobility in terms of definitive and unchangeable outcomes.

In parallel, brain gain/brain drain debates are traditionally State-centred, with skilled human capital seen rather as a relevant commodity for the State's continuous effort to maintain its political and economic sovereignty, than as a construction whose quality and vitality are very much dependent on circulation and communication. When the circulation of highly skilled individuals is put in terms of State losses and winnings, it signifies that much of the meaning about *circulation* as a space of multilateral and interchangeable political, economic and social outcomes is being ignored. Thus, although it would be misleading to assume that *brain circulation* is spared from controversy (Teferra, 2003), we consider that this concept enables a discourse more focused on the individual and on his/her fundamental right to mobility, and subsequently on the potential gains that may be brought from it to various systems (political, economic, cultural, social).³

³ Brain circulation is very important not only from the perspective of the individual and of her life options, but also from the perspective of the State's competitiveness. Ideally, states have much more to gain from acting not as deposits but as platforms of

The market of knowledge, as any other, is inherently imbalanced, with a dynamic and sophisticated game of 'winners and losers'. Dynamic, because positions may and often change over time; sophisticated, because no place in that specific market is ever a sole winner or a sole loser. In other words, if by place we mean a state's territory, this means that in the international market of scientific production no state is ever simply a winner or a loser in a completely unidirectional way. The game is sophisticated also because the term *boundary* is rather complex and ambivalent when it comes to delineate the territory of scientific production, and more specifically when the credits for such 'delineation' are claimed by national discourses on the production of knowledge.

The language of brain drain/brain gain is deeply embedded in the national paradigm, while science, at least in its post-modern interpretation (Santos, 1997) is hardly a national product. Science requires exchange of ideas. The continuous

continuous attractiveness for brain circulation. But it may be argued also that brain circulation is much less interesting for countries which do not have the capacity for such positioning in the international market of knowledge. For them, keeping as many national brains as possible is still a priority since implementing other pull strategies would demand massive economic resources as well as, in some cases, social, cultural and even political revolutions. To understand how serious brain drain still is for many developing states, we recall here the UNCTAD's 2007 report. The 'Least Developed Countries Report 2007: Knowledge, Technological Learning and Innovation for Development' called attention to the fact that five developing countries (Haiti, Cape Verde, Samoa, Gambia and Somalia) had lost over the last years more than half of their qualified resources with higher degrees as a consequence of their escape to more attractive countries. This is of course a more poignant reality and it explains why the brain circulation argument is also often accused of being a western argument. Indeed, it is easier to be pro-brain circulation when we do not have to suffer so deeply the impacts of massive drain. By the same token, and from the individual point of view, brain circulation is only good if indeed taken as a life option and not as fate. In other words, for many skilled migrants coming from developing countries that still face various social, political and economic challenges, and also for many skilled people of younger generations, circulation often stands for precariousness of labor conditions and necessity to migrate.

flow of ideas, as well as of counter-ideas and the narratives of validation/rejection of ideas are hardly compatible with a closed circuit, a circuit limited to 'national' spheres of interest. Besides, the very notion of 'national scientific communities' is questionable, considering that scientific Diasporas are not totally detached from national communities, while foreign scientists working on behalf of projects substantially financed by their receiving states may also be considered as making part of the national effort for the scientific and technological improvement of such states.

Portugal, a semi-peripheral state in the brain circulation circuit

The debate on the utility of brain circulation in opposition to brain gain/brain language sounds a reasonable one, and yet, it seems not strong enough to transcend the reality of facts, facts being that states do have to deal with the mobility of highly skilled individuals.

In practical terms, how then do states try to obviate the impacts of brain drain and how do they try to enter the brain gain circuit on a steady basis? There is a multiplicity of answers to the double questions, all dependent on a myriad of variables, the position of the State in the World-System as a periphery, a semi-periphery or a centre, being a most relevant. The introduction of these concepts presupposes revisiting, although very schematically, Wallerstein's classic World-System Theory (1996).

Taking Wallerstein's macro-sociological perspective upon the dynamics of the capitalist world economy since the 15th century as a sociologically and politically valid proposal, we may portray the World as one shaped by uneven relations, not just at the economic, political and social levels, but also at the scientific levels (2006). The World-System's complexity is deeply embedded in the dynamics between (social, economic, political, scientific) centres and peripheries, as well as in the relational condition existent in both concepts. This systemic reading tells us that a locus is only a centre in regard to another locus, while it can be simultaneously a periphery in regard to any other locus. The centre-periphery relation is thus one of permanent tension

and evolution not only outside but also inside these very concepts.

But a peculiar position seems to be that of the semi-peripheries which Wallerstein has initially defined as corresponding to places trying to improve their position in the world economic system, or places which became declining cores after periods of a relatively dominant position. The latter was clearly the case of countries such as Portugal and Spain which had been dominant centres at the beginning of Modernity (15th and 16th centuries) and then became peripheries to the central areas of the globe, namely Europe and North America, while simultaneously being economic exploiters of their own colonial empires. The tension released from the accumulation of these double roles, has affected not only the essence of each role – that is, the specificities of a country such as Portugal as on the one hand a centre, and as on the other hand a periphery – as it has also given a particular essence to its *semi-peripheral condition*.

Portugal has been portrayed as a semi-peripheral country by reference to its economic and social behaviours, political bargaining capacities and cultural attitudes (Santos, 1993; Carvalhais, 2004), but as Santos suggests, a semi-peripheral condition does not stand simply for an intermediate position between periphery and centre. Instead, the semi-periphery has a substance of its own, being ‘a quality’ of its own ‘and not just a quantity’. As a quality, the semi-peripheral condition translates thus ‘a territorialized dimension of the global interactions where a given country is integrated’ (1993: 24).

Following this interpretation, Nunes and Gonçalves (2001:13-31) consider that the Portuguese scientific performance reveals a semi-peripheral condition which is determinant in any understanding of the country’s education, scientific and technological policies in general, as well as of the country’s specific policy towards brain circulation.

Along with the semi-peripheral condition, there is a second pillar that is essential in understanding the country’s relation with the scientific world, that pillar being the specificity of its historical and sociological relationships between

science, technology, society and culture (Nunes & Gonçalves, 2001: 21). These relationships integrate a map of discourses and images corresponding to a specific culture, one that Santos (1994: 132-136) has named *cultura de fronteira* (culture of frontier).

