Changing European Governance, Changing Research and Innovation:

Coordination Effects & Membership Effects

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ABSTRACT

This chapter examines two fundamental dimensions of the changing European governance, namely the coordination of national policies and the changes in membership (accession of Central and Eastern European Countries in the mid-2000, and of Brexit in late 2010s). In particular this chapter looks at these changes from the perspective of their effects, in an attempt to give account of what European integration means in the context of coordinating national research policies, and in the context of changes of EU membership. Hence, the paper asks the question, what are the coordination and membership effects of changes in European governance? After providing an overview of these effects, the paper discusses them and provides some final remarks.

1. Introduction: Changing Governance and its Effects

By the turn of the millennium the European Union's research policy started a long process of transformation. A process that is as much related to some important changes in core issues of research policy in the EU, as it is to some fundamental changes in the overall governance of the European Union (Edler, Kuhlman et al. 2003). Those transformations have been rather profound, even if they are still mainly aspirational than real in some respects. Admittedly, a certain level of institutional inertia can still be seen in some procedures of assessment, funding and management in EU research policy since its creation in the early 1980s (Banchoff 2002). Yet, other fundamental aspects of EU's research policy have changed in important manners. The list is long: introduction of the European Research Area (to create a 'single market' lowering down regulatory barriers to the free movement of knowledge); the creation of new institutions like the European Research Council or the European Institute of Technology (Luukkonen 2013); the increased focus on innovation aspects associated with science and technology (Borrás 2003); a growing effort to internationalize EU-funded research activities; or the more recent efforts to promote open access to research results, or responsible research and innovation.

Yet two fundamental dimensions which have developed since the early 2000s stand out and have a particular relevance. The first one has to do with the new vision about the multi-level perspective of a supra-national research and technology system. With this vision in mind, the Union embarked in an effort to re-define its role in terms of coordinating the national reforms of research and technology policies. The second one has to do with the very important changes in EU membership, first with the rapid increase of new EU member states, in particular with the accession of 12 Central and Eastern European countries in 2004 and 2007; and more recently with the decrease of EU members, mostly related to the UK decision in 2016 to leave the Union, popularly known as Brexit.

This chapter examines these two fundamental dimensions of the changing European research governance. In particular this chapter looks at these changes from the perspective of their effects, in an attempt to give account of what European integration means in the context of coordinating national research policies, and in the context of changes of EU membership. Most studies of European integration have tended to look at integration as a process, examining the different factors that are at play in order to explain different phases of EU political construction as it unfolds through time. However, European integration should also be studied not as a process, but as an outcome. That is, as the final effect of that political process, rather than the process itself. In this relation, the question is, what are the effects of these fundamental changes in the European Union's research policy?

With this purpose in mind, this paper proceeds as follows. The next section reviews succinctly the literature, arguing to study European integration as an outcome, and positioning that discussion in the field of science and innovation studies. After that, section 3 examines the forms and shapes of the EU coordination of national research policies since the creation of the Lisbon strategy and the procedures associated to the Open Method of Coordination. It examines some of the effects of that cross-national

coordination. Section 4 is devoted to examine the accession of Central and Eastern European Countries (CEEC) in the mid-2000s. The accession of many more members has been an important hallmark of the history of Europe, members which are mainly small countries and small economies, traditionally with low innovative capacity and with low levels of international collaboration. The section examines the effects of membership in their patterns of European collaboration. A similar question is asked in section 5 regarding the UK. With the recent decision to leave, the country is facing many unanswered questions regarding its future formal relation with the EU. This section examines the UKs current relation with EUs research activities, revealing its important ties to and funding from the EU R&D budget. Whereas the effect of Brexit is difficult to predict, the section shows with all clarity that the UK is today highly integrated into EUs research and scientific activities. For that reason, the scientific and research community will be at the forefront in terms of the impact that Brexit will have, both for the UK and for the EU. In other words, research activities and the organization of research activities will be invariably affected by Brexit, one way or another, given the current high degree of integration of the UK into the fabric of EU-wide research landscape. The last section summarizes briefly and discusses some possible future trends for the governance of the EU research policy.

2. European Integration as an Outcome

For many decades the field of European Union studies has developed a series of alternative theories about the political process that defines the integration of Europe. The very special nature of the European Union, with supranational legal competences in a wide range of policy areas, has made this a particular case of how sovereign countries have embarked in building a new federal (or quasi-federal) political system. In order to explain that process, the integration theories have identified different alternative factors about how the European Union large constitutional changes have taken place (such as the Single European Act, the Maastricht Treaty, or the creation of the Economic and Monetary Union). Among the most crucial factors identified by those theories are the following: changes in the domestic preferences of large countries (France and Germany most prominently), changes in the day-to-day institutional performance and in legal interpretation due to new demands from EU citizens and firms, or the semi-automatic processes of functional spill-overs from interconnected policy areas (Wiener and Diez 2004). Yet, relevant as these theories might be, they have focused mainly on European integration as a socio-political process of constructing a new political system, only secondarily examining other more policy-specific dimensions of European integration. This eminently process-oriented and political system-oriented focus has obscured other crucial dimensions of European integration, most notably the understanding that European integration is not only a process, but also an outcome of socio-economic interactions; and that it is not only about constructing new political institutions through treaty reforms or grand/small political transformations, but also and essentially, the day-to-day unfolding of spheres and areas of interaction. Some scholars have taken up that agenda by looking into the transformative effects of European integration in some policy-specific areas (Cowles, Caporaso et al. 2001) (Radaelli 2003). However, research and innovation policy has tended to receive

very little attention in this literature in spite of its centrality in the EU's overall growth strategies and not least its budget (Wallace, Pollack et al. 2015).

The European integration of research, science, technology and innovation has to do with interactions. And therefore, it must be seen, not as a process, but as the outcome of cross-national and supra-national institutional frames. Hence, it is not so much about the nature and novelty of those institutional frames, but about what policy-makers, scientists, researchers, firms, etc. eventually do with them. For that reason, studying European integration and the governance of European science and research has to do with the interplay between these new institutional frames and the actual activities performed by a wide variety of actors at the domestic and cross-boundary levels. Following from that, this paper is aligned with some general view about European integration in the field of science and innovation, understood as the purposeful outcome of specific EU initiatives (Luukkonen and Nedeva 2010).

