THE ROLE OF EUROPEAN FUNDS FOR RESEARCH AS ENGINE OF ECONOMIC GROWTH

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ABSTRACT: *The economic theory has long since recognized the importance of innovation as one of the engines of economic growth and development. On the other hand, at the microeconomic level, research, development and innovation are some of the key factors for the organization's growth. Traditionally, the process of research and development is financed either by the state or by the large corporations, while the small and medium-sized enterprises have limited access to such activities. The entities from the EU member states and the EU member candidates have now a wide choice of EU programs for financing their research and development activities. In this paper we provide an analysis of the possibilities of financing these activities using EU funds, and we compare the effectiveness of the EU member states in accessing these funds.*

KEY WORDS: *research; innovation; EU funds*

JEL CLASSIFICATION: *O3, O52*

1. INTRODUCTION

The innovation process is not only one of the key factors of the economic growth, but is, furthermore, one of the pillars of the economic development. The idea that technology plays an important role in development has been studied for the first time by Joseph Schumpeter (1939). After the Second World War this idea was developed furthermore by the neoclassical economics, which gradually came to dominate the economic theory (Solow 1956, 1970). According to this way of thinking, technology should be seen as a freely available public good, facilitating development everywhere as long as markets are allowed to work properly. The focus on technology as the driving force of growth and development has been taken up by advocates of the

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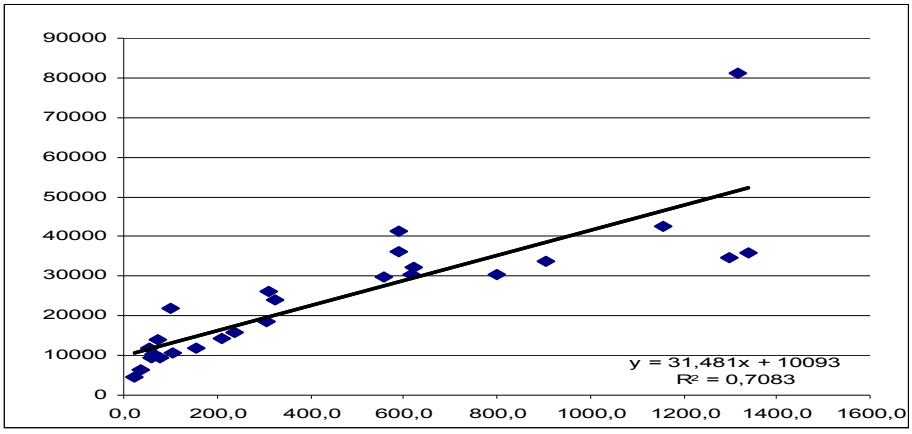
so-called "new growth theory" like Lucas (1988) and Romer (1990). As we have shown in Figure 1, there is a strong and positive correlation between the total expenditures on research and development per capita and the GDP per capita in EU Member States. The wealthier States with a GDP per capita of 30.000 euro or more have higher levels of R&D expenditures of 600 euro or more. The New Member States, with a GDP per capita less than 20.000 euro record much lower levels of R&D expenditures, typically below 200 euro per inhabitant.



Source: own calculations based on Eurostat data)

Figure 1. The total R&D Expenditures per capita and the GDP per capita in EU Member States (2008)

At the microeconomic level, research, development and innovation are some of the key factors for the organization's growth. Traditionally, the process of research and development is financed either by the state or by the large corporations, while the small and medium-sized enterprises have limited access to such activities. Nowadays, innovation is not limited to 'formal' R&D by large companies: often innovation takes place through the establishment of new firms, like during the boom in information technology of the 1990s. European governments have recognized the role of SMEs and entrepreneurship as has been reflected by a wide range of policies adopted in recent years.

