

Institutional logics and actor's strategies in European joint programs

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1 Introduction

The objective of this paper is to analyze systematically the development of joint research programs in the European Research Area, based on a newly collected dataset covering 11 European countries developed in a large-scale study commissioned by the European Commission (JOREP contract). Besides providing descriptive information on their characteristics, as well as on the volume of funding channeled through these programs, we aim to understand and interpret the strategies adopted by the different actors involved in joint programs in terms of the underlying *institutional logics* which frame their behavior and decisions concerning if and how to establish joint programs (Thornton and Ocasio 2008), as related to broader conceptions of how European integration in the field of S&T policies should take place (Edler 2009; Kuhlmann 2001).

We define joint programs as research funding programs for which at least one of the key program functions – i.e. mission statement; call for proposals; evaluation and selection; funding and contract management – is shared between more than one country (see section 2.1). As we will show in this paper, joint programs are not a new phenomenon in S&T policies, but two parallel processes – a more general tendency towards integration and coordination of S&T systems and policies (Edler 2009), as well as the process of European integration (Kuhlmann 2001) – drove to a multiplication of these programs in the last decade, as well as substantial changes in their organizational form, which deserve a closer investigation.

Historically, the first examples of joint programs were created in the '50 and '60 in order to achieve critical mass in domains where the resources of individual European countries were not sufficient to compete with the United States, as in the case of nuclear energy (creation of Euratom in 1957) and space (creation of the European Space Agency in 1975); these programs were based on international treaties and managed by a

European (or international-level) agency, where participating countries transfer resources to the international level which fund directly performers. Almost all these programs were focused on specific scientific and technological areas and their launch was championed by the scientific élites in their specific fields.

From the '70, a second set of programs was created, with a broader scope covering most scientific disciplines (Gronbaek 2003) and a stronger focus on networking among research groups at the European level rather than on funding research directly; in almost all cases, the design and selection functions have been delegated to a supranational agency, while funding is managed (mostly *à la carte*) through national funding agencies and thus there are no trans-border flows of funding. COST (created in 1971), the European Science Foundation (1974) and Eureka (1987) belong to this group (Guzzetti 1995). The '70 witnessed also the launch of some smaller and more focused initiatives by the European Commission – on renewable energies, health, environment -, which changed in their nature and size in the '80 with the technological programs and their inclusion in the Framework Program ({{2271 Callon 1997;}}). The latter became central for the Europeanization process of S&T policies in the following two decades and witnessed a steep increase of their funding volume (European Commission 2008a).

The Lisbon initiative and agenda (2000) introduced a new ambition for Europeanization, linked to a renewed coordination of national policies with the introduction of the open method of coordination (Borrás and Jacobson 2004). It drove to a shift from the creation of European programs and agencies towards the development of the cooperation between national agencies in specific fields. ERA-NET initiatives have been explicitly conceived as variable geometry tools for coordinating national funding through joint calls between national agencies; (European Commission 2008b). Article 185 initiatives and, more recently, Joint Technological Platforms go in the same direction, but develop towards stronger institutionalization through the creation of European-level Dedicated Implementation Structures.

This introductory review shows that joint research programs constitute a highly differentiated domain, which has developed over a long of period of time and tries to answer to very different political and scientific requirements. Diversity relates not only to the mission and scientific scope of the programs, but also the role and involvement of actors, including the European Union, national states and the funding agencies themselves, as well as the organizational settings in place for managing them.

In order to understand the observed patterns and changes across time, we first investigate the underlying conceptions of what joint programs are and which functions they should fulfill, related to broader notions of how European integration should take place (Kuhlmann 2001; Edler 2009). Second, we analyze how these logics frame the strategic behavior of the actors concerned with joint programs – European Union, national states, funding agencies, research organizations –, leading to the emergence of a small number of organizational forms for these programs. Finally, we test to which extent variation across time, countries and scientific fields in the strength of logics allows to explain variation in importance of types of joint programs, like the importance of different organizational forms across time, as well as different degrees of involvement of individual countries.

The paper is organized as follows. Section 2 introduces the concept of joint programs and frames it in the overall context of (national and European) research funding; following, it introduces the notion of institutional logics and its operationalization for our case of study. Section 3 provides information on the data used for this study and the analytical methodology adopted. Section 4 presents an overall characterization of joint programs and their main features, while section 5 identifies the main types of

institutional logics present in the domain, their process of institutionalization and their role in establishing joint programs. We conclude the paper with a general discussion of our results.

2 Background and theoretical framework

This paper deals with two closely connected questions, first how to systematically characterize joint research programs through a set of standardized descriptors and, second, how the strategies and interests of the involved actors account for their observed organizational characteristics. The concept of institutional logics provides the analytical link between these two issues, as these account for regularities in patterns of behavior of the actors involved and thus lay the ground for the existence of a limited number of types of joint programs.

2.1 Joint programs as organizational forms for research funding

In their broadest meaning, we define *research funding programs* as organizational settings which allow distributing project funding – i.e. money attributed to a group or an individual to perform a R&D activity limited in scope, budget and time – to research groups, mostly on the basis of a competitive submission procedure (Lepori et al. 2007). Some widespread examples include investigator-driven grant schemes managed by research councils, technology programs, strategic policy-oriented programs. In the last decades, research programs have emerged as one of the central modes of coordination of research funding systems in advanced countries (Lepori 2011). They build the interface between the policy layer of the research funding system – defining broad policy goals and providing most of the resources – and the performers layer, where research is executed, and are thus best conceptualized as complex multi-actor networks, including policymakers, funding agencies, research performers, social stakeholders (Shove 2003).

In this context, we define joint programs are those publicly-funded research funding programs for which one of the central program functions is shared between more than one country (or by regions belonging to more than one country). In practical terms, we focus our perimeter on programs which a) fund research – thus excluding the large number of national collaboration schemes which only allocate means for travel and coordination purposes – and b) distribute funding through calls for proposals, thus excluding cooperation programs between large research organization – like CNRS or DFG – that allocate funds to a pre-identified group of laboratories without open competition. This definition also distinguishes joint programs from programs directly funded from the EU budget – like EU Framework Programs -, which in terms of their organizational setting are not different from purely national programs.

This approach drives to a framework for characterizing joint programs focusing on how the main organizational processes are shared between the participating countries and between the national and European level, on how funding flows are managed and, finally, on the characteristics of the actors involved. This approach constitutes also the basis for the construction of a set of descriptors for the empirical analysis of joint programs (see further section 3).

a) The first relevant dimension refers to *the processes for which integration takes place*. To fulfill their function, programs need to manage a set of interrelated processes, namely a) the construction of an explicit goal and mission statement, b) the identification of scientific priorities and of the type and mode of research expected, c) procedures and rules for submitting proposals, as well as for their evaluation and selection and d) procedures for contract management, including follow-up and reporting. The distinctive characteristics of joint programs is that at least one of these processes – but typically not all of them - is shared between participating countries.

Therefore, our first set of criteria to characterize joint programs relates to the identification of those processes transferred to the supranational level or shared between countries and those which are kept at the national level.

b) The second relevant dimension refers to the *organizational form of integration*. In most cases, joint programs require the establishment of some kind of supranational structure in order to manage decision-making processes. However, there are wide variations in the chosen organizational form: the simplest way is the establishment of a supranational *funding agency*, i.e. a legal body with a supranational status managing at least one of the program processes (e.g. the call and selection process (Braun 1998; Slipersaeter et al. 2007). However, many joint programs don't have their own agency, but rather more transitory *coordinating structures* are established like joint decision-making committee; *delegation* to a single national agency is a third option which has been chosen in a number of cases (so-called "lead agency" agreements).

While in the simplest case, all program functions are managed by a single agency, a characterizing feature of many joint programs is that functions are shared by different agencies – e.g. the proposal selection by a supranational agency and funding decisions by national agencies. Thus, joint programs are complex organizational structures – what we could call *crystallizing agents* (Luukkonen and Nedeva 2010) -, tying together political authorities, funding agencies and performers in different countries according to a highly variable geometry. Characterizing the agencies involved, their degree of institutionalization, as well as their functions in each program is a further dimension in our characterization.

b)The third dimension is *how funding is managed*. A distinctive characteristics of joint programs is that resources are provided by more than one country and, in some case, from the European Union budget – implying a complex set of relationships between funders and the agencies managing the program. The main divide in this respect is between the programs where national funds are transferred to a supranational agency and then jointly used for funding the selected projects (common pot) and programs where funding is kept at the national level and reserved for national participants (national pot).

2.2 Theoretical framework: logics and actors

While an approach in terms of organizational structures is useful for characterizing systematically joint programs and to develop a typology, it does hardly provide useful insights on why specific types of programs have emerged, how they are related to the broader context of European integration and research policy, as well as to which extent interest and objectives of the involved actors are reflected in the organizational forms of the programs. In European research policy context characterized by the existence of different policy rationales (Braun 2006; Flanagan et al. 2011), as well as by a distributed actor landscape where different actors – the European Union, National States, funding agencies – interact and compete in shaping and managing funding instruments this issue deserves a careful discussion.

To this aim, we build on recent developments of institutional theory around the notion of institutional logics (Friedland and Alford 1991). This approach shares with the new institutionalism a concern on the central role of cultural rules and cognitive structures in shaping social life and actor's behavior; however, rather than focusing on conformity to an institutional order conceived as largely monolithic (Meyer and Rowan 1977) as well as on isomorphic processes (DiMaggio and Powell 1983), it focuses on the impact of differentiated systems of institutional logics on social life and how these provide opportunities for institutional change.

Broadly speaking, institutional logics are socially-constructed cultural and material patterns used by the relevant actors in order to produce their activities (Thornton and Ocasio 1999). Thus, institutional logics for joint programs are constructed by *institutional entrepreneurs* – i.e. organizational actors which are able to leverage specific resources in order to shape social institutions – by borrowing elements from broader inter-institutional systems, but also taking into account specific characteristics of the domain, as well as their own interests and objectives. In the following, we highlight two main antecedents in the case of joint programming, namely notions concerning European integration and specific notions concerning how research funding should be realized (“coordination modes”; Lepori 2011; Figure 1). Institutional logics share with ‘policy mix’ approaches to political processes a concern for the importance of ideas and culture in shaping actor’s behavior, but build more explicitly on actor’s theories in organizational research to address analytically this connection (for an overview see Greenwood et al. 2008).