From this point of view, the paper argues that studying the European integration as an outcome requires examining two interlinked dimensions. The first has to do with the dimension of policy organization (at EU and national level separately, and also how they are interlinked), and the second dimension has to do with the science and innovation-related activities performed by science and innovation performing organizations. Looking at the first dimension, the policy organization, there are a number of highly relevant studies about the organization of European-level science. The initiatives organizing science at the European level are located between the national and the global levels (Wedlin and Nedeva 2015) . This has to do with the different Framework Programs and their gradual openness to international collaboration (Nedeva 2013), as well as the creation of the European Research Council and similar EU-level policy initiatives. However, this dimension requires as well an examination of the transformations of domestic science and innovation policies, as the effect and outcome of some EU-level initiatives. Since the early 2000s, the European Union initiated a substantial amount of initiatives in relation to the coordination and reform of national policies. These EU-level initiatives are taken within the broad umbrella of the Lisbon strategy and the different focus on competition-enhancing initiatives (Mcguinness and O'Carroll 2010). However there are scarce studies about this issue, and the overall effects of this (see next section for an overview). For that reason, the Europeanization of domestic science and innovation policies is a topic that deserves more attention, as it is a core matter for understanding the effects of integration, and hence, of the changes in European governance and its implications in the organization of science and innovation.

The second dimension has to do with the effects of integration as the outcomes and performance of science and innovation. Earlier studies have examined this matter focusing on different aspects, most remarkably, in terms of the constitution of scientific networks, the types of organizations and their strategies participating in EU-wide scientific consortia, or in terms of co-patenting trends. Luukkonnen and Nedeva examine integration in terms of the networks formed in relation to EU-policies (Luukkonen and Nedeva 2010). They posit that these are related to 'crystallising agents' which are catalysts for social integration across Europe. Other empirical studies look at EU-wide networks, identifying specific patterns. For example, their interactions with global players (Raan, van Leeuwen et al. 2009), or the regional location of those networks and their lack of homogeneity throughout the European Union (Barber and Scherngell 2013). Another line of studies analyses the type of organizations taking part in

EU-funded scientific consortia. The findings show that it is characterized by a high concentration of a small group of universities (Lepori, Veglio et al. 2015), and that for these high reputation universities participation in EU consortia is an important strategic choice. For that reason, the strategies of these actors are key for the success of low-funded EU R&D programs in terms of fostering cross-national interactions (Lepori, Reale et al. 2014). Last but not least, some studies have examined the degree of European integration in R&D by examining levels of co-inventorship in patent applications (Guellec and Dernis 2009), by the trends and effects promoting cross-national mobility of researchers (Jacob and Meek 2013) (Edler, Fier et al. 2011), and by the levels of international co-publication of scientific articles (Muldur, Corvers et al. 2006). These are useful and strong ways of empirically investigating the degrees and forms of European science integration, as the outcome of political processes as well as of socio-economic dynamics. This paper follows this path, and investigates how the important changes in the membership of the European Union (accession of 12 new members in mid-2000s, and the near future Brexit of the UK) can be seen in the overall patterns of interactions. In other words, a general view of the effects of accession and Brexit on as the outcome of changing European governance.

3. The effects of coordinating national research policy reforms: Learning & Organizational Capacity

The presidency conclusions of the Lisbon European Council in March 2000 stated a new goal for the European Union: "The Union has today set itself ***a new strategic goal*** for the next decade: *to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion.* Achieving this goal requires an ***overall strategy*** aimed at: preparing the transition to a knowledge-based economy and society by better policies for the information society and R&D, as well as by stepping up the process of structural reform for competitiveness and innovation and by completing the internal market." (European_Council 2000) p. 1. This was the official launch of the Lisbon strategy, which put R&D and the knowledge-based economy at the core of its vision for the renewal of the European economy. A similar goal was re-stated in 2010 in the European 2020 agenda, the continuation of the Lisbon strategy.

The way of implementing these ambitious goals has largely been through the so-called Open Method of Coordination (OMC). In a nutshell, this method coordinates institutional reforms at the national level through a series of different mechanisms. Implicit in the OMC is the understanding that European integration is not just about transferring legal competences or funding resources to the Union, but that it is also about aligning domestic economic policies (Borrás and Jacobsson 2004). In other words, European integration not only by law and economic transfers, but also by multi-level coordination.

In the field of research, the OMC has been implemented in three different fields. Firstly, by proposing member states to commit to the Barcelona target of reaching a 3% of GDP expenditure on R&D;

secondly, through some declarative documents stating some guidelines and principles for voluntary action at the domestic level; and thirdly, in a series of rounds lead and undertaken by national policy-makers for the exchange of information, discussion and coordination of some specific and crucial areas of R&D policy.

Regarding the first, the Barcelona target proposed in 2003 in a European Council has been strongly criticized as being too simplistic a quantitative target. In many ways this was not only a blunt political idea; it was also unrealistic and disregarding more important and real aspects of R&D policy (Freeman and Soete 2009). Many years after the target was defined, most EU member's levels of expenditure continue to be far from that target (Boyer 2009).

In contrast to the Barcelona target, the second way of coordinating domestic R&D policies was through non-binding declaratory documents. This is the case of the mobility of researchers, and the efforts in terms of codifying some principles as guidelines at the EU-level. The European Charter for Researchers and Code of Conduct for their Recruitment are two recommendations without legally binding nature issued by the European Union in 2005. The promotion of those principles took place mainly at the level of research-active organizations and their representations, more than at national ministries (i.e. university associations, or associations of public research organizations). The response by these research-active organizations has been rather positive, as the two documents and the practices they promote have been actively endorsed by almost 900 research organizations in virtually all EU countries and beyond (Mcguinness and O'Carroll 2010).