The notion of culture of frontier is relevant because it is intimately related to the definition of the semi-peripheral position of the country from a cultural perspective. Before looking at how the country’s semi-peripheral condition shapes the present policy-making regarding brain circulation, it is thus useful to understand what that culture is about, as it contains the essence of the country’s semi-periphery in regard to culture in general and science in particular.

According to Santos, the Portuguese State has never performed the double role that other states were playing in cultural terms: on the one hand, it has never been capable of promoting externally a process of cultural differentiation, and on the other hand, it has never been capable of promoting internally a process of cultural homogenisation. As a result, the Portuguese culture has never developed nationally confined contents, (unlike most modern national cultures that flourished from the 18th-19th centuries on), but instead contents that may be interpreted as being placed ‘in-between’, hence the notion of culture of frontier, or culture of border.⁴

The following text of Santos is quite elucidative:

“The local and transnational spaces of Portuguese culture have always been very rich; only the middle space, the national, was and still is deficient (...) The paradigmatic manifestation of this semi peripheral matrix of the Portuguese culture is in the fact that the Portuguese were after the 17th Century (...) the only European people who simultaneously (...) considered the people of their colonies as primitive and savages, and was (...) considered by travellers and intellectuals of central countries of Northern

⁴ Unlike the English language, Portuguese uses *fronteira* to translate both the concept of frontier and that of border. We consider that both concepts may though be included in the original interpretation that Santos gives to his notion of *cultura de fronteira*.

Europe as primitive and savage. By the same token, whilst the Puritans colonised North America, the Portuguese were not only colonisers but emigrants in their own colonies. The Portuguese labour in the Brazilian Northeast in the 18th Century was cheaper than slave labour. Contrary to other European people, Portugal had to see itself in two mirrors, in the mirror of Prosperous and in the mirror of Caliban, aware that its real face had to be somewhere in between. In symbolic terms, Portugal was too close to its colonies to be fully a European and [in] the eyes of these it was too distant from Europe to be considered a serious coloniser. As a European culture, the Portuguese culture was peripheral and as such it did not succeed in playing well the role of centre in the non-European peripheries." (1994: 133) (Author's own translation).

Resulting from a complex set of political and sociological reasons, this culture of frontier has been transversal to various spheres of Portuguese society, shaping consequently the profile of its scientific system, which became one of persistent paradoxes as the following text suggests:

"Portugal had oscillated over the last 500 years between a fundamental contribution for the origins of modern science namely through the Discoveries, and a marginalisation and backwardness in regard to the protagonists of the scientific revolution of the 17th century and, afterwards, of the various episodes that have marked the development of sciences between the 18th and the 19th century. From precursors of the scientific modernity, Portuguese would have thus turned into "Galileo's stepchildren", [that is] into more or less despised or marginalised descendants of one of the crucial moments of World History..." (Nunes and Gonçalves, 2001: 21) (Author's own translation)

The political, economic and social reasons that explain how Portuguese have turned from core into periphery of scientific production is not subject to analysis in this text. It is though relevant to note that such reasons are also underneath the progressive formation of a strong academic culture, this being a quite evident sign of the Portuguese scientific system as a semi-peripheral one (Pereira, 2001).

The formation of a strong academic culture was (and is) the result of accumulated difficulties felt by scientists over the centuries to establish systematic relations that would involve science with the social, economic and political spheres

(Pereira, 2001: 151). As academies became the refuge of science from an external hostile world (although not totally protected from state control on various historic moments, among which Salazar's dictatorship between 1926 and 1974), they became also quite resistant elements to many attempts of conciliation with society, economics and politics. The relevance of this reality lays in the fact that despite the deep changes that the scientific system met (especially after the Portuguese adhesion to the EU in 1986), the academic culture still persists as a major feature of the semi-peripheral essence of the Portuguese scientific system.

Presently, the Portuguese semi-peripheral condition becomes evident through the country's capacity to create some technological value and to generate some significant scientific gains, while being those efforts insufficient to annul structural difficulties within the scientific system and in its relationship with other spheres such as the economic. Having this semi-peripheral condition as a starting point, the question to be made is what strategies has Portugal been implementing to overcome such condition, in particular, how does it try to stop intellectual drain and to mobilise skilled resources located abroad, whether Portuguese (intellectual Diaspora) or foreigner?

Portuguese policy of brain circulation: the essentials

The policy's sustaining pillars

The Portuguese policy-making process for brain circulation is deeply connected to its semi-peripheral condition, but it cannot be reduced to the idea that its specificities derive solely from this. The Lisbon Strategy has also been, in recent years, a crucial pillar.

The Lisbon Strategy stands basically for a compromise that the European member states agreed upon in 2000, during the Portuguese presidency of the Council of Ministers of the European Union (and already revised in 2005) to make a cooperative effort to develop the best measures to accomplish highly ambitious economic and social goals. Economic goals included increasing the EU's competitiveness in the global

market; while social goals included improving the European social model. Such ambitious goals were sustained on specific policy intents such as: to facilitate the creation and implementation of innovative ideas; to improve the dissemination and effective usage of new information and communication technologies towards a more inclusive information society; to implement employment policies towards a full employment scenario; to improve quality and productivity in the labour market; to broaden and increase the investment in human resources, especially by investing in an integrated approach to education and training on a life-long learning basis. To understand the importance of this compromise, it is worth noting that the Lisbon Strategy forced to change the communitarian budget's structure, through the inclusion of a new item titled *Sustainable Development*, initially proposed by the European Commission, and confirmed by the European Council of Ministers of 15-16 December 2005. The strategy's ambitions were meant to increase the EU's economic competitiveness in regard to the major economic challengers of the moment and quite likely of the future: the US, Japan and the BRIC countries (Brazil, Russia, India and China). Economic competitiveness was conceived as possible by massive investment in knowledge seen as the best way to search for positive differentiation⁵.