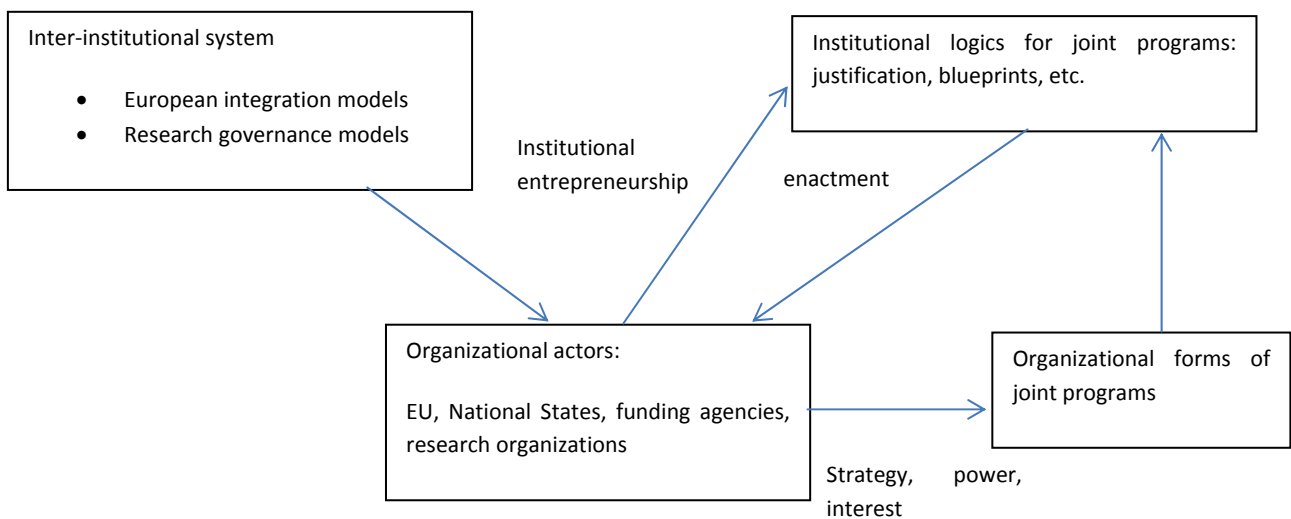


Figure 1. Institutional logics in joint programs. A scheme for analysis

However, logics are not static, but they provide frames of reference – providing rationales and legitimacy, but also blueprints for organizational forms - to the actors involved in research funding to decide if to establish a new joint program, its functions and organizational characteristics, the degree of financial commitment, etc.; in this process, organizational actors will borrow and combine the set of options made available by the logics with their own goals and interests; this might also lead to the design of hybrid types of programs, possibly combining elements from different ideal types of joint programs as stipulated by the logics in place. Expectedly, this process will also generate specific and observable patterns in the characteristics of joint programs which can be related to the underlying logics.

The established programs are *at the same time* material and cultural objects: they are practical instruments for distributing research funding, with direct impacts on research activities; they are also instantiations of the underlying institutional logics, making them accessible to other actors and indicating ways of operationalizing them. In turn, frequency and importance of types of programs will display and influence the strength of competing logics, as well as impact on their content. Logics as cultural objects and programs as organizational forms are thus expected to coevolve. This also implies that insights concerning the functionality of organizational forms, as well as learning process in the program implementation, become integrated into the available logics.

Finally, as we are dealing with evolutionary processes, where there is no equilibrium state, but the sequence of events is critical in order to explain the observed patterns and, especially, the creation of specific programs with a symbolic value, materializing for the first time an emerging logic; broader changes in the framework of European integration – like the introduction of the subsidiarity principle – provide new repertoires which might be exploited by actors in joint programs to generate new logics and types of programs. Accordingly, in our empirical analysis we pay specifically attention to the time dimension, to the sequence of events and to changes in the broader institutional context.

Summarizing, the analysis of institutional logics in this paper will deal with two closely related questions: first, identifying which logics concerning joint programs have emerged and understanding how these have been influenced by the overall institutional context concerning European integration and the governance of research activities; second, analyzing how these logics have been mobilized in time by different actors in the process of development of joint programs and how these processes explain the observed organizational forms and variations of their importance across time and space.

2.3 Logics: integration, coordination and collaboration

The definition of ideal types is a widely adopted approach to investigate institutional logics and their relationships with actor's strategies (Thornton and Ocasio 2008): ideal types are not taxonomies, but rather theoretical devices which allow to seize the main conceptual alternatives and thus to draw the available space of choices for actors. We will analyze in section 5 of this paper to which extent the joint programs in our sample can be related to the types identified in the following.

Types can be constructed alongside a set of dimensions, which refer to their antecedents – in our case the overall conception of European integration, as well as of research policy – their underlying rationale and source of legitimacy, as well as the main organizational model and the mode and source of funding. Finally, in an historical perspective, it is relevant to inquire which has been the first program where the emergence of one logic can be observed.

We construct our logics around three basic notions of internationalization, namely integration, coordination and cooperation (Edler and Flanagan 2011) introduces three concepts to deal with different ways internationalization is handled; as these refer to how the relationship between supranational and national levels are defined and organized, these constitute an excellent starting point for the definition of the ideal types of joint programs.

Integration. In Edler's account, *integration* refers to the transfer of competencies and autonomy from the national to the supranational level, by creating new structures. The integration type is related to accounts of the European integration as transferring competences from the national to the European level, by creating a common governance structure (Werner and Dietz 2004). This type is closely related to an account of European integration with a strong common governance structure at the European level (the *State/federation model*; Schmitter 1996); in research and innovation policy, it corresponds to a highly centralized scenario, where decision-making arenas are constituted at the European level and the role of national policies is strongly reduced (Kuhlmann 2001).

In research funding, there are three main rationales for this logic (with different emphasis in specific programs): first, to achieve critical mass in research funding especially in areas where the size of national programs does not reach a sufficient level – either because the field itself is too small-scale or it requires a large-scale investment; second, to promote more competition among research groups by widening the market; third, to favor research collaboration through transnational projects. In terms of program

organization, this type drives to an organizational model build on the creation of a supranational agency, managing independently from national States all processes and decisions. Sources of funding are national states – bound to a fixed level of contribution stated in an international agreement – or from the European budget. The origin of this logic can be traced back to the early steps of European integration in the '60 and found application especially in the domain of research organizations (CERN: 1954). In the domain of program funding, the first ancestors are the EURATOM program (1957) and the European Space Agency (1975).

Collaboration. At the other extreme, the logic of collaboration implies that different partners – in the case of joint programs, national funding agencies – work together with a specific goal and on a specific activity, without delegating decisions on their funding policies to a supranational body. This logic is related to strongly decentralized scenarios both of European integration overall (“condominio model”; Scmitter 1996) and in research policy (Kuhlmann 2001). Its underlying rationale is strengthening the national research basis; while there are strong reasons to keep research policy at the national level –respecting national specificities and diversity, keeping funding agencies near to the research performers -, fostering research collaboration is beneficial as it increases national research quality and output.

In organizational terms, this logic translates into point wise collaboration between national funding agencies on very specific measures, where fostering research cooperation is a prime objective; national agencies keep strong control on evaluation, selection and funding decision, but some kind of matching between the two processes is made (e.g., by funding only the projects which have been selected by the two parties). The first and oldest example of application of this logic to funding programs is the French-German cooperation in the field of transport research DEUFRAKO created in 1978

Coordination. In the words of Edler, coordination means to bring different elements – in this case national and European funding policies – to a more harmonious relationships. This goes farther than collaboration in single activities – which might obviously be also present – towards an idea of mutual alignment of funding policies with a lasting structural effect; to this aim, some forms of integration might take place – e.g. the creation of some joint bodies or consortia -, but without implying that these joint bodies take over the national competences. This logic is related to scenarios of European integration emphasizing the value of diversity of national and regional contents and looking to the European level as a place where coordination and competition should take place in a subsidiary manner; it implies conceptualizing S&T policies as multi-actors and multi-level spaces, where National States, the EU and funding agencies interact, compete and agree on joint actions under a variable geometry approach (Kuhlmann 2001).

The rationale is to value and exploit the specific strength of each national system and to seek coordination where it provides an added value, for example because the field is too small to achieve critical mass at national level or in order to avoid duplications between funding instruments.

In funding policies, this logic is closely related – *but not limited to* - to the launch of joint programming initiatives by the European Union, adopting a variable geometry approach where national states can decide different level of commitments to these programs (European Commission 2008b) ERA-NETs represent the most typical example of this logics.

	Integration	Coordination	Collaboration
European integration conception (Schmitter)	Supranational state (stato/federation model)	Confoederatio model	Condominio model
Research policy scenario	Concentration and integration in transnational arenas	Cooperation and competition in multilevel-policy arenas	Decentralization scenario, where national state are the dominant actors.
Underlying rationale and legitimacy	Achieving critical mass Fostering competition between research performers. Promoting international collaboration.	Subsidiarity: promoting coordination and competition while building on national and regional cultures and strenght	Promoting research collaboration to strengthen the national research basis.
Organizational model	Joint programs managed by a supranational agency who is fully in charge of all program functions.	Joint programming initiatives with variable geometry and levels of commitment	Ad hoc agreements between national funding agencies; light and transient structure for joint decision-making.
Funding model	Common pot (no national return rules).	National-pot or national pot with EU top-up funding	National pot.
Funding source	National budget based on fixed contribution or European budget.	National budget, possibly with additional EU contribution	National budgets
Ancestor	European Space Agency (1975)	ERA Chemistry (2004), MATERA (2005)	DEUFRAKO (1978)

Table 1. Ideal types of logics in joint programs

3 Data sources

By its nature, the institutional logics approach requires triangulation of different kinds of data, including qualitative information from documents and interviews highlighting cultural concepts and actor's motivations, quantitative data on characteristics of programs and distribution of resources, as well as demographic information on the sequence of events and key events leading to institutionalization processes (Thornton and Ocasio 2008).