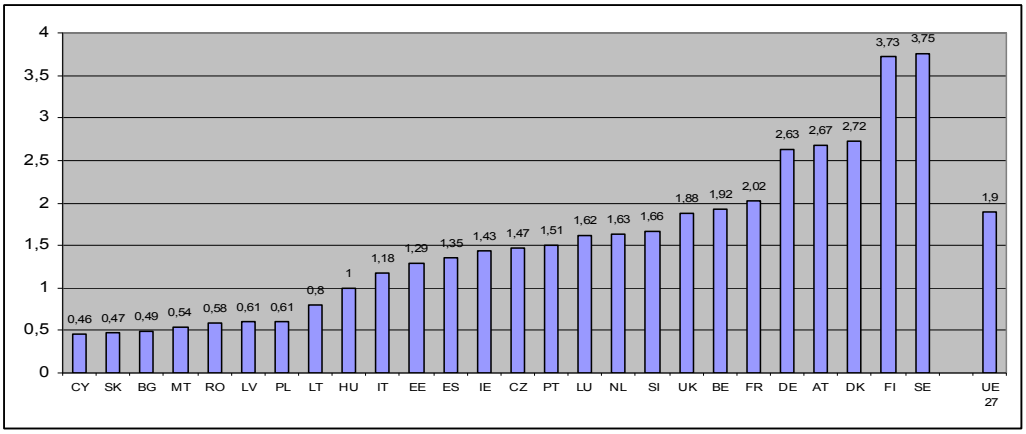
2. THE NEED FOR AN EU RESEARCH POLICY

External effects are important by-products of research. Knowledge, the product of research, is non-rival and often also non-excludable. In this line of thinking there is obviously a case for state intervention in order to take part in financing the research activities. For the same reasons as the non-rivalry and non-excludability of knowledge leads to market failure, it may result in government failure if knowledge diffuses freely across borders. In this situation, a part of a nation's expenditure 'leaks away' to other countries and gives national governments an incentive to 'free-ride' on the research funded abroad. Keller (2004) provides ample evidence of positive external effects of

R&D to other countries often channelled by trade and foreign direct investment. It has also been empirically established that the importance of these R&D spillovers decreases significantly if distance increases (Keller, 2002). However, distances are relatively small within Europe compared to the distances within the US or Japan; and the R&D spillovers are, therefore, significant. European centralization of public expenditure on research can reduce this coordination problem. Van der Horst et al. (2006) show that the openness of a country tends to be negatively related to government expenditure on public and private research. This suggests that the free-rider problem caused by knowledge diffusion is a real-world problem.

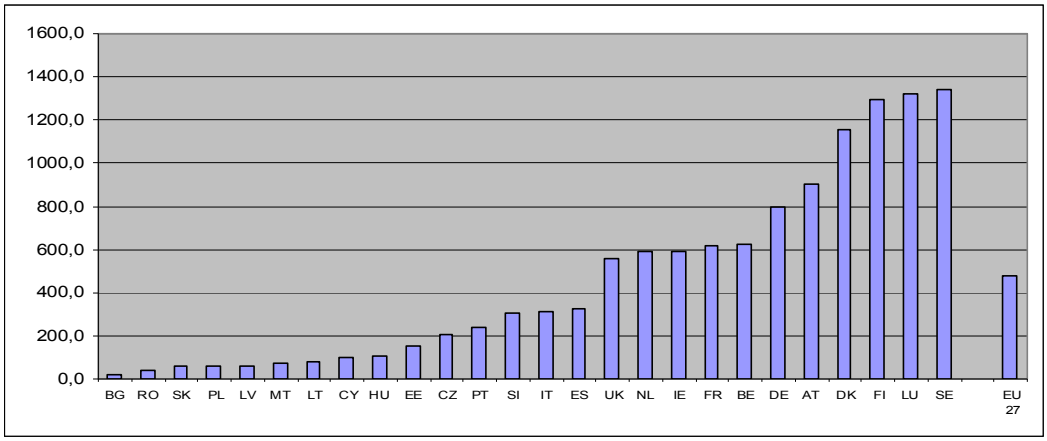
Despite the likely presence of scale economies and externalities, European centralization of public expenditure on research may also have drawbacks. The data on the objectives of publicly-funded research, as well as the literature on national systems of innovation suggest that heterogeneity among the members of the EU is large. In particular, there is substantial heterogeneity in the amounts that Member States allocate to research and in their socio-economic objectives. Moreover, this heterogeneity has increased with the entry of ten new Member States in 2004, and two more in 2007. Figure 1. provides an indication on the relative importance of R & D spending, both private and public, in the Member States of the EU. It should be noted, however, that differences in the amounts allocated to research may not necessarily imply differences in preferences; it may also indicate a certain amount of under-spending by Member States, resulting from the presence of spillovers.