⁵ Investing in knowledge implies a series of intertwined measures involving articulation of national education and training systems, as well as continuous development of strategies to attract highly skilled human resources. In other words, the battle for economic supremacy implies entering the battle for technological and scientific supremacy, a battle that cannot be won without highly prepared (and highly motivated) human resources. Of course, many are sceptical about the capacity of the EU to win such battles and consider them as already lost for countries such as Canada, the US or most recently Brazil. Difficulties are even bigger for Europe if we consider that the United States policy to attract highly skilled individuals is previous to the events of 9/11. This means that despite the negative impacts of 9/11 on most immigrant policies in western countries, the US was already much better positioned (along with Canada, Switzerland and Australia) when the European Union came along with the Strategy of Lisbon in 2000. The success of the American policy seems to be based mostly on its

The Portuguese compromise with the Lisbon Strategy unveils yet another meaning, as the commitment to this agenda helps the country to fulfil internal needs of its semi-peripheral scientific system that would be otherwise too costly to deal with. Therefore, the adherence to the Lisbon Strategy has been also a way to concretise a much needed national priority, while counting on financial support from the communitarian budget to do so.

'green card system' that simplifies the administrative procedures involving the entrance of highly skilled migrants, speeding up their access to the American labour market. Over the years, other countries such as Canada, Australia and Switzerland have been developing policies of selectiveness sustained on a 'points-based system'. In Canada, for instance, where the system was first implemented in 1967, the skilled migrant must gather at least 67 points out of 96 in order to become established in the country. To get the points, a series of factors is considered, including: education (up to 25 points); work experience (up to 21 points); language skills (up to 20 points); arranged employment (up to 10 points); age (up to 10 points, with benefit for younger ages). Some authors argue that a similar system should be implemented in Europe, by the implementation of a blue card system (Weizsäcker, 2006a; 2006b) that would attract highly skilled migrants and foster their mobility around Europe, with gains for both receiving and sending societies. Indeed, according to this reasoning there are substantial gains to be considered for sending societies, which include not only financial remittances, but also a well-trained Diaspora that may always return to their home countries and contribute locally for the state's development, or stay at least in touch with home-based human resources in mutually beneficial projects. Other social gains include the quality of social integration of immigrant communities and possible positive effects on the education rates in sending countries. According to Weizsäcker (2006b) stories about successful highly skilled migrants may awaken other fellow citizens to the relevance of education as a path for success, as well as contribute to combat negative images on migrant communities that citizens may have in receiving countries. It is a fact that countries which have implemented systems with a strong bias towards highly-skilled individuals, have several social and economic gains, and possibly as achieve better social integration of migrant communities. But the validity of these arguments has to be questioned. Are non-skilled or less skilled labourers doing that well in 'points based system' countries? Clifton puts precisely this question when analysing the impacts of the Canadian system on the integration of less-trained and low-skilled Portuguese, with results being negative (Clifton, 2008).

The semi-peripheral condition and the European Union priorities have been thus the two main references of present Portuguese policy for brain circulation, with special emphasis on the benefits that the semi-peripheral condition may take from the back-up of the European context.

How the policy works

The Portuguese policy of brain circulation is based on three basic challenges:

- a. to re-captivate highly skilled Portuguese citizens that left the country in pursuit of better working conditions after or during studies;
- b. to attract foreign highly skilled professionals that may bring extra-value to technological and scientific areas in particular;
- c. to prevent the loss of highly skilled Portuguese/foreigners now integrated in the domestic markets of science, technology and academy, or who are still studying in the country.

Only recently though has this policy emerged as a systematic and integrated one, designed to reach out each one of these challenges. Since at least the mid 1990s, Portugal has been trying to implement a policy of advanced training of human resources, while also supporting scholarships to foreigners willing to proceed with post-doctoral research in the country (Hansen et al., 2004). Though very important, these were rather random efforts that did not meet the standards of a highly integrated policy for the three identified challenges and the European demands. The best expression of a new policy-making approach appeared, in the mean term, with the launching in 2005 of the national technological plan (*Plano Nacional Tecnológico*).

Assessing the governmental strategies through the national technological plan

In December 2005, the Socialist Government lead by José Sócrates approved the national technological plan (NTP), a document meant to assure the country's compromise with the Lisbon Agenda, as well as with its urgent domestic need to stimulate scientific and technological development, and to increase its citizens' levels of training, education and willingness to

innovate.⁶ The high level of political articulation became quite evident as most governmental measures presupposed integrated efforts inside the organic structure of the socialist Executive (namely between the ministry of science, technology and higher education, and the ministries of finances, economy, internal affairs, foreign affairs, among others).

Three axes of action composed the NTP's structure: knowledge, technology, and innovation.

- a. Under the axe of knowledge, the country is called to improve the levels of knowledge of its population, especially by broadening and diversifying the paths to education and training on a lifelong-learning basis; and by stimulating the access to new technologies of information and communication;
- b. Under the axe of technology, the country is called to overcome its technological and scientific deficits, notably by reducing the gap between the entrepreneurial world and research activities;
- c. Under the axe of innovation, the country is called to bring new impulse to innovation by making the entrepreneurial world more sensitive to the creation, usage and dissemination of new services, new products, new organizational forms and new managerial practices.

The main targets of these axes are citizens, companies, public administration, but also research and higher education activities.

For each axe there are specific goals and several specific measures designed to help the country meet such objectives. The next section takes a closer look at some of those measures, designed mostly for the axes of technology and knowledge.⁷

⁶ Such goals were already inscribed in the National Programme of Action for Growth and Employment (PNACE 2005/2008).

⁷ Another relevant axe is the axe of innovation. This axe is quite symptomatic of the huge effort that Portugal still has to make to increase its percentage of high technology products in the total of exportations. Indicators such as the percentage of new companies created in the high tech and medium-high tech areas, are still quite modest and below the expected values for 2010 (3.30 percent in 2008, against 3.38 percent in 2002, thus far from the expected value of 4.7 percent in 2010 and quite far from the EU aver-

Technology and Knowledge

- XIV. The investment on the Axe of Technology aims at two main strategic goals: to reinforce the scientific and technological competences of the population and to mobilize the entrepreneurial sectors for research and development (“R&D”).
- XV. Although not intuitive, the impact indicators on technology are in fact intimately related to the country’s effort to ameliorate its position in the brain gain circuit. The amount of researchers per one thousand inhabitants and the total personnel in R&D per one thousand active inhabitants have all met strong developments and seem to have been positively influenced by the capacity to attract highly skilled labour forces outside the country.⁸ Over the last years a series of initiatives has been launched aiming precisely at capturing highly skilled resources. In 2006, a governmental plan called *Compromise with Science for the future of Portugal*, integrated several goals, among which the hiring until 2009 of at least one thousand doctorate professionals, regardless of nationality, to integrate various R&D units located in public and private sectors, namely universities, associated labs and companies.⁹ This milestone seems to have

age of 6.69 percent already in 2007. It seems though to follow a communitarian trend since the EU zone of the 27 members, as its percentage decreased from 7.23 percent in 2002. Nevertheless, it would be unfair not to stress that the country’s Balance of Payments in regard to technology has been positive in three consecutive years since 2007. According to the Bank of Portugal, the BP in regard to technology remained positive in 2009 despite the international crisis (Plano Tecnológico Newsletter, 2010).