The main source of data in this study is represented by a large-scale data collection on joint programs in 11 European countries realized in a project commissioned by the European Union (the JOREP project); this data collection provided for the first time a quite complete census of joint programs in the considered countries for the year 2009, as well as a set of descriptors characterizing their organizational structure. Coverage of national programs is fairly complete, but in some countries programs whose primary aim is not research – like programs from the Ministry of Foreign Affairs – might have not been fully covered; moreover, counts of the number of programs need to be carefully interpreted, as some countries might have a single multi-country program, while others individual programs. Overall, data based on funding volume have to be considered as more reliable than program counts.

For each program a standardized set of descriptors characterizing the most important dimensions of its organizational setting has been collected. Methodologically, standardization of information represents a relevant innovation which is critical in order to allow systematic and quantitative comparisons.

While, based on our definition of joint programs, the selection of descriptors was relatively straightforward, the definition of a pre-defined set of categories for the answer was a complex task, entailing a delicate

balance between standardization and ability to capture the essential elements of diversity in the reality and to some extent already anticipating choices concerning the program classification and the definition of ideal types. It was managed both deductively and inductively, thus first identifying the main conceptual alternatives for each dimension and, second, by checking that the devised categories were able to adequately represent the reality of programs in the perimeter and, if needed, by adding further categories. In the data collection an extensive use of remarks was made in order to highlight special cases which don't completely fit into the predefined categories.

The list of descriptors includes some basic information – like the year of creation of the program, the list of participating countries and agencies, as well as their accession date, the research topics, the program budget, the project selection criteria and duration; further, a set of more complex descriptors characterizing the program organization have been collected (see Table 2).

Descriptor	Definition	Categories
Integration mode	This descriptor identifies how the common programs activities are institutionalized	<p>Creation of a specific agency, where joint activities are managed by a supranational agency with an enduring and long-term status (<i>agency</i>).</p> <p>Management of joint activities through non-permanent structures like joint committees, whose existence is specifically related to the program itself (<i>coordination</i>).</p> <p>Management of joint activities through the delegation to a national agency in one of the participating countries (<i>delegation</i>).</p> <p>Independent evaluation and selection, where the project is approved only if both parties decide independently to finance it (<i>independent selection</i>).</p>
Submission process	Where the proposal answering to a call should be submitted	<p>Single-entry point when proposal are submitted to a single agency.</p> <p>Parallel submission when proposal have to be submitted at the same time to two or more agencies (as in many bilateral programs).</p>
Funding model	How the financial resources of the program are managed	<p><i>Common pot</i> when all financial resources from participating countries (possibly including EU contribution) are put in a single pot and used for financing the selected projects, independently of the country.</p> <p><i>Common pot with return rules</i>, when on the whole of the program some relationship is formally requested between national contributions and funding to national performers. The rule should be stated in some official documents (including statutes, policy briefs and minutes).</p> <p><i>National pot</i> when financial resources for participating countries are managed separately and devoted to national performers.</p> <p><i>Mixed-mode</i>, i.e. virtual common put plus top-up contribution to support best ranked projects.</p> <p><i>National pot with additional EU contribution</i> to the whole program.</p>
Scientific field	The scientific field covered by the program	Classification by using the socio-economic objectives of the Frascati manual (NABS) at the 1-st digit level. Includes 12 thematic fields, as well as two codes for research devoted to the general advancement of knowledge (13: other funds; 14: General University Funds).
Evaluation criteria	How are the proposals evaluated	4-points scales both for scientific quality and policy relevance. 1 = not relevant; 2 = additional criterion; 3 = important criterion; 4 = most important criterion.

		The sum of the two items must be equal to 4.
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Table 2. List of descriptors used for categorizing joint programs

Descriptors have been filled in by national experts in the JOREP project mostly from documentary sources, like program websites, policy documents, text of calls for proposals; in most cases, this information was checked with national ministries and funding agencies.

Data on funding flows were also collected. They are relevant for two main purposes: first, to provide a quantitative measure of the importance of joint programs in overall research funding – testing the hypothesis that their share strongly increased in the last decade. Second, the funding volume can be used as proxy of the importance of different programs, thus by distinguishing between programs with significant volume of resources and those with a more symbolic role – this is coherent with conceptualizing logics both as cultural and material objects. As programs act as intermediary agents between the policy and the research performers level, funding flows need to be analyzed at two levels, namely funding flows from the State to funding agencies for the purposes of the identified joint programs and funding flows from the agencies to performers for that program. However, in many cases national contributions for joint programs cannot be identified, as the level of budgetary commitment is decided directly by the participating national agencies and the resources are derived from the general contribution these agencies receive from the State.

In principle, data on funding flows were collected for all programs in the perimeter and for the years 2000-2009, thus allowing a longitudinal analysis of changes in the importance of different programs. Moreover, beneficiary data were divided between public-sector and private sector. Data on funding flows are reasonably complete (some missing data for earlier years), with the exception of France and Poland.

Finally, these data have been complemented through the analysis of policy documents in joint programs – especially at the European level –, as well as through interviews to policy and program actors focusing on their motivations in the establishment of this type of programs.

4 Mapping the landscape of joint programs

Before turning to the analysis of logics and actor’s strategies, we provide in this section a short descriptive overview of the landscape of joint programs in the 11 countries covered by the JOREP project, namely Czech Republic, Denmark, France, Germany, Italy, Netherlands, Norway, Poland, Spain, Switzerland and the United Kingdom. The perimeter refers to the year 2009; however, as funding in most programs is multiannual, also programs with calls for proposals in 2008 have been included.

While the project has a specific focus on the European Research Area, all joint programs in the considered countries are covered, including also programs with third-party countries. We notice that, by our definition, programs managed by the European Union bilaterally with a single Member State – for example structural funds – and programs directly managed by the European Union and funded only from the European budget are not considered as joint programs and not included in the data collection. However, given their relevance in the European funding landscape, we will provide some information on EU FP in some figures.

4.1 Joint programs: a summary overview

The sample of joint programs in the considered countries is composed by 102 programs (as referred to the year 2009) accounting for a total of 363 program participations, i.e. 3.5 countries participating by program. As the following Figure 2 shows, there are however large variations among programs: for half of the

programs in the database there is just one JOREP country participating – most of them are bilateral programs with non-European countries -, while the other programs have variable number of participants and only four of them include all JOREP countries (these are the multilateral programs ESA, COST, EUREKA and the European Science Foundation). These data highlight to which extent the variable geometry approach has been put in practice.

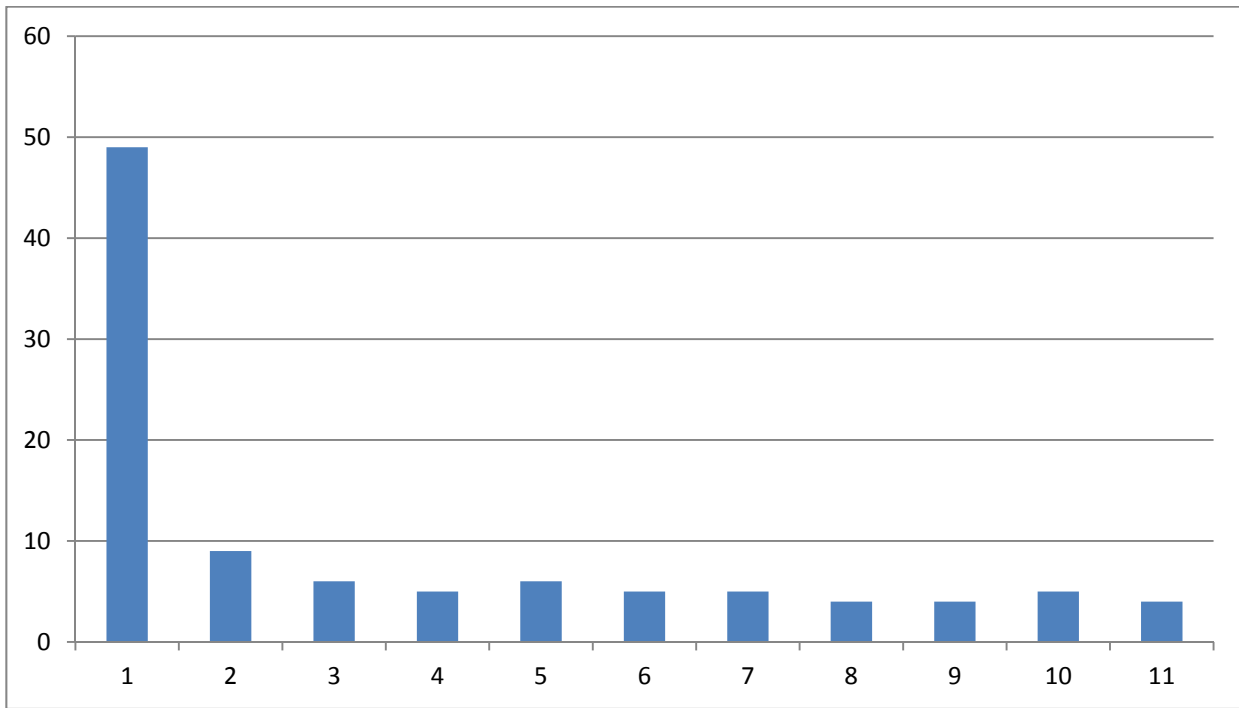


Figure 2. Number of countries participating per program

Looking to the participation of non-EU countries to these programs, some interesting patterns also emerge. Overall, the 102 programs include 130 participations of non-EU countries; the countries with the highest number of participation are the two candidate countries Israel (19) and Turkey (17), followed by US (10), Canada (10) and Japan (6). A third relevant group is composed by BRIC countries including China (10 participations), Brazil (6), India (5), Russia (4).

Despite the large number of programs, their overall budget is highly concentrated in very few initiatives and a single program, namely the European Space Agency, account for almost 80% of the total funding volume. As shown by Figure 3, even if we exclude ESA, the level of concentration remains very high: the other 18 programs exceeding 10 mio. euros budget cover about $\frac{3}{4}$ of the remaining budgetary volume. Among these programs, we find EUREKA and COST, two Joint Technology Initiatives, three art. 185 initiatives and 6 ERA-NETs. The largest bilateral cooperation program is the international program for regenerative medicine at place 12. Overall, excluding ESA, the total budget of joint programs in the considered countries – which include all large EU countries – was in 2009 around 700 mio. euros, i.e. about 10% of the EU FP budget in the same year.