The third, and perhaps most relevant than the other two, way of coordinating domestic R&D policies was done through a series of rounds in 2004-9 in some specific R&D policy areas. These policy areas were, among others: policy mixes, public research and industry collaboration, tax policies for R&D, intellectual property rights (IPR), and small and medium-sized enterprises (SMEs). The rounds were organized in a voluntary basis, and only the countries directly interested in those topics were engaged in the coordination exercises. This 'a la carte' coordination is on the soft-side of the Open Method, as other policy areas have implemented the Open Method in more stringent ways (with all countries, and with strong conditionality). These rounds of coordination have exhibited different effects in terms of learning. The empirical findings show that learning is most likely to take place when there is a direct alignment between the political attention and saliency of that particular area of R&D policy at the domestic level (i.e. tax exemptions) and the EU-level coordination (Borrás 2015). Likewise, learning at the national level will take place when the domestic level exhibits some degree of organizational capacity. Meaning, when the domestic level already has some degree of knowledge and expertise. Whereas this does not exclude the possibility of the EU coordination exercises building capacity at the domestic level; it is those with a medium-level of organizational capacity and previous knowledge who are most likely to learn most (Borrás 2011).

As we have seen above, some few studies have asked about the effects of R&D policy coordination in the EU, or about the conditions under which that coordination is conducive to some learning processes and transformations at the domestic level. Yet the scarce findings suggest that there are mixed effects. On the one hand, at the general level, the design of national policies do not seem to have followed the

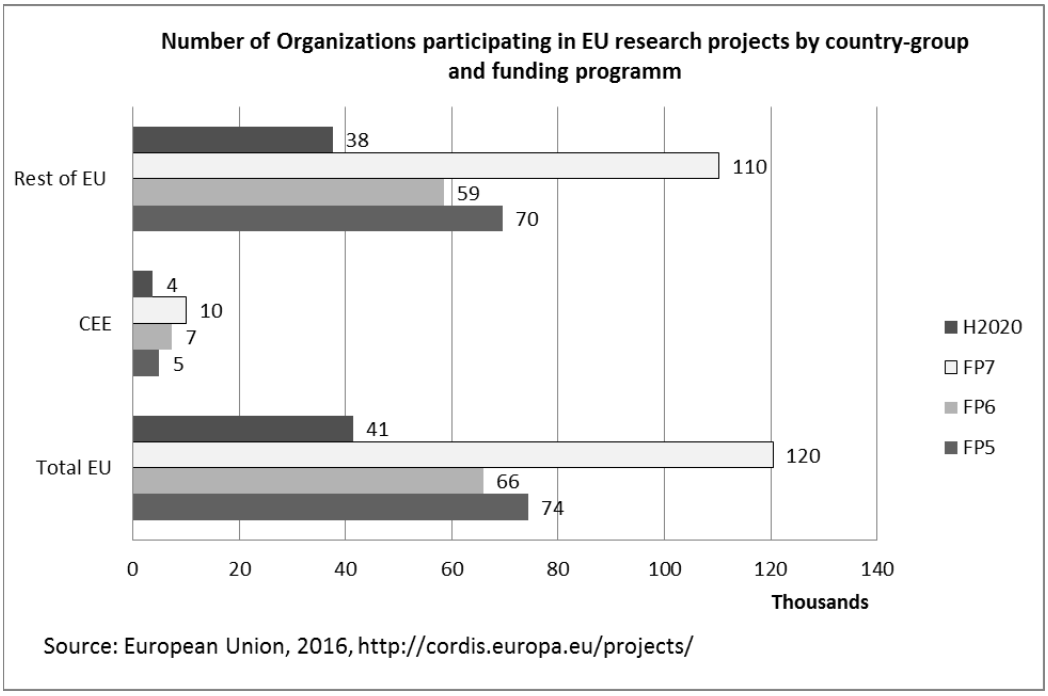
generic lines suggested by the European Research Area objectives (Lisbon_follow_up_expert_group 2009). In a similar vein, the input-oriented 3% target has been rather unsuccessful, most likely because it was never a realistic nor a relevant target. On the other side, however, positive coordination effects seem to have taken place. This is the case of the Chart and Code of Conduct for mobility of researchers, and of the different rounds of coordination in the CREST committee (the committee of national representatives of R&D policy). The scarce evidence suggests that there have been relevant learning processes at the level of research-active organizations (the Chart and the Code) and at the level of highly-specialized policy-makers (the rounds of CREST coordination). This is mainly because those issues in question (mobility of researchers, etc) were highly relevant for the actors who engaged in the learning and transformation. Such a finding is consistent with theories of policy learning, which see policy learning not as an automatic rational process of acquiring new information, but as the fruit of the intentionality of some actors and as a process highly embedded in complex institutional settings which are not exempted from conflict.

4. The effects of new members' accession: Increasing Cross-national Collaboration

The enlargement of 12 new members from Central and Eastern Europe in the mid-2000s had not only important historical connotations. It had as well very significant practical effects for those individual countries and for Europe at large. In the field of science, technology and innovation, the new members were not only among the smallest countries in size, but also among the weakest science and innovation performers. This was the legacy of their past, where scientific activities were mainly performed by public research organizations strongly connected to the state, but largely detached from university education and from industrial production. Moreover, these were scientific and innovations systems with generally low internationalization levels. Naturally there is substantial variation across the new 12 countries, as their industrial specialization, scientific structure, educational and knowledge capabilities differ in important ways. Nevertheless, these new countries were facing similar challenges when joining the Union, in terms of building capabilities, strengthening excellence and industry relevance, and increasing the internationalization of their research and innovation systems.