⁸ The average annual growth of researchers per one thousand active population increased 9.7 percent between 2004 to 2007, against 1.9 percent in the EU27 zone.

⁹ The *Compromise with Science for the Future of Portugal* revealed both the governmental attempts to overcome the country’s deficit in scientific and technological development, as well as the country’s compromise with the European scientific and economic agenda. In fact, the compromise followed both the Lisbon Agenda (2000) that set out the European concerns and goals about its scientific position in the international market, as well as the European Summit

been fully reached, with the celebration of 1113 labour contracts (Tribunal de Contas, 2009: 48), updated to 1192 contracts according to the Portuguese Foundation for Science and Technology (FCT, 2010)¹⁰.

- XVI. Following what seems to have been the success of previous initiatives, a new programme was launched in 2010, called Welcome II. This programme, co-funded by Marie Curie Action COFUND, and under the European Commission’s 7th Research Framework Programme, aimed at attracting European researchers with doctoral degree who had worked in non-EU member-states for at least three years, to join institutions located in Portugal. According to the FCT (2010) 42 percent of the hired researchers under the *Compromise with Science* initiative were foreigners, although no data has been provided in parallel about the hired nationals living abroad.
- XVII. Still under the axe of technology, it is also worth highlighting the remarkable growth on scientific production per one million inhabitants, which almost doubled between 2004 (373 outputs) and 2008 (626 outputs), not only overcoming the expectations set for 2010 (609) but also diminishing dramatically the gap between Portugal and the EU (estimated in 623 outputs in 2003, although more updated data on the EU would be needed).

Another major axe of this national plan of action is the axe of knowledge. This is composed of several strategic aims, among which to increase the educational levels of the population.¹¹

(2002) which had set as a major goal to increase the overall spending on R&D and innovation in the entire EU area, planning to reach 3% of the GDP by 2010.

¹⁰ More recently, in 2012, the Foundation for Science and Technology (FCT) has launched an international call for the recruitment of eighty researchers during 2012 to be integrated in FCT funded R&D units and associated Labs across the country.

¹¹ The levels of education are often presented by public authorities as being closely related to governmental efforts to attract academics placed out of the country, who will subsequently contribute to the country’s battle to increase the number of graduates. We do question however the reasonableness of this

One way to assess the governmental performance on achieving strategic aims set for the axe of knowledge is to look at the impact indicators established for each strategic aim, as well as at the percentages set for each impact indicator as milestones for 2010 and at the percentages so far actually achieved.

The progress on achieving the strategic aim of increasing the educational levels of the citizens has been quite positive. For instance, in 2003 only 10.5 percent of the population aged between 25 and 69 years old had higher education diplomas, increasing to 13.7 percent in 2007, with a milestone set for 2010 of 15 percent. It is still very distant from the EU average percentage which was already of 23.5 in 2007. Another impact indicator is the percentage of people holding diplomas in science and technology per one thousand inhabitants. In this case too the evolution was significant: from 8.2 percent in 2003, to 18.1 percent in 2007, overcoming the milestone of 12 percent expected for 2010. A third impact indicator relevant to the assessment of this strategic aim is the percentage of population aged between 20 and 24, with high school education. From 49.6 percent in 2004, it rose to 54.3 percent in 2008, although the milestone for 2010 had been set at 65 percent and the European average in 2008 was already of 78.5 percent. Again, the evolution is remarkable but still not good enough to put an end to the major gap that separates the country from most EU member states.

A second strategic aim of the Axe of Knowledge is fostering lifelong learning, which met though a rather modest evolution: 5.3 percent in 2008, against a decrease in 2003 to 4.3 percent, while the milestone for 2010 is 12.5 percent and the EU's average in 2008 was already 9.5 percent.

Finally, a third strategic aim is to prepare citizens for a society of information and knowledge, following the idea that new technologies of communication and information are strategically fundamental means of post-industrial literacy that

connection, as the logic behind it presupposes that the country is lacking in quality academic staff to fulfil such a goal. So far we have found no data or preliminary study either corroborating the suggested connection, or contradicting its terms.

will empower the citizen at various levels in a highly competitive global world.

All impact indicators of this strategic aim confirm that this has been a major governmental interest. For instance, the percentage of families with broadband internet connection has increased from 12 percent in 2004 to 46 percent in 2008, quite near the 50 percent set for 2010 and not far from the European average of 56 percent. The percentage of available online public services has increased also, from 40 percent in 2004 to 100 percent in 2008.

But what measures are enabling these various performances?

And most importantly, what is the relation of such measures to the country's policy of brain circulation? That is what the next section envisages to explore.

The Law of Immigration and the public management of brain circulation

Attracting qualified human resources and the legal device DR 84/2007

The axe of knowledge includes thirty-two projects of action, among which a measure called '*Attracting qualified human resources for Innovation/Adaptation of the legislation related to immigration and of the mechanisms for admission of immigrants of a high technical and scientific level*' (CNELPL, 2008). This is a measure meant to attract highly qualified resources. It is a measure intimately connected to the present Law of Immigration, as we will show ahead, although it does not exclusively target foreigners but the Portuguese Diaspora as well.

This measure has political implications. Increasing the levels of training and education, along with increasing the communication skills of the population, implies opening the doors to highly skilled human resources placed outside the country. What it does not say however, is whether the internal human resources are failing to accomplish such goals, and whether these are failing due to quantitative or qualitative reasons.