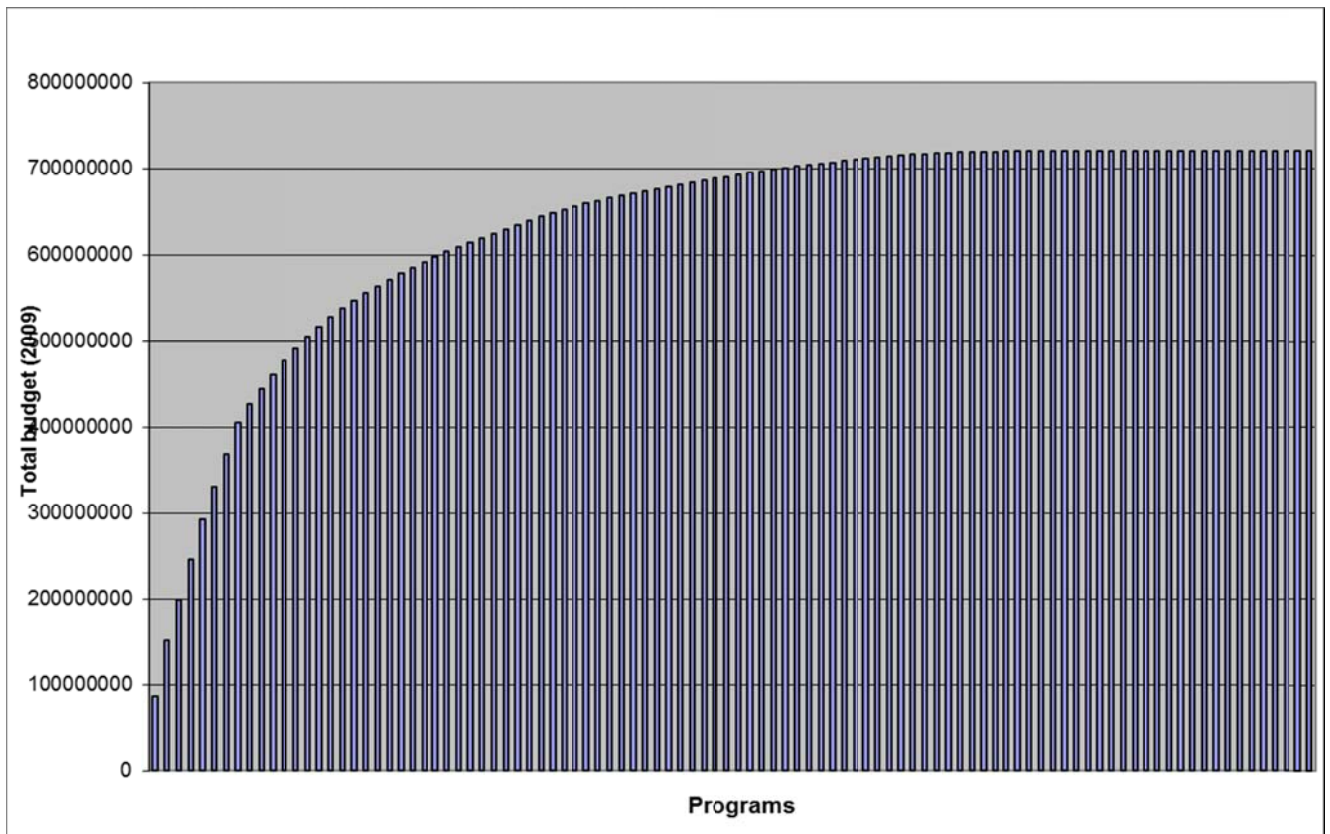


Figure 3. Cumulative distribution of the program budgets, 2009

Euros, excluding ESA, N = 101

In terms of funding volume, we can then identify four circles. First, two very large programs accounting for most of the funding volume, namely ESA and the European Framework Programs, with a budget of similar or greater magnitude to largest national programs; second, a group of about 20 programs with sizeable volume of funding, comparable to specific national programs, almost all of them related to EU initiatives; third a larger group of smaller-scale national-based initiatives providing some level of marginal research funding, which cannot always be separated from the much larger set of national exchange programs funding travel and coordination activities.

Second, our descriptors provide some first insights on the organizational characteristics of these programs, which we will analyze more in-depth in the following of this paper by looking to differences between categories of joint programs (as related to underlying logics on European integration).

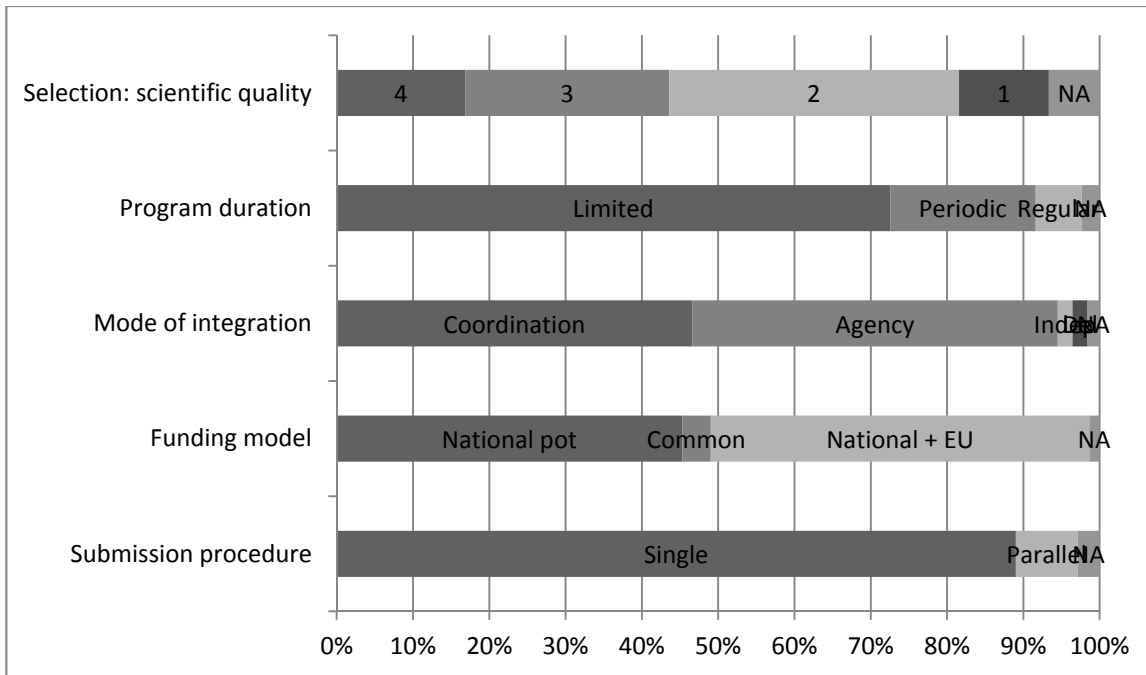


Figure 4. Main characteristics of joint programs in the sample

Share of the program budget (excluding ESA). N= 101

According to these data (Figure 4) and excluding the European Space Agency, half of the joint programs (based on the budgetary volume) are managed by a supranational agency, half from coordinating bodies; in the majority of the cases the submission process – and accordingly probably also the proposal evaluation – is integrated, while funding is managed at the national level, but quite frequently the European Union provides some common budget. Most of the programs are also limited in time. Finally, data on the evaluation criteria display wide variations among programs, the core being composed by programs where scientific quality is important alongside policy relevance, purely science-oriented or relevance-oriented programs covering a small share of the funding volume.

Finally, data on the repartition of programs by topics display the emergence of two broad groups, one related to investigator-driven research (NABS 13) and one to some central fields of application, namely health, industrial production and technology, as well as environment (NABS 1-12; Figure 5). Expectedly, general-purpose programs and programs oriented towards the general advanced of knowledge display a slightly higher importance of the scientific quality criterion than the programs following specific socio-economic objectives, but the difference is not significant.

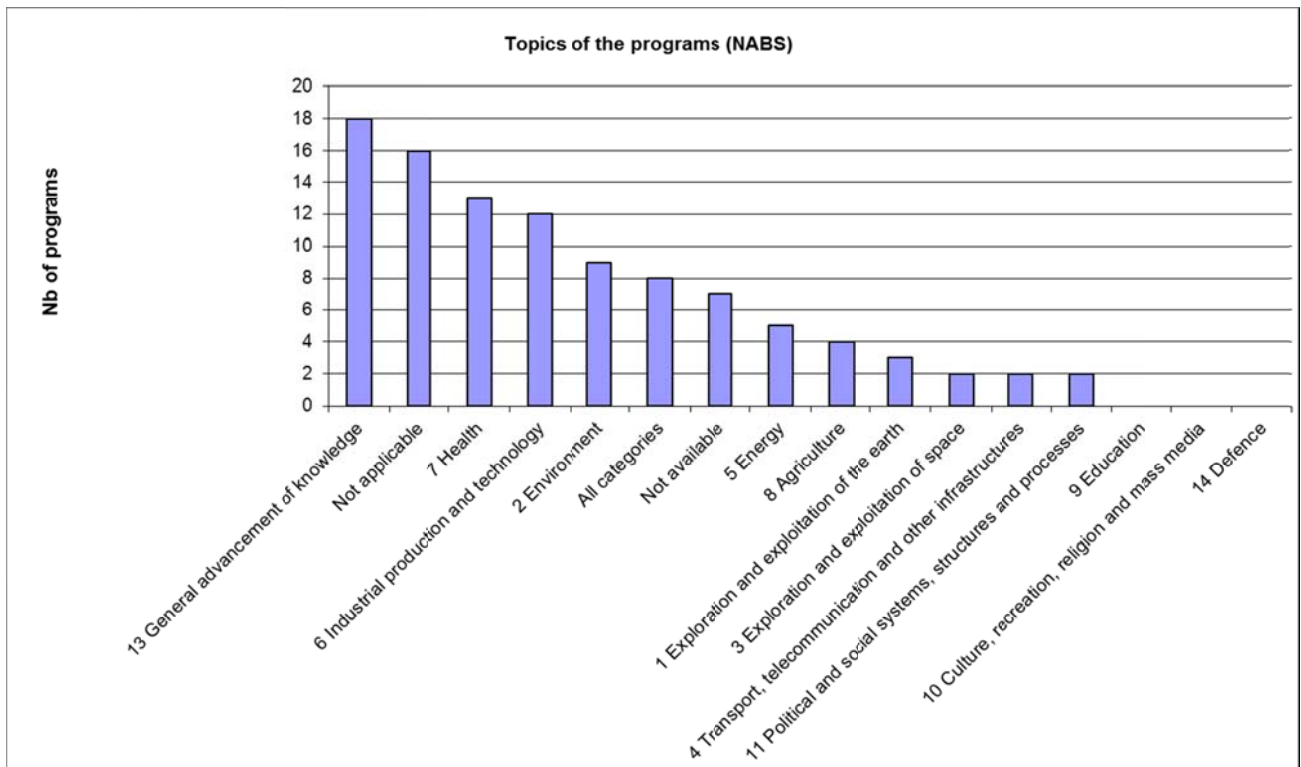


Figure 5. Joint programs by topic

Socio-economic objective classification of the Frascati manual (NABS 2007). N = 7 not available

