



Leveraging R&I to strengthen regional cohesion

Policy Brief by the Research, Innovation, and Science Policy Experts (RISE)

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HIGHLIGHTS

Highlight 1. Research capabilities in less developed regions have improved, but this has not necessarily been translated into improvements in innovation and economic growth:

Empirical evidence from technology-leading countries supports that technological improvements are an important force behind long-run economic growth. However, this has not been the case in most less developed regions of Europe, where efforts to stimulate research and innovation (R&I) have improved research capabilities, but neither yielded the anticipated broader socio-economic benefits nor led to higher levels of economic growth and employment.

Highlight 2. R&I policies thus far have focused on inputs rather than outputs: Much of the effort to make the EU more competitive through the promotion of R&I has fundamentally concentrated on inputs to the system. The focus has been on the relative dimension of expenditure on R&D, rather than on how changes in the R&D effort translate into firm-level innovation, employment, and economic growth.

Highlight 3. Trade-offs between European and regional competitiveness: Knowledge intensive, innovative activities have a tendency to concentrate in 'core' areas often at the expense of less developed ones. Hence significant policy efforts are needed to orient R&I towards lagging countries and regions. Policy makers need to walk a tightrope of sorts, devising strategies and policies that foster research and innovation without increasing the gap between core and periphery. Brain-drain, relocation of companies and research results generated in the less developed regions but exploited in core countries can be beneficial for the EU without necessarily contributing to economic cohesion.

Highlight 4. Overcoming hurdles: Although conditions vary from one region to another, four prominent structural factors inhibit the transformation of research capabilities into sustainable growth in less developed areas. These include: a) deficits in the supply of suitably skilled human capital; b) economic fabrics whose structural and sectoral compositions make them less prone to knowledge-intensive, innovative activity; c) brain drain and the loss of valuable highly qualified personnel; and d) deficient institutional settings.

Background

The European Union (EU) has the objectives of enhancing the competitiveness of, increasing the productivity of, and fostering employment in its member states with the ultimate goal of improving the well-being of its citizens and promoting sustainable, inclusive economic growth at both the national- and continental-level through the promotion of research and technological development (RTD). This, however, is not the only priority of the EU; the goal of harmonious development and territorial cohesion is included in article 174 of the Treaty.

These dual goals are not necessarily immediately reconcilable. Knowledge intensive, innovative activities have a tendency to concentrate in 'core' areas rather than less-developed ones meaning that EU efforts to foster research and innovation could significantly undermine the overall cohesion effort and contribute to an increase in the territorial gap between the countries and regions of Europe, ultimately jeopardizing the well-being of citizens living in the fringes of the EU.

Moreover, less-developed areas face serious challenges in transforming both basic and applied research and the knowledge it generates into innovation – a phenomenon that has been termed the "European Paradox". This difficulty is attributable to a variety of factors, the exact combination of which inevitably varies across countries and regions. That said, an assessment of conditions in peripheral areas reveals four prominent and seemingly ubiquitous structural factors. These 'common denominators' are: a) deficits in the supply of suitably skilled human capital; b) economic fabrics whose structural and sectoral compositions make them less prone to knowledge-intensive, innovative activity; c) brain drain and the loss of valuable highly qualified personnel; and d) deficient institutional settings.

The economic crisis has also affected the potential of less developed regions to catch up. Before the crisis public R&D expenditure was increasing, reducing the gap with leading Member States. Economic convergence was also the norm. However, convergence was not the result of increasing competitiveness in lagging areas. Much of the rise in the R&D effort also took place in the core regions of the periphery: regions such as Attica, Bratislava, Catalonia, Lazio, Lisbon, Lombardy, Madrid, or Prague benefited from the bulk of R&D investment in less developed countries. Similarly, success stories have been mainly concentrated in few research organisations, companies and newly created hubs. Since the inception of the crisis R&D expenditure in lagging areas of Europe has, however, declined rapidly.

This sizeable increase in R&D expenditure before the crisis in the less developed areas of Europe has not, however, yielded the anticipated broader socio-economic benefits, nor set the basis for sustainable development. R&D investment has been associated to significant improvements in scholarly outputs, but not with higher levels of economic growth or with increases in employment.

The reasons behind the limited delivery relative to the dimension of the effort can be found in the differences between conditions in the core and the periphery of Europe. An important difference between the core and the less developed regions relates to who is behind the R&D effort. In core regions of Europe, the majority expenditure in R&D is attributable to the private sector. Firms spend more on R&D than the public sector and universities put together. Two thirds of R&D expenditure in core regions comes from the private sector. This ratio has remained more or less stable since 1995. By contrast, the majority of R&D expenditure in the periphery of the EU originates from a combination of the public sector and universities.