Having made sense of the political implications, we verified that the Portuguese strategy to attract highly skilled people placed outside the

country has been intimately tied to the creation of a simplified legal regime to ease the entrance and permanence of non-nationals as legal residents.

The *Decreto Regulamentar 84/2007* sets out in more detail the regime's functioning. It defines for instance the automatic terms that may be used to classify and verify the existence of highly skilled activities. It sets the possibility of articulating information between Portuguese services at home and placed abroad (consulates) while the applications of high-skilled non-nationals are under evaluation, thus speeding up their entrance and concession of legal residence.

The relevance conferred by the present Law of Immigration to the entrance of high-skilled capital in the country was also made evident in the creation of a ministerial *troika* (until 2011 formed by the Minister of Foreign Affairs, the Minister of Internal Affairs and the Minister of Science, Technology and Higher Education) meant to supervise the celerity and efficiency of all applications submitted under this regime of entrance.

The legal frame previous to this regime was often considered as costly, complex and time-consuming. This was particularly true for foreigners seeking longer periods of residence, instead of shorter ones which could be easily solved with tourist visas most of the time. In contrast, the new regime is seen as a very positive step in the battle for brain gain, though obviously not spared to criticism.

An initial criticism made to the regime signalled the absence of students, especially at their post-graduation levels, in contrast to what happens in countries such as the US where many post-graduate students are non-Americans (ACIDI, 2006). This criticism has been partially answered by the new Plan for the Integration of Immigrants (Resolution of the Council of Ministers 63-A/2007). The plan clearly states the importance of easing the entrance in the Portuguese higher education system of students who may have been integrated in foreign education systems; as well as the importance of simplifying the recognition of foreign higher education degrees, along with the creation of a welcome service specific to this end. The plan sees these

as fundamental measures to improve society's competitiveness in the labour sphere.

Other opinions suggest that the present simplified regime for highly skilled migrants should go further. As an example, the first coordinator of the technological plan, José Tavares, argued for the legal establishment of a fiscal frame favourable to high-skilled immigrants as a way to increase the country's attractiveness in the international market. Of course, one of the counter-arguments to this idea underlines the negative discrimination that this measure would imply to Portuguese brains and a series of potential side effects such as the runaway of Portuguese brains to countries where fiscal systems would not penalise them on grounds of national belonging.

According to the Report of July 2009 on the progress of the NTP, there is a set of relevant measures that has now been concluded. Specifically with regard to '*Attracting qualified human resources for Innovation/ Adaptation of the legislation related to immigration and of the mechanisms for admission of immigrants of a high technical and scientific level*', the list of accomplished activities include:

- a. the approval of Immigration Law 23/2007;
- b. the publishing of the *Decreto Regulamentar 84/2007* that regulates Law 23/2007;
- c. the creation of a taskforce between three ministries called *Grupo de Contacto* (literally contact group).

As a result of these measures, the report indicates that 'Portugal has attracted in 2008 more than the double of highly-skilled foreign citizens in relation to 2007.' (GCNELPT, 2009: 63). The report stresses as a sign of success the fact that on average the concession of visas is now eleven days against the twenty days registered in 2007. Also according to the same report:

"The data from the Contact Group created for the accomplishment of this process reveal that among these immigrants of over 40 countries, there were 88 researchers, 132 academic staff members and 313 company boards, medical and paramedical professionals, information systems professionals, electro-technical engineers, chemists, juridical professionals and liberal professionals. The measure is concluded." (2009: 63)

Can a semi-peripheral state win position in the brain circulation game?

Previous sections have looked at the recent Portuguese governmental measures to gain the best position possible in the brain circulation game. One may thus be tempted to think that these efforts are typical of a semi-peripheral state, or even that they are exclusive to the country under analysis. However these efforts equal those implemented by other European countries such as Ireland, Hungary, and some quite central states such as the UK, France or Germany. Indeed, international trends reveal that governmental efforts usually include legislation designed to facilitate the entry of skilled foreigners, as well as less bureaucratic administrative measures to facilitate the transfers of human resources in the entrepreneurial sphere (Hansen et al., 2004: 21-22).

But regardless of how close policy designs may be, the challenges of the brain circulation game are felt more poignantly by a semi-peripheral country such as Portugal. Any country has to focus simultaneously on the brain gain *and* brain drain, but for semi-peripheral countries the equation is of a much more difficult resolution.

Studies conducted earlier have revealed that the difficulties in stopping the brain drain follow a European trend. Findings (Hansen et al., 2004: 17-18) suggest that for instance:

- a. studying abroad increases the risk of EU-born remaining abroad;
- b. there is no significant difference in the income of the EU-born and the US-born high-skilled that work abroad, but there are large differences among the incomes of those working at home, with US-born earning significantly more than EU-born;
- c. one in three EU-born at home were planning to move abroad;
- d. only one in ten EU-born human resources may plan to ever return home (13 percent against 52 percent of US-born human resources willing to return home);
- e. having children does not seem to increase the desire of the EU-born to stay home or to return home (59 percent of the studied human resources with children and working abroad

had no plans to come back and 36 percent had plans to go abroad).

These are all very good reasons to suspect why so many feel sceptical about the success of the Lisbon Agenda. But these difficulties are even bigger for semi-peripheral countries such as Portugal (Peixoto, 2004: 13) as their pull capacity tends to be inversely proportional to their various structural constraints.

Internal structural challenges to the Portuguese scientific system

Weizsäcker, well-known for arguing in favour of the creation of a European blue card as a means to improve the European attractiveness to international high-skilled labour, has signalled Portugal as among those with the highest potential to attract high-skilled capital (2006a; 2006b). How is that possible?

In a group of fourteen countries, Portugal showed the lowest performance in higher education, with only 7.7 percent of its native population holding a higher education degree. In parallel, this explains precisely why the country is well-positioned in the pull race for brain gains, as it is in demand for highly qualified people especially in comparison with its supplying capacity. In theory at least, there are thus very good reasons for the Portuguese state to keep betting on public measures to attract foreign and Diaspora experts, and to keep them for as long as possible.

There is however a series of challenges that persist and whose continuity may very well disturb the country's efforts. By challenges we mean what literature has been calling *push factors* and which in the Portuguese case find echo in much of what the international literature has identified as such (Todisco, Brandi and Tattolo, 2003: 126; Favell, Feldblum and Smith, 2006: 9; De la Vega and Vessuri, 2008: 72; Rizvi, 2005: 176; Hansen et al., 2004; Kurka, Trippl and Maier, 2008).