4.2 Internationalization of research policies and the development of joint programs

As highlighted in the introduction, the establishment of joint programs in the European and international context is a long-standing process, which started already in the '60; in the JOREP dataset, the oldest program is COST, created in 1971, followed by ESA in 1975. Figure 6, which refers to the *currently existing* programs, displays two noteworthy features: first, there is a clear turning point concerning the creation of joint programs around the year '2000, while in the previous 30 years no growing trend can be detected. Second, there is no general tendency of joint programs to grow larger with time, but this seems to be more related to the form of their institutionalization than to their age: among 21 programs created before the year 2004, only 5 had in 2009 a budget exceeding 10 mio. of euros, including ESA, COST, EUREKA, the first JTI and one bilateral program.

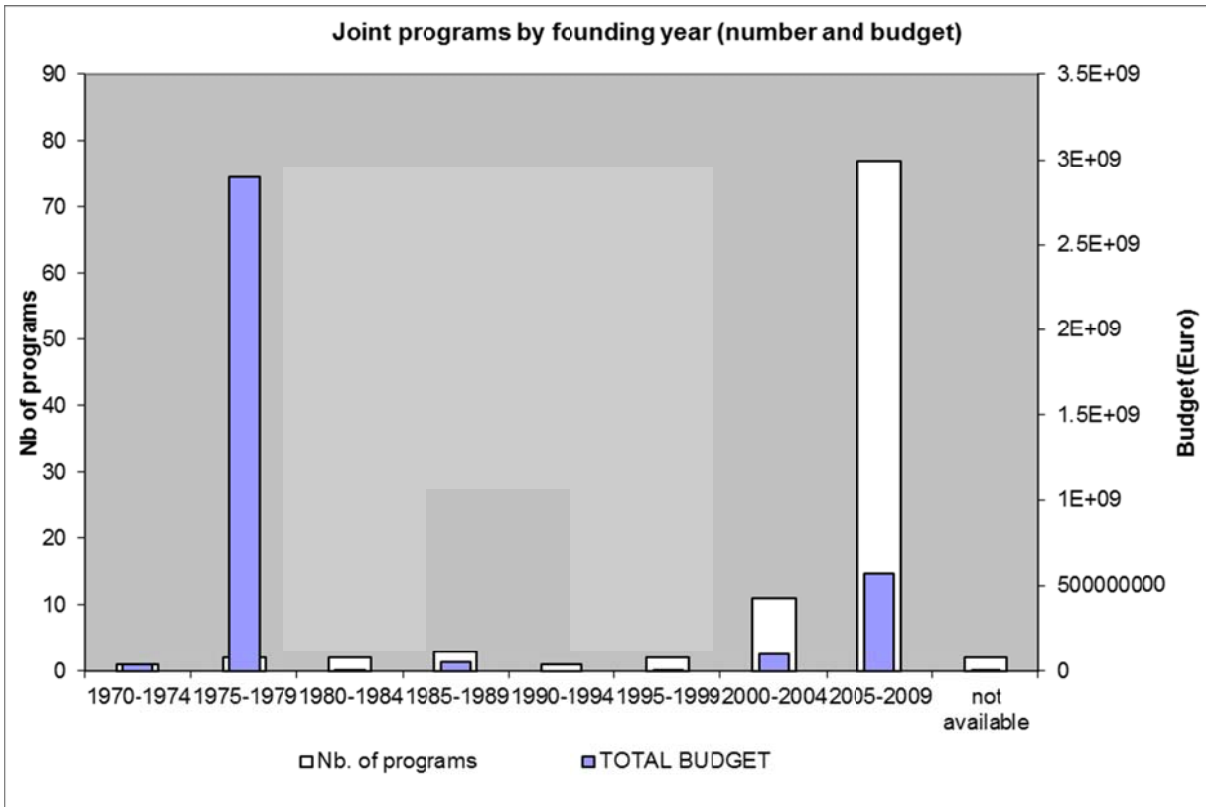


Figure 6. Joint programs by founding year

N. and budget in 2009 of the programs created in each period of time

The data on yearly budgets need to be taken with some care as the coverage in the previous years is far from being complete. Nevertheless, if we exclude the European Space Agency, in relative terms the growth of the financial volume of joint programs is impressive (see Figure 7): in absolute terms however, their financial volume is still much lower than the ESA budget, as well as only about 10% of the total budget of the EU framework programs.

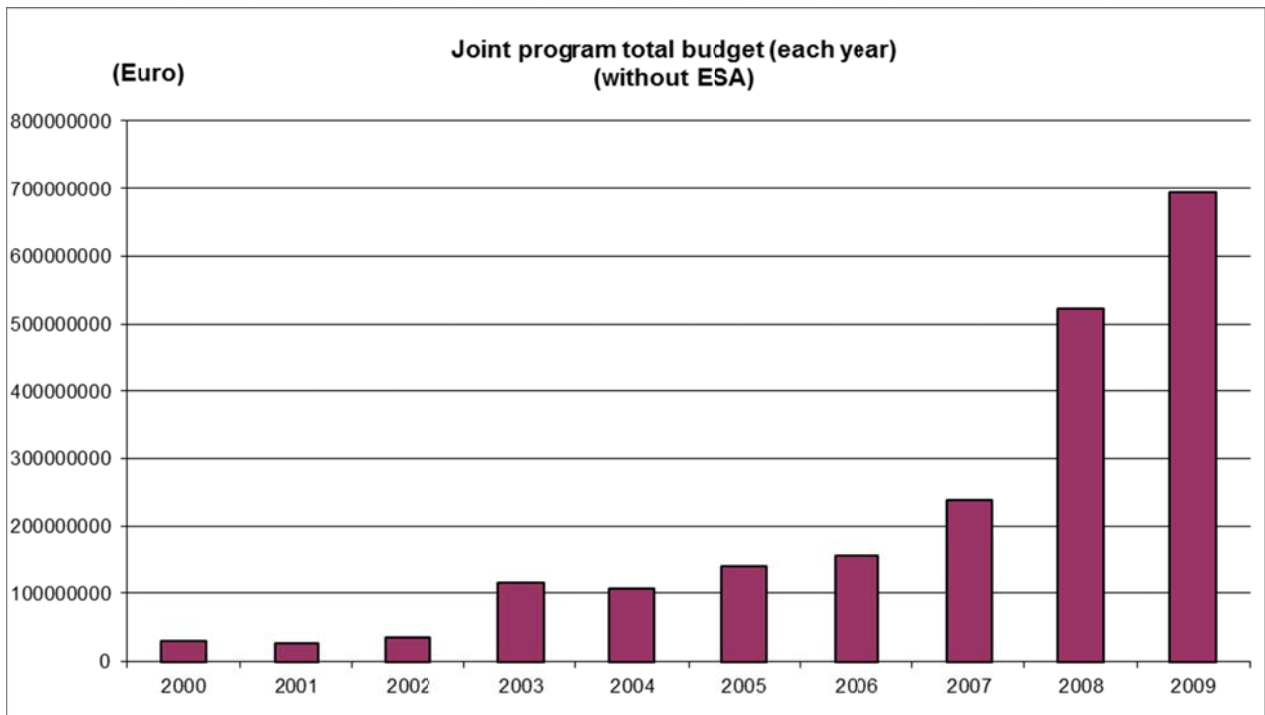


Figure 7. Budget of joint programs in each year

Excluding ESA.

Our preliminary interpretation of these data is that, while internationalization of S&T is a lasting process which started in the '60 already, it started to impact on national funding policies only after the European Union receive specific competences concerning research policy and create a set of tools for promoting cooperation between national funding policies – beyond the specific EU-funded initiatives like Framework Programs. The hypothesis we will develop in the following of the paper is that this drove to two parallel processes, the launch of a large number of European-level joint programs, promoted by the EU and where national states adhered with a variable geometry approach, as well as a more proactive behavior in bilateral cooperation both from national states and from national funding agencies.

5 Institutional logics and the development of joint programs: empirical results

A central insight of the previous analysis is that there are large differences among the considered programs, concerning their size, but also national participation and organizational characteristics. In this section, we turn to a more differentiated view by identifying and to explain main groupings of programs with more homogenous characteristics, related to the ideal types of logics identified in section 2.3 of this paper. To this aim, we first use the descriptors collected in the JOREP project to map joint programs in our sample onto these three ideal types; second, we systematically compare the identified groups of programs for some key organizational characteristics, including the level of budget, the topic and selection criteria, the number of countries participating. Third, we look to variations across time and space, analyzing years of creation of the programs, as well as patterns in national participation.

5.1 Translating logics into organizational forms of joint programs

To map our sample of joint programs to the three logics introduced in the previous section, we make use of three descriptors: integration mode, submission process and funding model (see Table 2 for definitions). As

types are ideal model, displaying the main conceptual options, we do not expect that all joint programs fit in a single type and we foresee the emergence of blended cases.