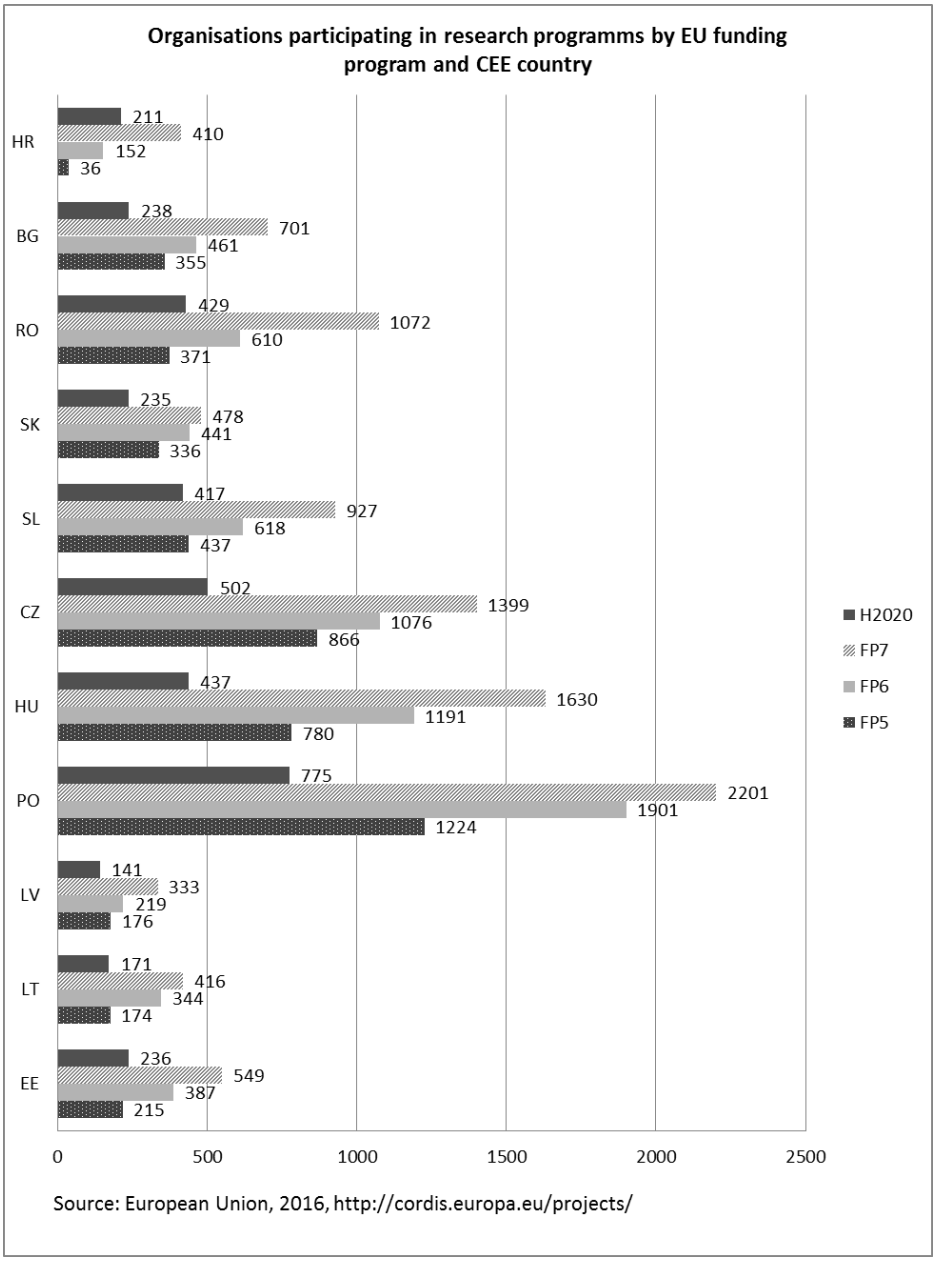
The effects of integrating in Europe have been rather significant for them. Figure 1 shows the absolute number of organizations (firms, universities, public laboratories, etc) which have been part of funded consortia in the different EU Framework Programs (FP5: 1998-2002; FP6 2002-2006; FP7: 2007-13; H2020: 2014-2020). Central Eastern European countries were invited to join EU consortia well before they became full EU members. Their participation has been increasing substantially, from 5.000 organizations in the period 1998-2002, to 10.000 in 2007-13. This trend is also shown in Figure 2 on a one-by-one basis for each country. As it can be noticed, all countries invariably increase through time. The H2020 figures are still open, because H2020 is a large program which is still running until 2020, hence the dataset is unfinished and cannot be so far compared to the previous framework programs.

Figure 1: Number of Organizations participating in EU research projects FP5, FP6, FP7 and H2020 by country group.



OBS: Data for H2020 is unfinished, as the program will run until 2020.