Challenges in a positive approach, or push factors in a less positive one, may in any case cause serious damage to the State's efforts, hence demanding a strong, long-term commitment to contradict their impacts. The following part of the text identifies what we assess as major challenges to the Portuguese scientific system as it

stands, and whose persistence may contradict the governmental efforts to set a successful policy of brain attraction.

Challenges embedded in the country's economy
According to the *Observatório das Desigualdades* (Observatory on Inequalities) the percentage of the Portuguese GDP allocated to R&D has been growing. In 1998 it was 0.65 percent while in 2008 it was 1.5 percent of the GDP (more than its neighbour, Spain which went from 0.87 percent in 1998 to 1.35 percent in 2008). Of course these percentages are not comparable to those of Finland (3.7 in 2008) or Sweden (3.8 in 2008). The comparison is even less possible when looking at absolute numbers: 1,058.20 Euros in R&D per capita in Sweden, 1,013.70 Euros in Finland, against 233.20 Euros in Portugal, in 2008. Portugal is also below the EU average (1.9 percent in 2008 for the EU27) corresponding to 399.80 Euros per inhabitant. So, despite the undeniable efforts to increase the investment rates in R&D, there is still a long way to go.

The mentality of a substantial part of entrepreneurs about the need to invest more on R&D is certainly not strange to this. Studies conducted earlier show that, for instance, the connections between scientists in the Diaspora and the Portuguese entrepreneurial world represent only 5 percent of the total, in contrast with the connections of the former to higher education institutions, with universities gathering almost 80 percent of that total (Delicado, 2008 b). This goes along with what this text has already signalled as the persistence of a strong academic culture in the country (see section 3).

This is a major problem, one big enough to contradict Weizsäcker's analysis on the brain gain potential of the country in result of its low rates of education among the native population. Indeed, previous research on Portuguese reality show a major paradox: that although ideally the country's deficit in training and higher education would mean it could be highly attractive for qualified immigrants (as a result of both redundancy in home countries and of Portugal's imbalance between its human resources demands and its capacity to answer them), the persisting

low levels of income challenge such predictions (Peixoto, 2004: 2). In other words, it will be difficult to attract highly skilled individuals, whether national or non-national, residents or in the Diaspora, as long as the business sectors in civil society:

- a. resist to investing more in R&D;
- b. resist to increasing the number of companies specialised in the production of innovative products and services, based on high/medium-high technology;
- c. resist to raising the wages of highly skilled employees.

Despite a significant evolution of the average wages earned by graduates in Portugal (Alves et al., 2010), companies in general are not the most attractive realm for scientists, who end up seeing the academic institutions as a better workplace to be. But even that may be about to change as the present domestic economic crisis is most likely to affect also the attractiveness of the academic world. The already mentioned academic culture is translated into a strong concentration of high-skilled capital in universities and associated labs, both strongly dependent on public funding.

In parallel, severe financial cuts in strategic sectors (such as education and health), along with wage cuts in the public sector (up to 10 percent), recruitments and career progression frozen or cancelled (with very few exceptions), VAT reaching the maximum of 23 percent over most consumption goods and services, unemployment rates reaching 14.8 percent in 2012 (35 percent among the youngest) are all presently threatening to hurt the attractiveness of the country's R&D activities.

Challenges embedded in the academic environment

Another challenge the country faces has to do with the brain waste inside its academic culture. Generally speaking, Portugal shares the academic culture of the West (Teferra, 2003). One aspect that has been characterising this culture is the absence of a system of motivation for younger scientists and younger academic staff.

Young academic staff, for instance, is frequently overwhelmed by excess administrative work and teaching hours per week, while also facing the increment of short-term labour contracts and increasing demands in terms of scientific production.¹²

Most European academics of younger generations face similar fears, frustrations and distress, but this is something to be taken very seriously by a semi-peripheral country as it cannot afford to lose more qualified individuals. The absence of a culture of merit and motivation especially for younger high-skilled professionals is definitely a strong push factor that may lead ultimately to brain drain, or at least quite certainly to brain waste, that is, to the rapid degradation of intellectual power never fully explored.

Challenges of Diaspora and native residents' mutual perceptions

Another academic factor in Teferra's designation (2003), include the Diaspora's perceptions about their fellows in Portugal, against the native perceptions about the Diaspora. Although not subject to generalisation, native intellectuals tend to feel the Diaspora as arrogant and excessively harsh in judging the country's (lack of) opportunities, as well as its mentality and cultural habits. On the other hand, Diaspora intellectuals tend to complain about what they understand as the persisting power of academic feuds. In the eyes of the Diaspora, the academic feuds reveal a resistance to the entrance of new forms of doing things, of thinking and organising scientific and technological activities. In parallel, they also express forms of national resentment (by inflicting a sort of punishment to those who had left the country and who now have to face difficulties in the recognition of higher education diplo-

¹² Although this is not an exclusive scenario to Portugal, one often finds academic staff in public universities with annual part-time (50 percent) contracts that correspond to eight hours of teaching per week, though in practical terms it may ascend to ten to twelve hours per week. Unnecessary to stress that academic staff under these conditions are almost excluded from research activities simply due to lack of time.

mas¹³), jealousy (by impeding the entrance in the academic structure of fellows who had proved to be successful abroad) and fear (by preventing the entrance of highly competitive fellows that might expose the existence of internal mediocrity).

Other factors contributing to a less effective relationship between natives and the Diaspora relate to the existence of different embedded administrative cultures (more bureaucratic in Portugal), different accesses to infra-structures, material resources, financial funding, and different capacities in human resources recruitment (which may also be connected to the need of following more or less bureaucratic and time-consuming recruitment processes). But, again, much of the relevance of these factors depends on the way individuals understand them as valid reasons to justify their mutual perceptions.