In order to relate programs to logics we adopt the following approach: programs with integration model *agency* are attributed to the integration type, as this should imply that at least some program functions are transferred at the supranational level. Programs with integration model *coordination* are attributed to the coordination type, at the condition that the submission process is single; otherwise, these programs are attributed to collaboration type – as parallel submission is taken as a sign that national agency still want to evaluate rather independently the proposals for their national part. Finally, all programs characterized by a delegation or independent selection are attributed to the collaborative type. Table 3 displays the outcome of this classification exercise, as well as emerging subgroups.

Main logics	Type of program	Main descriptors		Nb of pg	Examples
Integration	Integrated with integration of funding	Integration model	AGENCY	2	ESA, International Visegrad Fund
		Submission process	SINGLE		
		Funding model	COMMON POT		
	Integrated without integration of funding	Integration model	AGENCY	10	EUREKA, COST, ESF, JTI, Art. 185
Submission process		SINGLE			
Funding model		NATIONAL POT			
Coordination	Coordinated programs with integration of funding	Integration model	COORDINATION	6	2 ERA-NETs, 4 bilateral programs
		Submission model	SINGLE		
		Funding model	COMMON POT		
	Coordinated programs without integration of funding	Integration model	COORDINATION	38	27 ERA-NETs Different types of bilateral programs
		Submission model	SINGLE		
		Funding model	NATIONAL POT		
Collaboration	Collaborative programs with delegation	Integration model	DELEGATION	7	D-CH-A agreement; DFG-AHRC agreement
		Submission model	SINGLE		
		Funding model	NATIONAL POT		
	Collaborative programs - Parallel programs	Integration model	COORDINATION	21	4 ERA-NETs, 17 bilateral programs
		Submission model	PARALLEL		
		Funding model	NATIONAL POT		
	Collaborative programs - Independent programs	Integration model	INDEPENDENT	4	4 bilateral programs
		Submission model	PARALLEL		
		Funding model	NATIONAL POT		

Table 3. Categorization of joint programs

13 programs have not been classified because of missing information.

a) *Integration*. 12 programs belong to this group, which can be neatly divided in two subgroups: first, the classical international programs based on agreements between countries and with an agency established as an international body and, second, those programs established from the European Union, whose agency is thus based on European law (e.g. European Interest Group status). The noteworthy feature of this second group is that the integration logics applies to all programs functions, except the management of the

budget, which in most cases is controlled by national agencies. In terms of their grade of membership to the coordination logic, ESA represents the nearest to the ideal type of integration, whereas art. 185 and JTI are the farthest and borrow some elements of the coordination logics, as country can decide *à la carte* and case by case the volume of funding to invest in each call for proposals.

A closer look to the funding mode, reveals however that of the 10 programs without integration of funding, 7 receive EU top-up funding managed centrally by the agency; the remaining three programs are EUREKA and the two programs of the European Science Foundation. We notice that it has been recently decided to close ESF funding schemes, as national research councils preferred lighter forms of coordination with the launch of EUROHORCs. Accordingly, some level of budgetary endowment seems to be a required conditions for the viability of a supranational funding agency.

B) *Coordination*. This groups includes 44 programs, 27 of them are ERA-NETs, the remaining bilateral and multilateral programs with single submission of proposals. For 38 out of these 44 programs financial resources are managed at the national level, while only in 6 cases the real pot funding mode applies. This group is thus characterized by some light coordination structure, which manages the submission and evaluation process, but it is established as a durable agency; European Union initiatives are the driving force behind this group, but also a sizeable number of national initiatives adopts this model.

c) *Collaboration*. Finally, 21 programs are attributed to the collaboration logic: almost all of them are bilateral programs where submission has to be made nationally and funding decisions are coordinated among participating funding agencies; 4 programs are fully independent, meaning that only projects funded by both sides will be finally supported (no joint decision-making process). Obviously, in all these cases funding remains at the national level.

A specific subgroup is represented by *lead agency initiatives*, where the whole evaluation and decision process is delegated to the agency of the lead project partner, whereas funding is allocated at the national level. These programs are based on mutual agreements between research councils, mostly related to investigator-driven funding schemes. They are attributed to the collaboration logic, as they don't imply a coordination of funding policies, but make the establishment of collaborative project between already similar programs easier to handle.

The outcome of this discussion is that, first, some archetypical configurations of joint programs can be identified and, second, these can be related in a quite straightforward manner to underlying logics concerning European integration. Moreover, the identified groups are rather homogeneous in their organizational characteristics, as subtypes blending different logics account for a small number of programs (see

Figure 8). The main variation in this respect, which deserves close investigation, are lead agency agreements, as these display a very specific organizational setting and promoted directly by national research councils.

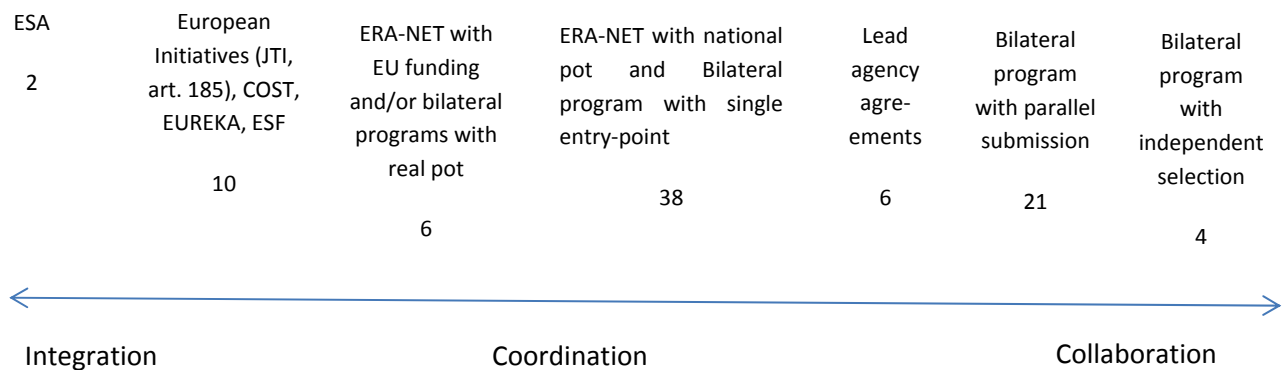


Figure 8. Ideal types and groups of joint programs

5.2 Analyzing characteristics of joint programs and their dynamics across time

The categorization developed in the previous section allows a more disaggregated analysis of the characteristics of joint programs, identifying patterns and differences between groups. This step is highly relevant in order to understand the mechanisms behind the establishment and evolution of joint programs.

As shown by Table 4, the repartition of the budget among categories is highly skewed; even if we disregard ESA, which account for the extremely large share of integrated program with integration of funding, it is apparent that most of budget is concentrated in the other integrated programs, as well as in the coordinated programs (albeit with a much smaller average program size given their large number). Matching this information with the programs categories shows that only European coordinated initiatives have been able to mobilize significant level of resources, whereas the large number of (mostly nationally-based) collaborative programs have a very low level of financial resources. This is coherent with the underlying logic: in the coordination logic, the aim is to coordinate national funding policies in specific areas and this implies some level of funding for research, whereas in the collaboration logic funding is mostly required only for the collaborative part of research activities (whereas most of the resources are provided by national funding schemes). These data show also that “intermediary” categories – like the few coordination programs with integration of funding – by large represent only residual cases with little significance both in terms of numbers and of funding volume.

Program category	N. of programs	Total budget*	N. of countries**	Scientific quality score**	NABS 13/all categories***	NABS 1-12****
Integrated program with integration of funding	2	2'899	6.0	2.5	0	1
Integrated program without integration of funding	10	345	9.8	2.6	5	5
Coordinated program with integration of funding	6	16	1.7	3.0	1	3
Coordinated program without integration of funding	38	261	4.0	3.0	6	23
Collaborative program - parallel program	21	48	2.0	3.3	8	7
Collaborative program - independent program	4	9	1.5	3.8	0	2
Collaborative program with delegation of responsibilities	7	14	1.4	3.2	4	3

Table 4. Characteristics of joint programs by category

*Mio. euros 2000 **Average of the programs in each category (only JOREP countries) ***N. of programs

Further, data on number participating countries display a clear pattern: practically all JOREP countries participate to the integrate programs, while coordinated programs have a more limited and variable participation; finally, most collaborative programs are bilateral. The existence of a supranational agency seems thus to be a strong factor promoting at least formal participation of almost all countries. Finally, descriptors on selection criteria and topics display a concentration of thematic programs in policy domains in the coordinated category – reflecting the specific orientation of most ERA-NETs –, while general-purpose programs with a focus on scientific quality are concentrated in the collaborative category – reflecting the importance of joint programs promoted by research councils.

Data on the year of foundation of programs (Figure 9), as well as on the evolution of the budget in the period 2000-2009 (Figure 10) provide some interesting information on the temporal dynamics of joint programs. First, while most of the programs in the sample have been created after 2005, most of integrated programs started before the year 2005; among this group, all programs which are not related to EU initiatives have been launched before that date. This hints to the fact that, after the launch of the ERA concept and EU joint programming initiatives, the European Union completely replaced national states as a driving force for the establishment of integrated programs. Concerning EU initiatives, data might point also to an evolutionary model where first collaboration and limited cooperation is established and, if successful, this proceeds towards stronger forms of integration; this approach is endorsed by the EU with the transition from ERA-NET to ERA-NET+ towards art. 185 initiatives.

Data on the budget show that the largest share of the increase in the volume of joint programs was due to the small number of integrated programs; a two tier structure thus emerged after 2005, namely a rather small circle of integrated programs with a sizeable budget alongside a much larger number of coordinated and collaborative programs with low budget volume.