The New Member States tend to have lower levels of expenditures for research activities, usually below 1% GDP and below 100 euro per inhabitant. The higher levels of expenditures on R&D activities, in 2008, were in Austria, Denmark, Finland and Sweden recording 2,67%, 2,72%, 3,73% and 3,75% of GDP, much higher than the EU 27 average 1,9% of GDP. As we have shown in Figure 3. the lower levels of R&D expenditures per inhabitant were in Romania and Bulgaria (37,6 and 21,8 euro). On the other hand, in Denmark, Finland, Luxemburg and Sweden these expenditures were well above 1000 euro per capita.



Source: own calculations based on Eurostat data

Figure 2. The Total R&D Expenditure in Member States - share of GDP (2008)

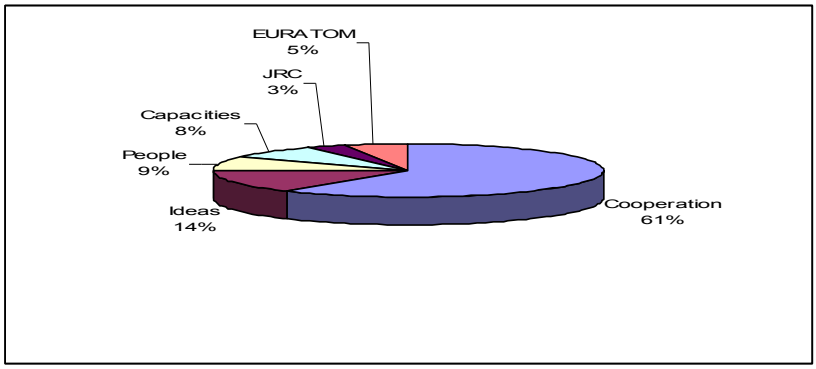


Source: own calculations based on Eurostat data

Figure 3. Total R&D Expenditure - euro per inhabitant (2008)

3. THE SEVENTH FRAMEWORK PROGRAMME (FP7)

The European Union expenditure on research is concentrated in the Seventh Framework Programme (FP7). FP7 is an initiative under which various subsidies are granted for both public and private research. The budget of FP7 currently is € 53.3 billion for the period 2007-2013. This represents an average yearly budget of € 7.6 billion, which is substantial when compared to € 65 billion spent on public research by the Member States of the EU15 in 2003. FP7 consists of four programmes: Cooperation (€ 32.4 billion), Ideas (€ 7.5 billion), People (€ 4.7 billion) and Capacities (€ 4.2 billion). In addition, FP7 also has a budget for the Joint Research Centre (JRC) amounting to € 1.8 billion and a budget for research on nuclear energy (EURATOM) of € 2.8 billion.



Source: European Commission, A Study on EU Spending, Amsterdam, 2008

Figure 4. The Budget Structure of the FP7 Programmes (2007-2013)

Participation in FP7 is open to a wide range of organizations and individuals: research groups at universities or research institutes; companies intending to innovate;

small or medium-sized enterprises (SMEs); SME associations or groupings; public or governmental administration (local, regional or national); early-stage researchers (postgraduate students); experienced researchers; institutions running research infrastructures of transnational interest; organizations and researchers from third countries; international organizations; civil society organizations.

The budget of FP7 is allocated in a variety of ways, and has a multitude of goals. Arguably, the most prominent goal of FP7 is the stimulation of public and private research. With respect to this goal, there are theoretical and empirical arguments in favour of European policy. To start with, some research projects are simply too large and risky to be funded by a single country. Multilateral cooperation then makes research projects possible that would not otherwise have been undertaken. A concrete example of a large international research project is the ITER-project on nuclear fusion. In addition, European centralization of research can foster competition between researchers, induce specialization among them and reduce the risk of overlapping research activities. Van der Horst et al. (2006) present empirical indications that larger countries tend to spend relatively more on public R&D and on subsidies for private R&D which could be caused by economies of scale in larger countries.