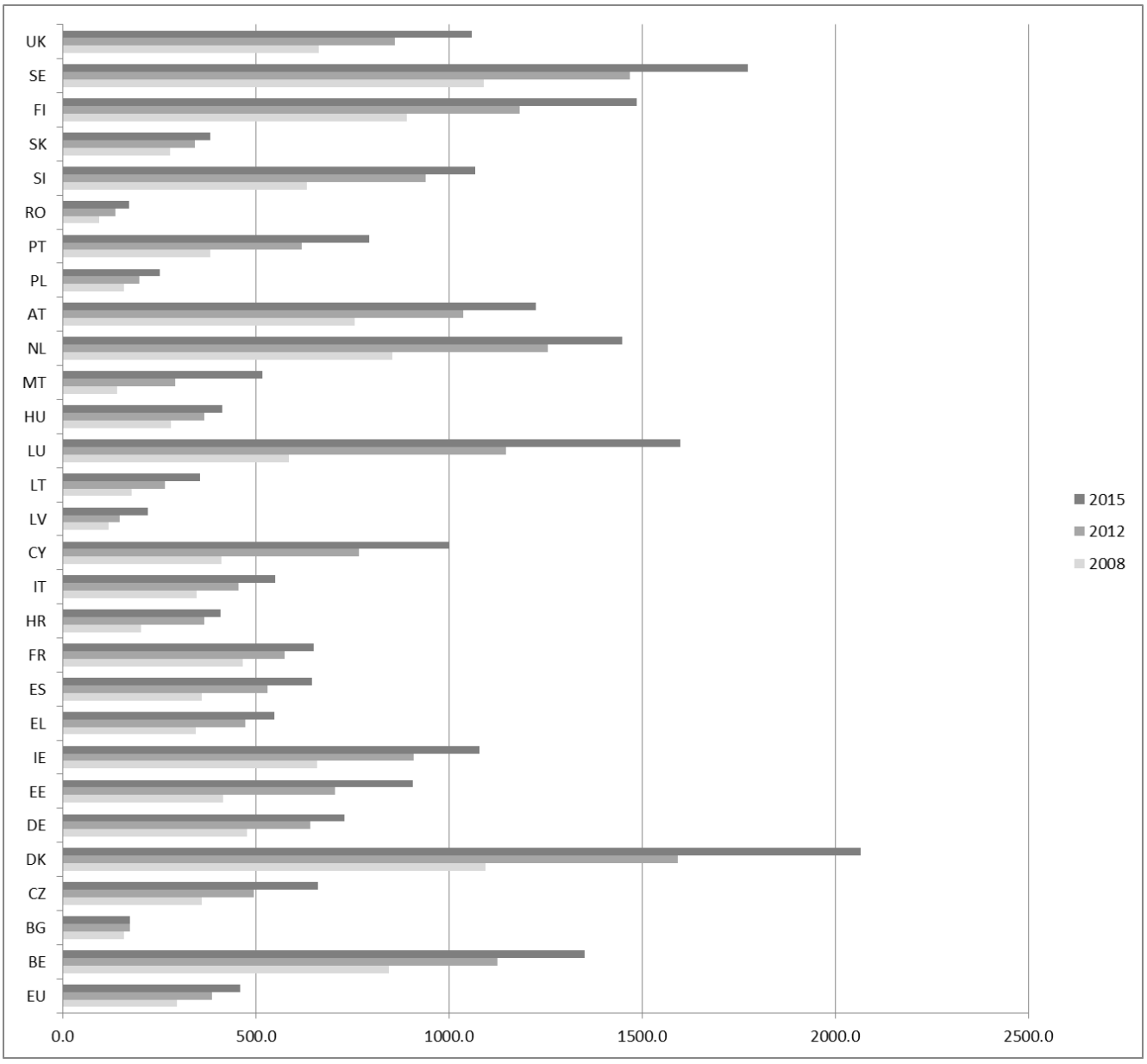
Figure 2: Organizations participating in EU research programs FP5, FP6, FP7 and H2020 by CEE country



The increasing participation in European consortia has corresponded to the rapid internationalization of these science and innovation systems. Another relevant figure to examine in this regard is the number of international scientific co-publications. Figure 3 shows this for all EU28 countries. Some countries have internationalized very rapidly the past few years, like Denmark or Sweden, which were quite internationalized to start with. Yet, virtually all CEEC have invariably increased their internationalization particularly considering their modest starting point. Yet, the growth has been less rapid than in the other EU countries. This figure shows as well, that these countries continue to be among the less

internationalized in EU2, and that there might be some barriers that hinder their rapid internationalization compared with other EU members.

Figure 3: International scientific co-publications per million population

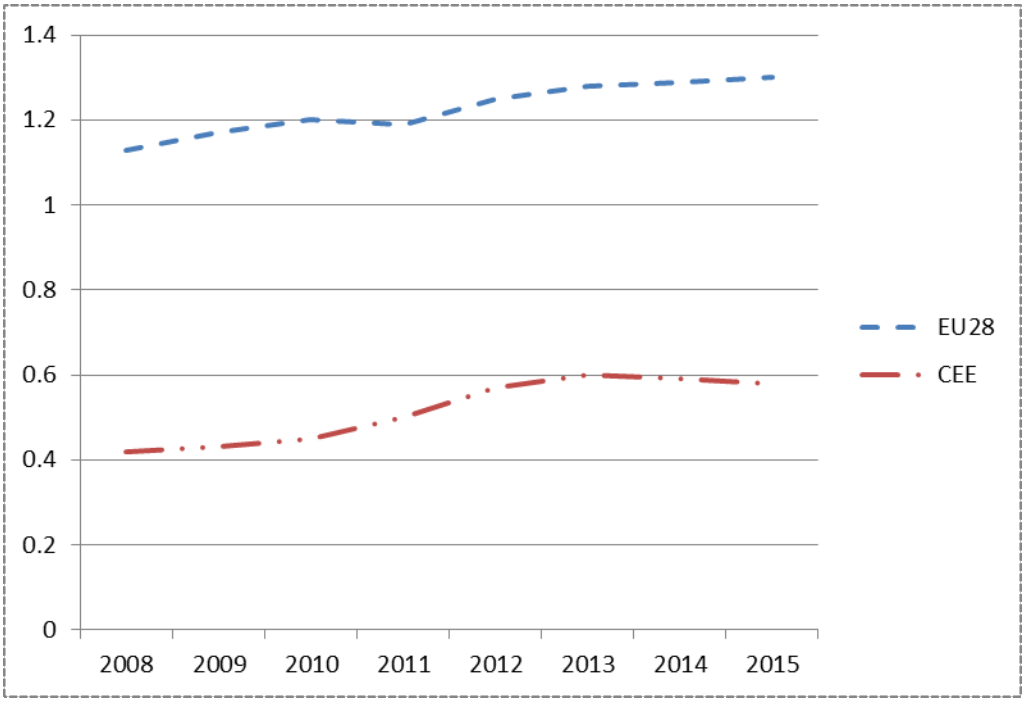


Source: European Innovation Scoreboard 2016

In terms of business R&D activities and innovation, the CEEC have also gradually improved during the time span analyzed. Figure 4 shows that there continues to be a remarkable gap between EU28 average and CEEC average in business expenditure in R&D as percentage of GDP. The level of business R&D expenditure has increased in important ways in CEE countries few years after joining the Union, but is

still well below the average performance in the rest of EU countries. It is worth noting however, that the business expenditure in R&D remained somehow stable during the hardest years of the 2008 economic crisis, to increase again after 2011.