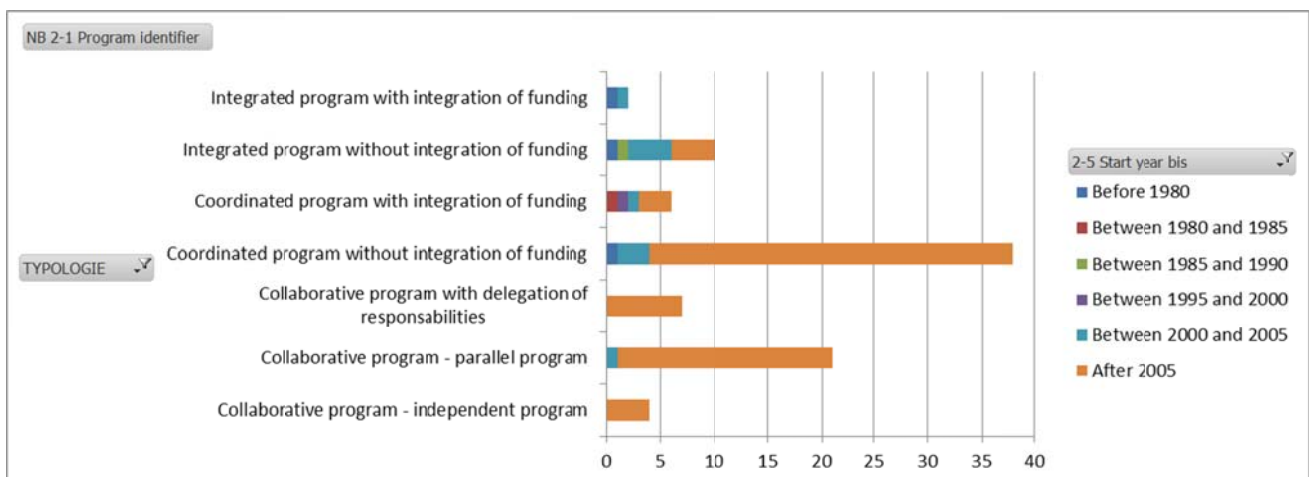


Figure 9. Year of creation of programs by type

N = 102

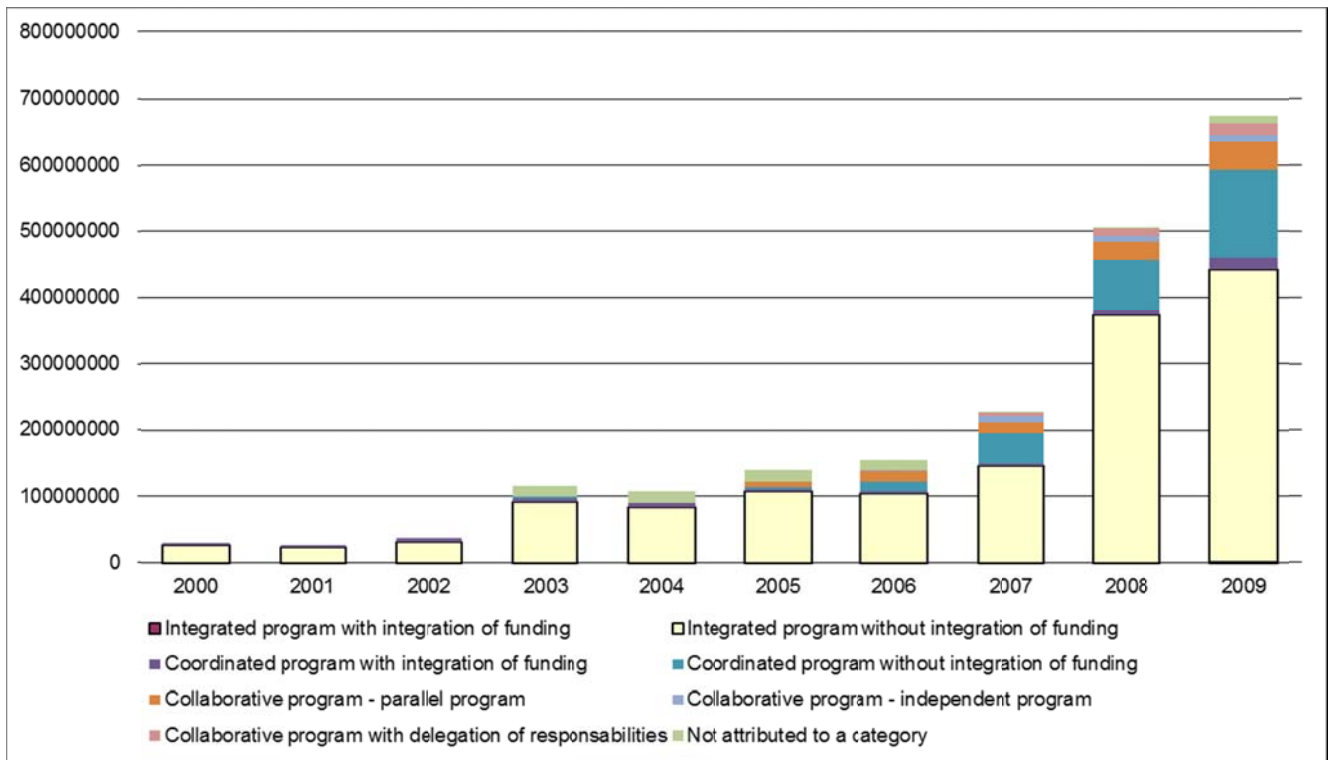


Figure 10. Program budget by category, 2000-2009

Nominal values converted at official exchange rates. Excluding ESA.

5.3 Actors roles and national variations

As displayed by Figure 11, there is a clear divide between different actors in establishing joint programs. National States and the European Union are the relevant actors in establishing integrated joint programs, but – as demonstrated by crossing this information with the one on year of foundation – they characterize two distinct periods, namely the pre-Lisbon (2000) for national states and the last decade for the European Union. In the European context, integration is currently promoted solely by EU initiatives, to which national states decide to participate with varying levels of financial commitment. Coordinated programs are also essentially driven by the European Union, but, in this case, the variable geometry approach implies that not all countries participate to the same programs (as typical for most ERA-NETs).

At the contrary, collaborative programs are the remit of national states, mostly through bilateral agreements, but also of national funding agencies, which become increasingly active on themselves. The case of *lead agency* agreements between national research council displays to which extent national funding bodies are becoming exposed to pressures to keep into account internationalization – both from policymakers and the research community – and how these are trying to develop specific responses which avoid delegating part of their functions and budget to supranational agencies.

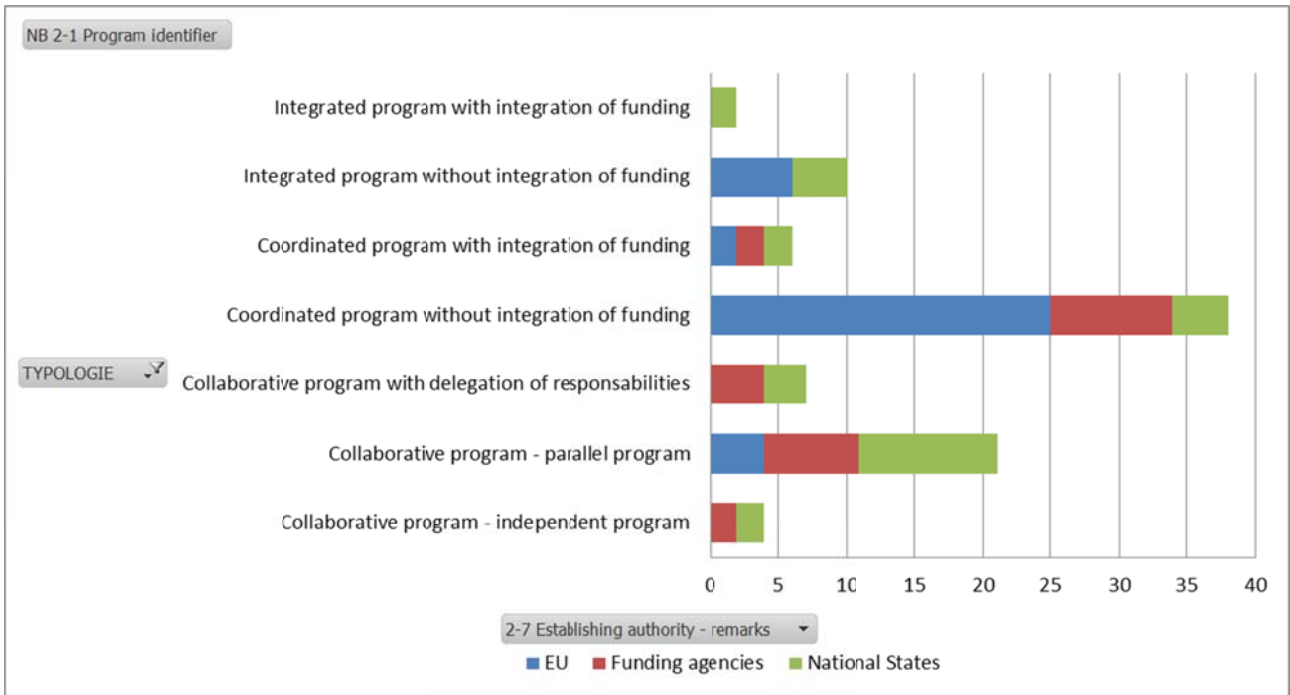


Figure 11. Establishing authority by category of program

When looking to patterns in national participation, we prefer the use of budgetary data for two main reasons: first, counts of programs are not very reliable, as they might be biased because of different aggregations and unequal coverage of small-scale programs; second, it is important to distinguish between largely symbolic participation and those which imply a sizeable financial commitment.