3.1. EURATOM and Joint Research Centre

EURATOM is financed through a specific research framework programme and the Joint Research Centre (JRC) has a special status within FP7. As such EURATOM and JRC are not considered to be 'programmes' within FP7. EURATOM is the EU's oldest form of cooperation on research. The European Atomic Energy Community was founded in 1957, at the same time as the founding of the European Economic Community (EEC). EURATOM is the textbook example of a research project with increasing returns to scale. Given the prevalence of secrecy in atomic research, externalities due to knowledge diffusion are not likely to be a reason for European centralization. EURATOM has managed to survive despite the declining popularity of nuclear energy in some Member States. The Joint Research Centre (JRC) is the European Commission's own research branch. The benefits of the JRC are not so much to be found in the normative part of the subsidiarity test - although some economies of scale might be present. Instead, the JRC assists in the development, implementation and monitoring of EU policies, while being independent from individual Member States.

Cooperation. The programme *Cooperation* receives the bulk of the FP7 budget. The objective of this programme is to support the whole range of research actions carried out in transnational cooperation. The programme covers collaborative research in ten thematic areas: Health; Food, agriculture and fisheries, and biotechnology; Nanosciences, nanotechnologies, materials and new production technologies; Energy; Environment (including climate change); Socioeconomic sciences and the humanities; Transport (including aeronautics); Space; Security; Information and communication technologies.

All kinds of transnational consortia - public, private and public-private - can apply for subsidies for research activities. Support for transnational cooperation will be implemented through Collaborative Research, Joint Technology Initiatives, and coordination of non-community (national and inter-governmental) research programmes and international cooperation. Collaborative Research provides funding for transnational collaboration and receives the bulk of the programme's budget. Proposals for projects under the sub-programme Collaborative Research must be made by at least three legal entities, no two of which are established in the same Member State. In this way, an incentive is offered for transnational cooperation. The European Technology Platforms (ETPs) should give the private sector more influence over the priorities of FP7. These ETPs consist of business leaders who formulate Strategic Research Agendas that should give a direction to the allocation of funds. If an ETP is deemed to be of strategic importance for the EU, it can be turned into a Joint Technology Initiative. Joint Technology Initiatives provide funding for long-term public-private research projects based on the Strategic Research Agendas. Coordination of National Research Programmes offers possibilities for multilateral cooperation, joint implementation of public policies, and could prevent a costly duplication of research efforts by the Member States. However, the primary objective of this programme is to promote scientific and economic integration of the Member States, leading to increased competition between research institutes and between companies, and to a better diffusion of knowledge across-borders. This objective clearly refers to an externality: the reduction of barriers between Member States.

As there are a great number of areas covered by these programmes, heterogeneity of Member States is not a likely issue, here. Given the size of the programme and the diversity of research fields and actors, it might be problematic to guarantee the quality of the review process. Moreover, the large budgets possibly generate a common-pool problem, although the multilateral nature of proposals provides a slight counterforce to this risk.

Ideas. The programme *Ideas* establishes a European Research Council (ERC). The ERC should fund projects proposed by researchers, similar to the National Science Foundation in the United States. Formally, the objective of this programme is to support 'investigatordriven' research carried out across all fields by individual national or transnational teams in competition at the European level. Only one legal entity is required for funding. The scope for economies of scale is large in this programme. By deciding centrally which proposals receive funding, the risk of duplication of research is limited; and it is less costly to employ the experts needed for high-quality assessment of project proposals. Centralization also avoids the negative effects of cross-border externalities and limited systems competition: the nationality and country of residence of the researchers submitting a proposal becomes less relevant for the chances of obtaining a grant. In addition, the risk of 'personalism' can be reduced if the experts evaluating a proposal come from another country than the persons submitting it. The 'second-best' argument, that centralization promotes competition and diffusion of knowledge, also applies to this programme.

People. The programme *People* is meant to financially support individual researchers in the EU. The Marie Curie Fellowships are an example of what is covered

by the programme. The objectives are to improve both the quantity and quality of researchers, and to make researchers more mobile in the EU. The principal difference with the programme "Ideas" is that less expertise is required in order to evaluate whether a person is entitled to a grant or not. Hence, economies of scale are less likely to occur. The risk of a common-pool problem is limited as long as the programme stimulates the mobility of researchers. Furthermore, centralization prevents a home-bias that would likely result from financing by Member States.