Challenges embedded in the attractiveness of other systems

Push factors often have to do with the political and economic conditions of the sending country (Jalowiecki and Gorzelak, 2004; Thorn and Holm-Nielsen, 2006), as well as with the professional and scientific milieus of the sending country (Casey et al., 2001; Teferra, 2003; Todisco, Brandi

¹³ The adherence to the Bologna process, which was felt more intensively after 2006, has since greatly improved the recognition of diplomas earned abroad. Diplomas from higher education institutions within the European Union are almost automatically recognised. However, there is a distinction between the recognition of an academic degree (*reconhecimento de grau*) and the attribution of equivalence (*equivalência do grau*). Though a diploma might be almost automatically recognised, this is not the same as being equivalent to the diploma granted for a specific area in a specific academic institution. The equivalence in this case requires a separate procedure that will imply the official constitution of a jury. This jury will then evaluate the scientific contents of the academic programme and the contents of the dissertation/thesis that the applicant has developed, and will decide whether or not the existent diploma is equivalent to the one conferred by the institution to which the applicant submits his/her request. So, although higher education institutions cannot escape the demands of the Bologna process for recognition of diplomas, they may remain attached to some old feudalistic habits by complicating the access of foreigners or Diaspora intellectuals to the regime of equivalences.

and Tattolo, 2003). In the Portuguese case, and according to Delicado (2008a) Portuguese scientists seem to be attracted in general terms by central systems with more human resources; more employment opportunities; more investments on science and technology according to the percentage of GDP allocated to R&D; higher productivity rates (percentage of scientific outputs); and more internationalized higher education systems with stronger capacity to attract foreign students and foreign academics. As a result, Delicado notes that despite the relevant growth of the Portuguese academic and R&D performances, Portuguese high-skilled professionals in the Diaspora still perceive the provided conditions as bellow those found in central systems (2008a: 126). But is this simply a mismatch of perceptions between what the country actually has and what its Diaspora is willing to see? In other words, is the Diaspora still attached to old perceptions on the country's conditions, which no longer find echo in present reality?

We may find the answer by looking into another study, on the presence of foreign high-skilled professionals in Portugal. Marques and Góis stress that the presence of high-skilled foreigners in Portuguese R&D activities has increased significantly (Marques and Góis, 2008). But this growth, however relevant, has not been translated into a substantial increase in the country's scientific and technological outputs. Why? As these authors underline, the presence of foreign high-skilled professionals is rather heterogeneous, with groups or at least with a significant number of individuals within specific groups (for instance, high-skilled labourers from Eastern European countries) experiencing great difficulties in accessing the labour markets that match with their expertise. This is a clear case of brain waste that corroborates the perceptions that the Diaspora still has on the capacities of the Portuguese society to absorb their potential in the best ways possible.

If we define brain waste as the inability of a country to allocate high-skilled capital to activities compatible with its expertise, then brain waste can affect nationals as well as and non-nationals, with civil society and governments sharing the

responsibility. Portuguese civil society is responsible for much of its brain waste, because part of its entrepreneurial structure still tends to privilege education and training less than low wages. This puts a tremendous pressure on graduates, especially more vulnerable groups such as immigrants. As a consequence, instead of a 'top-levelled' labour market, there is a tradition of a 'bottom-levelled' labour market where employers often do not recognise the recruitment of highly qualified human resources as relevant. In this 'bottom-levelled' labour market, entrepreneurs follow the old fallacious assumption that international competitiveness can be met by reducing costs in human resources. Brain waste in Portugal may be considered an even bigger problem, if we take into account that the country has been making a major effort to increase its levels of education (UNESCO, 2010). If this effort on the side of education ends up wasted in low-waged and low-skilled activities, one has to question how much the effort is actually worth.

Though governments are not exempted from responsibilities in fostering brain waste, it would be a mistake to ignore the Portuguese public efforts to change the entrepreneurial environment. The national Technological Plan provides a series of measures specifically designed to help companies increase their levels of innovation, technological competitiveness and participation in R&D activities. According to a recent report of the Foundation for Information Technology and Innovation, this is a successful approach, with Portugal ranking third in a total of 21 countries for showing the best competitive systems in support of R&D activities. This satisfactory performance seems to be in part thanks to an attractive system of fiscal incentives to business sectors dealing with R&D, whether as producers or as intensive users of R&D outputs.¹⁴ However, this does not erase the fact that companies in Portugal are still spending much less in R&D (from 0.24 percent in 2003, to 0.76 percent of the GDP in 2008) than companies in the EU area in general (1.21 percent of the GDP in 2008).

¹⁴ On the fiscal system see Law 20/2005 and Law 10/2009 that sets the Programme of Initiative for Investment and Employment.

Governmental efficiency: how improvement is being pursued

Solving the brain gain/brain drain equation from the state's perspective is no easy ride. Regardless of the position that states hold in the World-System, responding to the brain gain/brain drain challenge implies respecting fundamental human rights such as the citizen's right to mobility (unless the states are under non-democratic regimes); investing more in the continuous renewal of pull strategies that may attract both nationals and non-nationals; and investing in continual support for the communication circuit between its Diaspora and home-based high-skilled capital. But the more distant the state is from the centre of the economic World-System, the more it experiences difficulties in dealing with that complex equation.

Experts have been arguing over the last years on the benefits of virtual networking as a means to partially respond to this challenge. The benefits of new information and communication technologies (ICT) for the production and circulation of science have been deeply explored by various authors (Gibbons et al, 1997; Ackers et al, 2001; Connel, Wood and Crawford, 2005; De la Vega and Vessuri, 2008; Dickson, 2003), while its impact on the making and strengthening of the Diaspora networking has also been widely studied (Meyer and Brown, 1999; Meyer and Wattiaux, 2006; Mahroum, Eldrige and Daar, 2006; Thorn and Holm-Nielsen, 2006). Unfortunately though, most public strategies on brain attraction still disregard the relevance of fostering systematic relations between domestic communities and Diasporas (Teferra, 2004) through the support of new ICT. It is therefore crucial that states realise the relevance of developing measures that may facilitate the passage from sporadic, spontaneous and well-intended contacts between Diasporas and home-based high-skilled professionals, to well-organised networking structures whose projects may also be in line with the state's R&D priorities.

Portugal is a paradigmatic case of absence of public support to this kind of networking. As recent studies reveal, most contacts between home-based scientists and Diaspora scientists

are informal, corresponding to 84.8 percent of the total inquired in Delicado's study (2008a:123). In parallel, activities that denounce 'an effective collaboration [of the Diaspora] with the Portuguese scientific system' are by far less representative (30.3 percent in co-production of papers or other scientific outputs, and 26.9 percent in joint research projects (2008a: 122)).