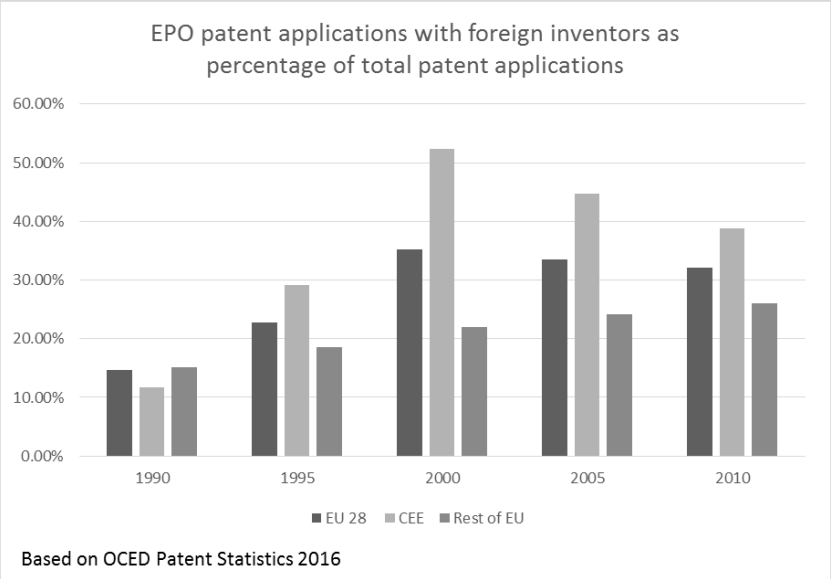
Figure 4: Business R&D expenditure as percentage of GDP, EU28 and CEEC



Source: Innovation Scoreboard 2016 // CEEC: Bulgaria, Croatia, Czech Republic, Estonia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia and Slovakia

In order to see the degree of integration in innovation activities, figure 5 below show the percentage of patent applications to EPO with foreign inventors. It is important to keep in mind that the absolute number of patents in CEE countries is rather low, which is the result of low-intensity innovation activities and of small size countries. For that reason year-by-year statistics show high volatility. Putting all CEE countries together and treating the data in a multi-year scale helps to diminish that volatility, and to identify more reliable patterns. The figure below shows that the percentage of international co-inventors in CEE countries is higher than in the rest of the EU member states. This is quite relevant piece of information. It indicates that the innovative activities in CEE countries, even if more limited in intensity in total, have in fact been highly related to international collaboration. In other words, the CEE countries innovative activities seem to be related to increasing collaboration, particularly in business related and close-to-market innovation activities.

Figure 5: EPO patent applications with foreign inventors EU28 average, CEE average, rest-EU average.



OECD (2016), "Indicators of international co-operation", OECD Patent Statistics (database).
DOI: http://dx.doi.org/10.1787/data-00507-en
(Accessed on 23 March 2017)

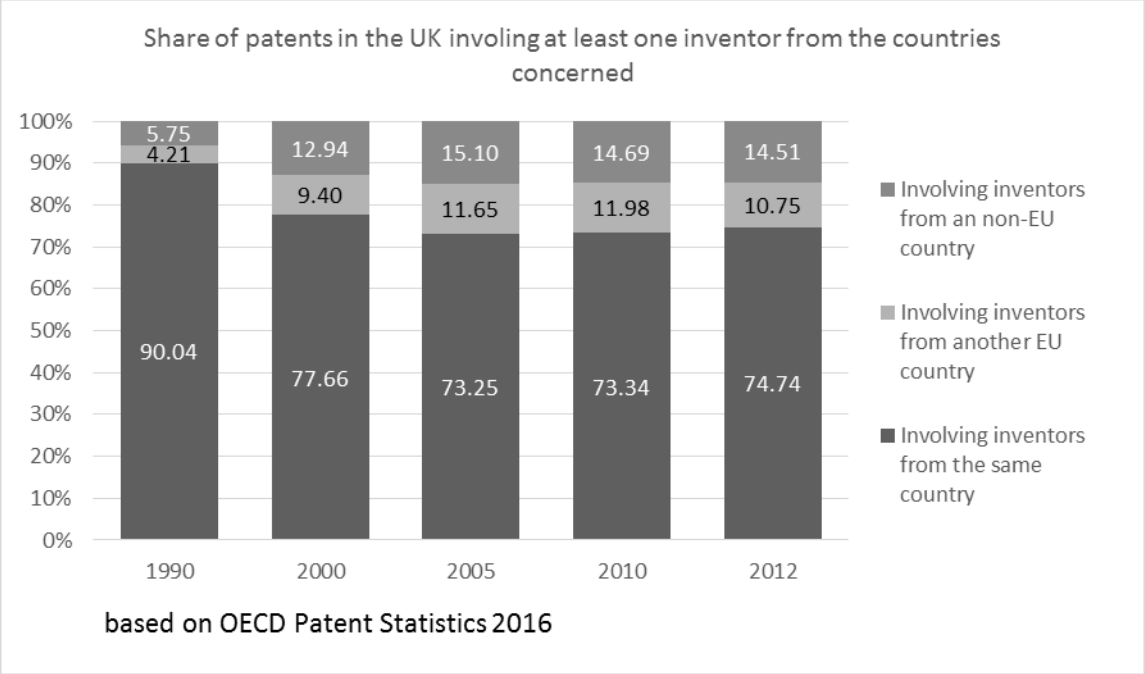
5. The Unpredictable End Road for Brexit, and its Unpredictable Effects

After the British voters narrow decision to leave the European Union in June 2016, the UK government subsequently invoked article 50 in March 2017, initiating officially the legal and political procedure. The UK decision is the first of the kind in the history of the European Union, and invariably, a landmark in the political history of European integration. The terms of the withdrawal are going to be the subject matter of the negotiations between the UK and the other 27 members of the Union that have just opened. Naturally, at the time of writing, it is still very much unclear how this negotiation is going to proceed. But it seems already that they are going to be rather complex negotiations. This is so, not only because of there is a very large amount of topics and areas to be addressed during those negotiations, but also because the final form and depth of the relationship between the UK and the EU has not been determined yet.

For those reasons, the end road of the Brexit negotiations is at this point in time unknown and unpredictable. The same degree of unpredictability that characterizes at the effects that Brexit will have on the UK and the EU at large. What can be done, nonetheless, is to describe the nature of the UK science and innovation system relationship to the EU as it has evolved during the past years. Such a description might provide some clues as to the size of the challenge and the issues at stake for both parties.