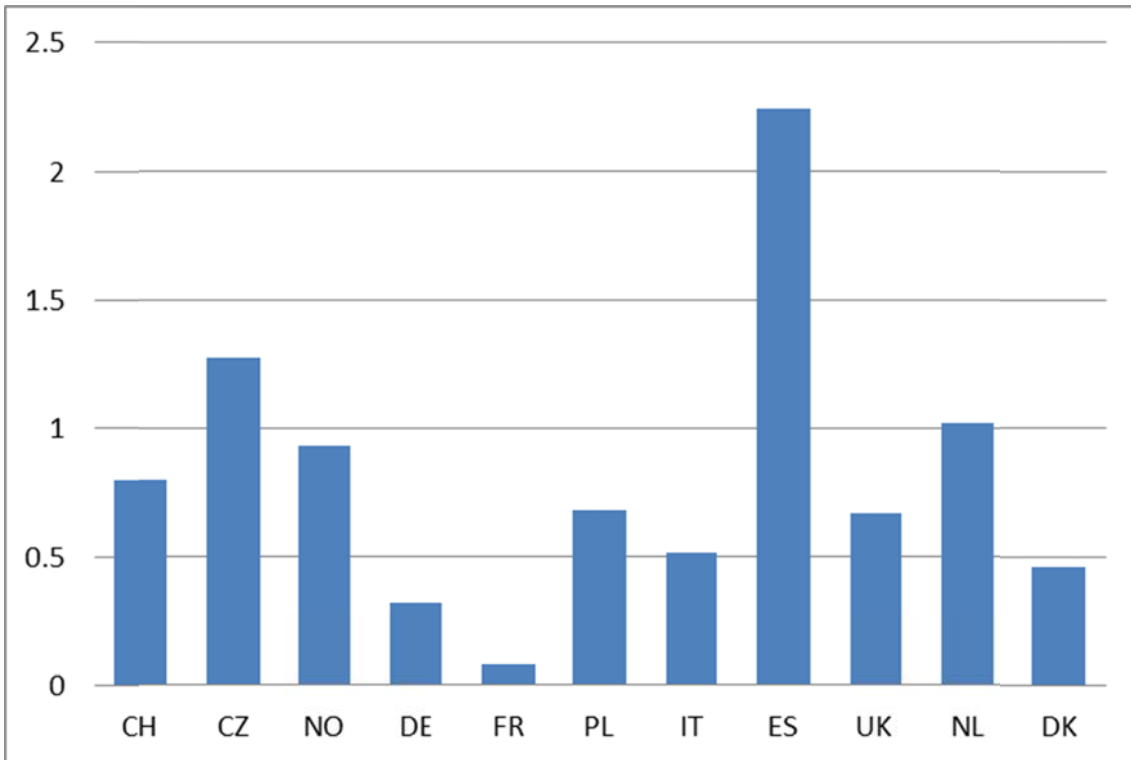


Figure 12. Budget for joint programs by country as a % of GBAORD

Year 2009, values in euros converted with exchange rates for non-euro countries

Data on France and Poland are largely incomplete, data on Spain probably overestimated

Figure 12 shows that there are large differences among JOREP countries in their level of financial participation to joint programs. If we disregard the value for Spain – which is due to a single item which needs to be checked – , France and Poland – for which the data are largely incomplete, the percentage of GBAORD devoted to joint programs (without ESA contributions) ranges between 1.27% for Czech Republic and 0.32% for Germany; expectedly, the smaller JOREP countries (CZ, CH, NL, NO) display a higher share of joint programs than the largest countries (DE, IT, UK). Overall, joint programs currently represent an extremely small share of public research funding in all the considered countries.

In drawing these comparisons, differences in the structures of national research systems need however to be taken into account, as our definition of joint programs focuses on the existence of funding agencies and thus excludes joint activities between large public research organizations, which are an important actor in national research policies in countries like France, Italy, Spain and to a lesser extent Germany.

Further, a look of participation of non EU-countries shows that, in the case of integrated programs it is mostly related to countries which are part of the ERA, like Israel and Turkey, whereas bilateral programs tend to strongly focus on BRIC, Israel, US and Canada. Coordinated programs display the broadest network worldwide, but this is due to a few ERA-NETs with the specific aim of promoting international collaboration.

A final interesting information to analyze the role of different actors, and more specifically of funding agencies, is provided by a descriptor on the type of budget. If there is a specific budgetary line for the program considered or if the budget is earmarked (e.g. in performance agreements between State and funding agency), the involved funding agency can take decision on how to attribute money, but not on the level of endowment of a specific program. At the contrary, where the program budget is delegated to agency, the latter can also take decision on the extent of national participation to a specific program and thus has a broader role in national research policy. This descriptor is also useful in order to analyze the structure of national research policies in general and their level of delegation.

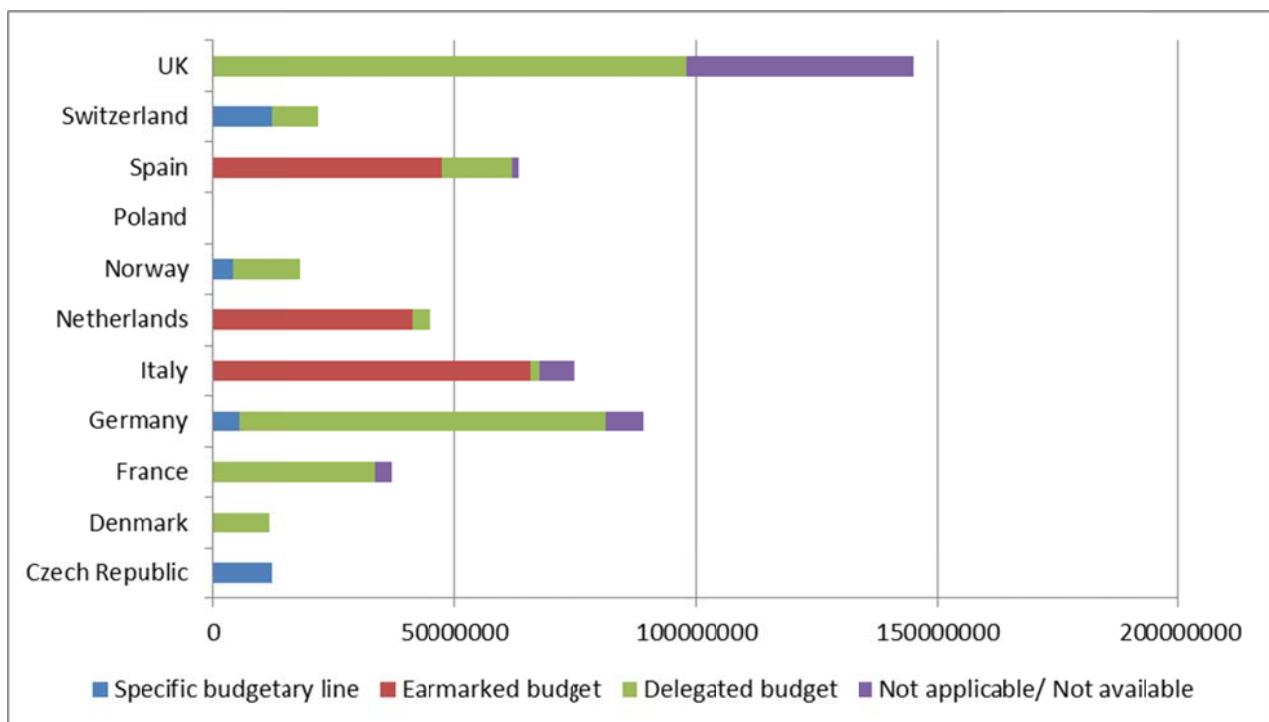


Figure 13. Type of budgeting by country

*Mio. euros, 2009.

Figure 13 displays wide variations between countries, contrasting countries where the decision on the level of funding committed to joint programs is defined at the policy level – including Italy, Netherlands and Spain –, with countries where this decision is taken at the agency level, including Denmark, UK, Germany and France. We notice that these differences do not always correspond to the levels of delegation to agencies in the national research policy, as the case of Netherlands displays. A more in-depth analysis of national budgeting practices for joint programs – as well as differences between program categories - is likely to shed much light on the role of the States vs. the one of national funding agencies in European joint programming.

6 Conclusions

The data presented in this paper provide for the first time a reasonably complete picture of the landscape of joint program in a (rather representative) set of ERA countries. Besides their descriptive interest, they provide evidence that this domain of research funding has been profoundly shaped by the on-going process of European integration and, more specifically, by the existence of three distinct logics on how to realize this process, which we called integration, coordination and collaboration. These drive also to the emergence of specific organizational setting for joint programs, concerning how joint activities are institutionalized, which functions are transferred to the supranational level and, finally, how financial resources are managed. Despite the wide diversity of goals, topics and actors involved, there is a limited number of organizational archetypes which function as legitimate and functional ways of integrating program funding in the European context.

Second, it is also apparent that in joint programs different types of actors compete for their own role and try to promote the organizational settings best serving their interests., but all of them – and also national funding agencies – are under pressure to show their commitment to internationalization of S&T system and to propose suitable responses in terms of funding schemes. In this respect, the European Union clearly emerged after the Lisbon process as the driving force for developing the integration and coordination types of joint programs. This is closely related to budgetary power: namely, our analysis displays that the existence of some level of funding at the central level is essential for the stability of joint programs and, especially, to justify the existence of a supranational agency. The cases of COST, EUREKA and European Science Foundation have demonstrated the fragility of integration of programs where there is not some level of central budget, which allows also the supranational agency to edict some general funding and management rules and ensures that approved projects are not completely subject to national decisions which might jeopardize their realization.

However, the prevalence of the national pot model shows that national States are not willing to transfer control on funding to the supranational level – most likely both for reasons of power and of national legitimacy, as this would entail the risk of using national resources to support research in other countries. As shown by our data, EU top-up funding plays a central stabilizer and multiplier function: it allows integrated programs to exist without requiring fixed commitments from National states, but at the same time is able to attract à la carte national funding – decided case by case for each call for proposals -, thus leaving to National state a substantial level of decision-making power.

This European-level movement is accompanied by a parallel development at the national level through the establishment of a large number of collaborative initiatives, both inside the ERA and with non-European countries (with a focus on US, Canada, Japan and BRIC). While important in policy terms and to foster scientific collaborations, the impact of these initiatives in terms of funding volume is by large negligible.

Third our data show that, despite their rapid growth, joint programs still represent an extremely small share of program funding in European countries and their overall funding volume was in 2009 less than 10% of the budget of European Framework Programs. Accordingly, their impact on national funding agencies has been rather marginal, as these are devoting a negligible share of their total budget to joint initiatives (and, in many cases, hold a discretionary power on deciding on the level of participation, as the large number of programs with delegated budget displays). Should the quantitative growth of these programs continue, it might be foreseen that stronger competition between supranational and national agencies takes place and that the latter, instead of being essentially reactive, start devising proactive solutions based on collaboration between national agencies rather than on European coordination. First signs of this process can be detected in the funding of investigator-driven academic research, where, faced with competition from the European Research Councils, some national research councils are taking the way of bilateral collaboration through lead agency agreements.

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