Capacities. This programme strengthens the research capacities that Europe needs if it is to become a thriving knowledge-based economy. The programme *Capacities* comprises a list of areas that are to be supported: Research infrastructures; Research to the benefit of SMEs; Regions of knowledge; Research potential; Science in Society; International cooperation. In terms of expenditure, the emphasis lies on support for research infrastructures and SMEs. In general, support for research infrastructures can be expected to have economies of scale, just like EURATOM. It is, however, important to consider whether an 'infrastructure' has EU-wide relevance. For example, a large telescope, like the proposed Extremely Large Telescope (ELT), is a project that will benefit research worldwide and is too costly to be funded by a single Member State. In this case, the benefits of centralization (though not necessarily at EU level) are clear. For other initiatives labelled 'infrastructure', the case for centralization might be less clear. For example, it is difficult to see why the Commission should spend money on ICT infrastructure for researchers as in the "e-Infrastructure" initiative. The provision of ICT infrastructure to researchers is the primary responsibility of research institutes and the private companies employing them. The only likely exceptions are supercomputers and highly-specialised software. When public research institutes do not receive sufficient funding from their governments, funding by the EU might be a second-best solution. However, knowing the EU will bail them out encourages under spending by Member States.

With regard to the funding of innovative activities by SMEs, Van der Horst et al., (2006) provide empirical evidence that there are no scale economies or policy externalities discouraging expenditures on SMEs. Larger countries do not spend more on SMEs than small countries; while open economies tend to spend *even more* on SMEs than closed economies. In addition, the heterogeneity among Member States regarding policies aimed at SMEs is probably substantial. While the normative part of the subsidiarity test aims to keep SME policy decentralized, it can be argued that national governments are in a subsidy-race in order to protect domestic SMEs from foreign competition. If this indeed is the case, centralization of expenditure at the European level could help to promote a level playing field for SMEs. However, this seems a rather strong measure. The first best solution would be to apply strict rules on state aid. The remaining four themes of the programme "Capacities" (*Regions*, *Research potential* and *Science in society*) do not appear to qualify for centralization according to normative subsidiarity principles. This is simply because there are no substantial external effects, nor are there economies of scale. Moreover, there is heterogeneity between Member States/regions. EU financing is likely to be characterized by a common pool problem that would result in over-spending.

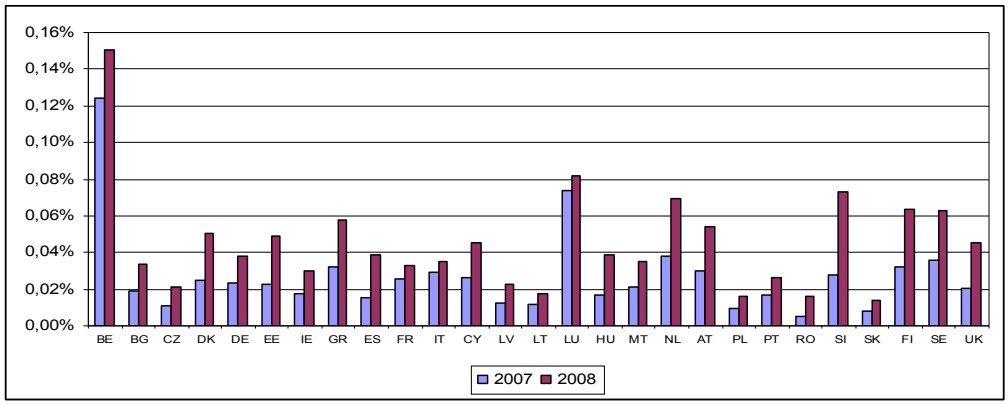
4. COMPETITIVENESS AND INNOVATION FRAMEWORK PROGRAMME (CIP)

The Competitiveness and Innovation framework Programme (CIP) is an initiative of DG Enterprise and Industry. The proposed budget is 3.6 billion euros for the period 2007-2013 (or 0.5 billion euros annually), which is less then 10% of the budget for FP7. The CIP consists of three specific programs: The Entrepreneurship and Innovation Programme (3/5 of the budget); The Information Communication Technologies Policy Support Programme (1/5 of the budget); The Intelligent Energy - Europe Programme (1/5 of the budget). The Entrepreneurship and Innovation Programme will bring together activities on entrepreneurship, small and medium-sized enterprises, industrial competitiveness and innovation. It encompasses the promotion of public-private innovation partnerships for SMEs, the provision of community financial instruments to overcome the poor access to equity, venture capital and loans for SMEs and the exchange of good practice between national and regional authorities.