There is no doubt that the science and innovation system in the UK is one among the strongest in Europe. Particularly strong are the top research-oriented universities in the UK, which have traditionally been among top performers worldwide. Likewise, the UK science and innovation system is very internationalized. Figure 3 above showed the UK above the average in terms of the international co-publication of scientific journals. In a similar vein, the UK has an important level of internationalization in patents. Figure 6 shows a consistent growth during the past decades in the percentage of patents with at least one co-inventor from another country. This is above the EU average of international co-patenting. Another issue that is worth noting in figure 6 is that the percentage of inventors from a non-EU country is consistently higher than from EU countries. Whereas the figure does not indicate the countries in particular, it is most likely that the USA figures prominently among those non-EU countries statistics for reasons of historical ties and the strength of USA innovation capability.

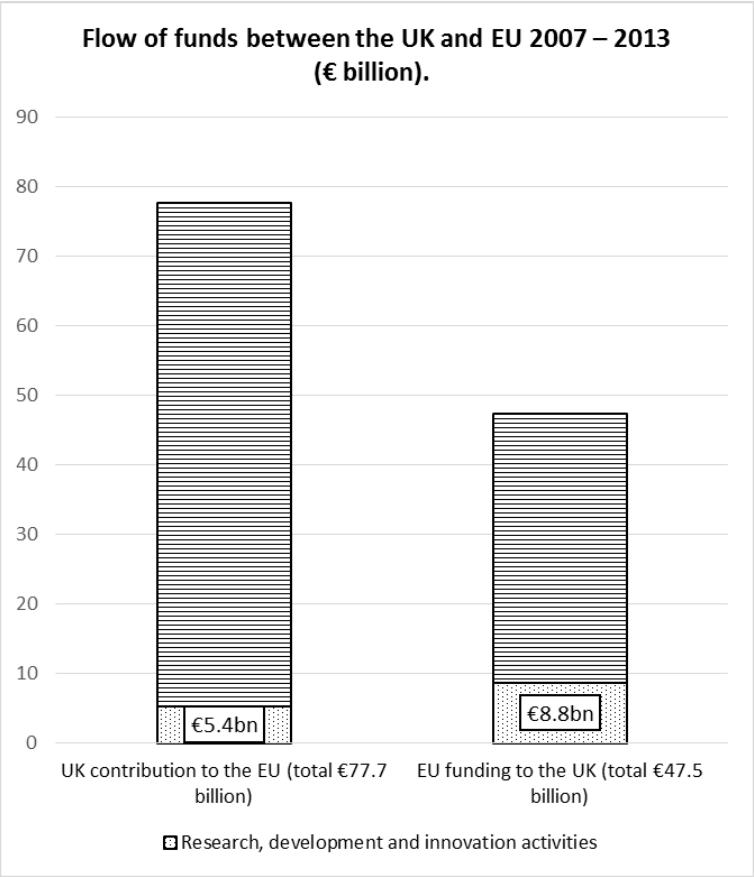
Figure 6: Average share of co-patents in the UK



Another very important issue in the negotiations of Brexit has to do with the European Framework Programs and other R&D-related funding (mostly from Structural Funds). During the past years, the UK has been one of the countries that has benefited the most from its participation from the FP programs, when standardizing the data per inhabitant and per GDP size. This is most likely related to the strength to its research universities, but also to the general high level of internationalization of its research and innovation system as shown above. Figure 7 shows the flow of funds from the EU to the UK and viceversa, specifying those which are R&D-related. The data includes funds from the different Framework Programs as well as other R&D-related expenditures from the EU, most prominently from Structural Funds. It is worth noting in this figure that the UK has managed to attract a considerable

higher amount of funds from the EU associated to R&D activities, proportionally higher than to other EU activities. This indicates that R&D activities are an important aspect of the UK traditional relation to the European Union.

Figure 7: Flow of funds EU and UK – Source: (The_Royal_Society 2016)



What do those figures tell us so far about the UK and the European Union? They tell us that the UK seems to be rather internationalized, and that that the EU is a very important partner for the UK. Likewise, the UK is a very important partner for the EU. The UK represents approximately 15% of the overall GDP of the EU, which is a substantial amount given the size and productive capacity of the country. Something similar is about the UK scientific and innovative capacity. The figures above show a UK that is highly integrated in the European Union not only in terms of scientific and innovation production, but also in terms of successful consortia in the EU funding of research collaboration.

6. Summary and Final Remarks

In 2009 Delanghe, Muldur and Soete edited a book with the title "European Science and Technology Policy. Towards Integration or Fragmentation?" (Delanghe, Muldur et al. 2009). The question they formulated about integration or fragmentation seems to be even more relevant today. The profound changes in European governance since the mid-2000 have left many open questions regarding the future of the European Union in general, and of the European science and innovation in particular. In this chapter we have seen that the coordination effects of the European Union in terms of the changes in domestic research policies have been nuanced, as there seems to be some learning process in some specific areas and under some specific circumstances. The same seems to be the case in terms of the accession effects on Central and Eastern European countries, as the overview provided in this chapter indicates at general level, a certain degree of increased collaboration in international co-publication, co-inventorship, and the absolute number of organizations from these countries participating in EU funding programs. However, extrapolating from previous findings, there is still a long way to go, as the levels of investment in R&D in these countries are still much lower, and the EU patterns of collaboration are still clustered and far from being geographically homogeneous.

Likewise, the chapter has shown that, even if it is difficult to foresee the development and final outcome of the Brexit negotiations, it is already obvious that there is a very high level of interdependency between the EU and the UK scientific and research activities. The uncertainty surrounding the negotiations is not positive from the perspective scientific collaborative projects, which are normally mid-term oriented (3-5 years) and therefore require some financial and organizational stability.