This text began by arguing that brain circulation seems much more adjusted both to the demands of scientific reality (for the sake of its own validation as a space of knowledge) and to the characteristics of present global reality. But even *circulation* as a concept has to be detached from the burden of physical geography and contemplate other new 'geographies' such as those of cyberspace. In the Portuguese case under scrutiny, virtual brain circulation already exists, but not as part of a governmental strategy to help both the Diaspora and the home-based scientific communities to reinforce their ties.

Concluding remarks

This paper analysed how Portugal has been trying to contradict the characteristics of its semi-peripheral scientific system. More specifically, it analysed how the country tries to increase its attractiveness in the international brain circuit, and tries to fight its general semi-peripheral condition in Science and Technology, through the implementation of governmental measures.

The paper suggests that a successful public policy in regard to the semi-peripheral condition of the Portuguese scientific and technological markets has to be built on at least three major pillars:

- a. to increase the attractiveness to foreign qualified migration;
- b. to increase attractiveness to its own qualified Diaspora;
- c. to prevent the loss of high-skilled residents, whether national or non-national.

According to some recent reports, Portugal's semi-peripheral condition actually has potential for attracting foreign skilled human resources (and of its own Diaspora we may assume). In parallel, looking at the numbers presented by governmental agencies, the country reveals a

serious commitment with science and technology, having decreased significantly its gap from the EU area. But, as the text denounces, there are various structural challenges which the country still has to deal with. A successful approach to such challenges implies at least three major recognitions:

- a. that the Diaspora (whether bigger or smaller in number) will always exist;
- b. that brain drain/brain gain is a continuous process of simultaneous benefits and losses for the State;
- c. that attracting foreign and Diaspora brain power cannot be successfully equated outside the valorisation of home-based brain power.

There are, at least theoretically, good reasons to say that high-skilled migrants are likely to be the new winners of migration flows. Even if the most populated countries out of the western sphere (China, India, Russia, Indonesia, Brazil, Pakistan) continue to bet on the high-skilled training of their human resources (HR), along with countries such as Japan and the United States, excess in the supply of qualified HR is quite unlikely to happen, because the Western demand for high-skilled labour will also tend to grow as globalization forces go further in scientific competitiveness. This means that strategies to attract high-skilled migrants will also become more and more aggressive among states. For semi-peripheral countries such as Portugal this will imply working even harder on their pull capacities to attract high-skilled migrants and Diasporas, otherwise the gap between them and the states in the centre of the scientific, technological, academic, and economic markets, is likely to increase.

This text suggests that brain drain effects can be minimized thanks to networking (Teferra, 2004). New ICTs have been fundamental in fostering scientific and academic relations between home-based professionals and Diasporas, as well as in enabling their continuity, renewal and expansion with reduced costs. However, there must be a continuous and oriented effort, or in most cases it will be all about singular, well-intended and spontaneous initiatives with no long-term impact in the country's scientific development, and, more relevant, with no con-

nection to the R&D priorities of the country. In other words, governmental support is crucial in order to explore as much as possible the benefits of networking between Diaspora and home-based national/non-national high-skilled professionals.¹⁵

Simultaneously, when equating the attraction of the Diaspora, this must not be thought strictly in terms of attracting scientists to return and stay in the country, but also, and most importantly in terms of how the Diaspora can play a relevant role in helping the country meet its goals still when remaining abroad (Favell et al., 2006; Meyer and Brown, 1999).¹⁶

If properly stimulated by the right policies, the benefits of networking may be quite big for the Portuguese scientific system. Indeed, studies reveal that most Portuguese scientists abroad keep very regular contacts with fellows in Portugal¹⁷ which is already a good basis to start with.

Moreover, there is also the importance of the language factor. There are over 200 million Portuguese speaking people in the world. Higher levels of education and training within all Portuguese speaking countries, and most particularly in Angola and Brazil, will be decisive in providing increasing numbers of high-skilled transmigrants that will be contributing regardless of nationality to the scientific, technological and economic development of this multicultural space, Portugal included.¹⁸

¹⁵ Of course, ICTs can also contribute to brain drain because it makes it easier to search for opportunities outside the country. And indeed, brain circulation fed by virtual intellectual Diaspora works beyond national control and this brings challenges to any State, and most sharply for those facing economic and/or social-political fragility.

¹⁶ Moreover, as literature signals, Diaspora can contribute to the creation of better returning conditions, as it helps researchers to be updated about the best opportunities in the national market (Ackers, 2001).

¹⁷ In a study conducted to the Portuguese Diaspora's behaviours, Delicado notes that a significant number of inquired individuals is bounded to associations of a scientific or scientific-professional nature located in Portugal (2008b: 7).

¹⁸ We take here *transmigrants* in Schiller's accession (Schiller et al., 1995:48), as migrants whose lives are structured on mobility and interconnections that surmount and relate to various national frames, while

Networking and virtual spaces are no panaceas for brain drain, but they may bring significant gains both for states and individuals. Its gains, however, tend to be diluted if they escape to the state's participation. This is certainly a challenge inherent to virtual communication, and which the state must tackle gently. However, the benefits from coordinating the state's R&D priorities with the richness resulting from virtual networking between Diaspora and home-based brain power will justify any effort to implement specific measures to enhance this reciprocity.

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Note on the Author

Isabel Estrada CARVALHAIS is Assistant Professor at the School of Economics and Management of the University of Minho in Portugal. She is currently director of the NICPRI – Research Centre in Political Science and International Relations and Chief Editor of the *Perspectivas-Portuguese Journal of Political Science and International Relations*. Her publications include (2007) *Postnational Citizenship and the State*. Lisboa: Celta; (2007) *Cidadania no Pensamento Político Contemporâneo*. Principia: SJ Estoril. (2004) *Os Desafios da Cidadania Pós-Nacional*. Porto: Afrontamento; (2010) ‘O Tratado de Lisboa e participação cidadã’ in SILVEIRA, A., *Direito da União Europeia e Transnacionalidade*. Lisboa. Quid júris: 103-121.

isabelestrada@eeg.uminho.pt