The Information Communication Technologies Policy Support Programme (ICT) policy support programme will stimulate the wider uptake of ICT by citizens, businesses and governments and aim at intensifying the public investment in ICT. The role of the EC is to enable the development of common approaches and coordinated actions, the sharing of good practices and the deployment of interoperable solutions across the Union - all in support of the private sector and the Member States, which are the key actors in the deployment and best use of ICT. The objective of the Intelligent Energy - Europe Programme is to support sustainable development as it relates to energy and to contribute to the achievement of the general goals of environmental protection, security of supply and competitiveness. It is a non-technological programme in the field of energy focusing on the removal of non-technical barriers, the creation of market opportunities and raising awareness.

5. THE MEMBER STATES EFFECTIVENESS IN ATTRACTING EU FUNDS FOR RESEARCH

For the year 2007, the EU budget reserved about € 3.9 billion for R&D, which is less than the average yearly budget for FP7. This could probably be explained by the start-up phase of the new Framework Programme. In 2007, R&D expenditures cover 3 to 4% of the EU budget. This budget share will increase during the time period covered by the FP7 (2007-2013). As we represented in Table 1, form the total € 3.9 billion reserved for R&D on the FP7 in 2007, the Member States collected only 3,28 billion. The largest amounts were attracted in Germany and France and the smallest in Malta and Lithuania. In 2008 the FP7 funds received by the Member States increased to 5.41 billion and under the CIP Framework Programme increased from 92.65 million to 164.76 million euro. As we have shown in Figure 5, Belgium is by far the most efficient country in attracting financing under the PF7, representing as high as 0.12% and 0.15% in GDP. Other good performances were recorded by Luxembourg, Netherlands and Slovenia.



Source: own calculations based on European Commission. (2009). EU budget 2008 Financial Report. Luxembourg: Publications Office of the European Union

Figure 5. The FP7 funds contracted by the Member States (share of GDP)

Table 1. The EU funds for research under FP7 and CIP attracted by the Member States in 2007 and 2008

EUR million

Member States	FP7		CIP	
	2007	2008	2007	2008
BE	416,44	519,89	15,79	25,55
BG	5,51	11,37	0,41	1,15
CZ	13,81	31,07	0,90	1,33
DK	56,24	116,79	2,20	3,30
DE	561,43	953,92	13,32	28,49
EE	3,57	7,89	0,11	0,21
IE	33,15	54,29	1,49	1,99
GR	72,84	137,39	4,44	5,82
ES	159,12	422,77	7,30	11,46
FR	481,15	645,31	7,47	16,50
IT	452,90	546,91	11,53	15,93
CY	4,24	7,75	0,14	0,31
LV	2,59	5,30	0,27	0,55
LT	3,32	5,56	0,24	0,47
LU	27,76	32,30	0,70	0,59
HU	16,66	40,69	2,54	2,47
MT	1,17	2,00	0,05	0,24
NL	216,78	411,86	5,39	13,22
AT	80,67	152,79	4,37	6,06
PL	29,21	58,63	0,59	4,30
PT	27,24	44,34	1,30	3,97
RO	6,48	22,94	0,36	1,45
SI	9,60	27,09	0,28	1,34
SK	4,39	8,84	0,18	0,40
FI	57,78	117,29	1,22	2,44
SE	118,35	206,36	2,30	1,89
UK	422,38	826,11	7,77	13,32
EU 27 Total	**3284,76**	**5417,46**	**92,65**	**164,74**

Source: own calculations based on European Commission. (2009). EU budget 2008 Financial Report. Luxembourg: Publications Office of the European Union

6. CONCLUSIONS

We can draw the conclusion that the role of the EU in providing funding for R&D is suitable. In many cases, there are economies of scale in centralizing R&D funding, such as EURATOM, JRC, Cooperation, Ideas and Capacities regarding infrastructure. In addition, the programmes Cooperation, Ideas, and People have the ability of internalizing the spillovers. Under the Competitiveness and Innovation Framework Programme where the R&D funding is directed to SMEs, the role of the EU is less obvious. Even though R&D has one of the largest shares in EU Budget, the Member States themselves have substantial R&D budgets. At the moment, the EU funds contracted through FP7 and CIP are still insignificant when compared to the total R&D expenditures financed by the Member States budgets, but their importance is likely to grow in the near future.

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