These important changes in the European governance and their coordination and membership effects on science and innovation show with all clarity that EU is an important factor in the unfolding of domestic policy strategies and in the actual unfolding of scientific and innovative endeavors. Science and innovation policies have traditionally been rather technocratic: They rarely make the headlines of newspapers, and they evolve largely unnoticed from the general public. The low political saliency of this policy is problematic in times of political discontent and protest. Citizens might make key governance decisions about the collective future of the nation or/and of the European Union, with little awareness (and even less debate) about the possible consequences for scientific endeavors and for the innovative capacity of the economy. This is perhaps the most important lesson so far from the UK experience, particularly about the nature of the debates that preceded the referendum in 2016. It is time perhaps for social scientists to make more active contributions to these types of debates, identifying and analyzing in more detail the effects of European integration. Disseminating the findings to the general public becomes essential in order to qualify a debate which has become too simplistic and identity-based, disregarding the high degree of interdependency and the international (if not universal) nature of the scientific endeavour.

7. References

Brexit and research funding- report from the Royal Society: https://royalsociety.org/topics-policy/projects/uk-research-and-european-union/

Banchoff, T. (2002). "Institutions, Inertia and European Union Research Policy." JCMS: Journal of Common Market Studies **40**(1): 1-21.

Barber, M. J. and T. Scherngell (2013). "Is the European R&D Network Homogeneous? Distinguishing Relevant Network Communities Using Graph Theoretic and Spatial Interaction Modelling Approaches." Regional Studies **47**(8): 1283-1298.

Borrás, S. (2003). The Innovation Policy of the European Union. From Government to Governance. Cheltenham, Edward Elgar Publishers.

Borrás, S. (2011). "Policy Learning and Organizational Capacities in Innovation Policies." Science and Public Policy **38**(9): 725-734.

Borrás, S. (2015). Reforms of National Innovation Policies in Europe. Coordinating Sensemaking across Countries. Sources of National Institutional Competitiveness. Sensemaking and Institutional Change. S. Borrás and L. Seabrooke. Oxford, Oxford University Press**:** 60-77.

Borrás, S. and K. Jacobsson (2004). "The Open Method of Co-ordination and the New Patterns of EU Governance." European Journal of Public Policy **11**(2): 185-208.

Boyer, R. (2009). From the Lisbon Agenda to the Lisbon Treaty: National Research Systems in the Context of European Integration and Globalization. European Science and Technology Policy. Towards Integration or Fragmentation? H. Delanghe, U. Muldur and L. Soete. Cheltenham, Edward Elgar.

Cowles, M. G., J. A. Caporaso and T. Risse, Eds. (2001). Transforming Europe: Europeanization and domestic change. Ithaca, Cornell University Press.

Delanghe, H., U. Muldur and L. Soete, Eds. (2009). European Science and Technology Policy: Towards Integration Or Fragmentation? Cheltenham, Edward Elgar.

Edler, J., H. Fier and C. Grimpe (2011). "International scientist mobility and the locus of knowledge and technology transfer." Research Policy **40**(6): 791-805.

Edler, J., S. Kuhlman and M. Behrens, Eds. (2003). Changing Governance of Research and Technology Policy. The European Research Area. Chentelham, Edward Elgar.

European_Council (2000). Presidency Conclusions. Lisbon European Council March 23rd 24th 2000. Brussels, European Council.

Freeman, C. and L. Soete (2009). "Developing science, technology and innovation indicators: What we can learn from the past." Research Policy **38**(4): 583-589.

Guellec, D. and H. Dernis (2009). The Levelling Off of the Integration of European Technology. European Science and Technology Policy. Towards Integration or Fragmentation? H. Delanghe, U. Muldur and L. Soete. Cheltenham, Edward Elgar**:** 291-311.

Jacob, M. and V. L. Meek (2013). "Scientific mobility and international research networks: trends and policy tools for promoting research excellence and capacity building." Studies in Higher Education **38**(3): 331-344.

Lepori, B., E. Reale and P. Larédo (2014). "Logics of integration and actors' strategies in European joint programs." Research Policy **43**(2): 391-402.

Lepori, B., V. Veglio, B. Heller-Schuh, T. Scherngell and M. Barber (2015). "Participations to European Framework Programs of higher education institutions and their association with organizational characteristics." Scientometrics **105**(3): 2149-2178.

Lisbon_follow_up_expert_group (2009). The Governance Challenge for Knowledge Policies in the Lisbon Strategy: Between Revolution and Illusion. European_Commission. Brussels.
Luukkonen, T. (2013). "The European Research Council and the European research funding landscape." Science and Public Policy **41**(1): 29-43.
Luukkonen, T. and M. Nedeva (2010). "Towards understanding integration in research and research policy." Research Policy **39**(5): 674-686.
Mcguinness, N. and C. O'Carroll (2010). "Benchmarking Europe's Lab Benches: How Successful has the OMC been in Research Policy?" Journal of Common Market Studies **48**(2): 293-318.
Muldur, U., F. Corvers, H. Delanghe, J. Dratwa, D. Heimberger, B. Sloan and S. Vanslembrouck (2006). A New Deal for an Effective European Research Policy: The Design and Impacts of the 7th Framework Programme. Dordrecht, The Netherlands, Springer.
Nedeva, M. (2013). "Between the global and the national: Organising European science." Research Policy **42**(1): 220-230.
Radaelli, C. M. (2003). The Europeanization of public policy. The Politics of Europeanization. K. Featherstone and C. M. Radaelli. Oxford, Oxford University Press**:** 27-56.
Raan, v., Anthony F.J., T. N. van Leeuwen and C. Calero-Medina (2009). Performance of European Science: Research Networks and Profiles of EU Countries in a Global Perspective. European Science and Technology Policy. Towards Integration or Fragmentation? H. Delanghe, U. Muldur and L. Soete. Cheltenham, Edward Elgar**:** 256-290.
The_Royal_Society (2016). UK research and the European Union. The role of the EU in funding UK research. London, The Royal Society.
Wallace, H., M. A. Pollack and A. R. Young, Eds. (2015). Policy-making in the European Union. Oxford, Oxford University Press.
Wedlin, L. and M. Nedeva, Eds. (2015). Towards European Science: Dynamics and Policy of an Evolving European Space. Cheltenham, Edward Elgar.
Wiener, A. and T. Diez, Eds. (2004). European Integration Theory. Oxford, Oxford University Press.