A large proportion of the increase in the innovative effort in less developed regions of Europe is attributable to increases in university R&D. Since 1995, R&D expenditure conducted by universities in the periphery of Europe has almost doubled in relative terms. However, private underinvestment in R&D has not only inhibited the production of new knowledge by firms (it itself stifling innovation), but perhaps more importantly, also prevented firms from developing a suitable knowledge base or basic level of competency that would permit them to absorb and subsequently internalize and exploit knowledge generated via other sources – i.e. universities or other public research facilities. In short, in many lagging areas of Europe firms are not positioned to capitalize upon the knowledge generation efforts of other actors. Moreover, research in the social sciences and humanities are particularly prevalent in less developed countries and regions, limiting the link between research and commercially viable innovations. Finally, many successful research departments and centres in less developed regions have failed to establish connections with other local research centres and/or firms meaning that the positive outcomes of aggregate knowledge generation efforts are not necessarily being realized within the jurisdictions where the R&D is actually occurring. They, by contrast, tend to be more successful in reaching out to research and economic actors located outside their regions of origin.

After two decades of increasing efforts to stimulate R&I in lagging countries and regions the stakes for European and national policies alike are now on the one hand the need to ensure effective R&I support and on the other to safeguard current (even if limited) achievements and maintain excellence in the few successful agents while personnel migrates and research infrastructure is gradually becoming obsolete.

Diagnosis of the problem

A key problem for less developed areas of Europe is that in the current globalized world, they can neither compete with low wage countries, nor have they been able to exploit R&I support in order to become knowledge-based economies. Many strands of research – i.e. neo-Schumpeterian, technology frontier, and new economic geography strands – have expressed considerable scepticism about the capacity of what is often considered as piecemeal and dispersed R&D investment to yield economic impacts. Such scepticism is largely attributable first to the neo-Schumpeterian belief that R&D is only (or certainly, more) effective beyond certain thresholds or minimum levels of investment and the notion of cumulative and increasing returns to R&D investment (Lucas, 1988; Romer, 1990), and second to the perception that certain socio-economic and institutional contexts are more 'prone' (or, conversely, 'averse') to innovation and transforming knowledge and knowledge-generation efforts into economic growth and benefit (Rodríguez-Pose, 1999). The linear model, stipulating that innovation is the more or less inevitable outcome of investment in R&D, and therefore increasing investment in R&D will yield proportional increases in innovation and ultimately economic growth has not worked. Innovation is not a unidirectional, frictionless, and aspatial process, but a dynamic, deeply territorially-embedded and critically dependent on contextual conditions and factors (Lundvall, 1992; Asheim, 1999; Edquist and Chaminade, 2006). This suggests that the promotion of R&D alone – particularly in peripheral areas – is perhaps insufficient in and of itself to foster innovation.

Structural Funds and national policies have tried to boost competitiveness through public investments in R&I but the results have been meagre. Some highly performing research organisations have been created and the overall performance of the research system has improved, but the increases in competitiveness have been limited. Firms have not reacted to the incentives as anticipated. The reasons are multiple: they may lack absorptive capacities, have a tendency to stick to risk adverse behaviour, or simply be concentrated in local markets. The critical mass that benefits from research and knowledge generation that leads to economies of scale, externalities and knowledge spillovers is simply not there and more R&D investment has not suffice to achieve it.

This does not mean that there has been no return on R&I investments and that resources have been wasted. Public research capabilities have in certain cases improved considerably and in some instances, coordinated interventions have led to the emergence of new hubs or sub-hubs of knowledge with the potential to drive economic growth. In other cases a few firms have emerged as winners from the increased opportunities offered. These have been typically persistent innovators with absorptive capacities and satisfactory economic performance in the global market. Case-studies suggest that preconditions for effective policies in lagging regions include a well-established industrial vocation; a good endowment of skilled labour force; and some research tradition. Wider networks, horizontal pre-competitive technologies and appropriate knowledge transfer mechanisms are ingredients that contribute to long-term change.

However, the institutional set up failed to systematically address the problems identified. Budgets for technical assistance have increased with the aim of helping to improve institutional capacity. However, many of the Member States in greatest need of such assistance have not always used it. Technical assistance is typically employed for small studies rather than to support interventions aimed at changing the overall institutional conditions and capabilities of development planning.

What are the reasons behind the failure to translate greater investment in R&D and improvements in scientific output into innovation and growth? There is no uniform set of reasons behind the limited returns of R&D in the periphery of Europe. The exact combination of factors varies from country to country and from region to region. However, a number of common denominators emerge from the assessment of conditions in the periphery. These include:

- a) **Human capital deficits:** Many less developed regions and countries face – to different degrees – significant human capital challenges (Rodríguez-Pose and Vilalta-Bufi, 2005). Some display deficits in human capital stock, including shortages in the percentage of workers with completed secondary or university education. Others are confronted with issues linked to poor quality of education and training – as suggested by the PISA and PIAAC tests. Mismatches between educational supply and demand in the local labour market are also particularly prevalent in many areas of the periphery. The central importance of training and education is exemplified by the Irish experience where educational reform (consisting of, notably, enhancing the quality and availability of higher education, as well as the promotion of technical and vocational education) and increased expenditure on education and training played a critical role in the upgrading of Ireland’s technological sophistication and innovative capacity, the attraction of knowledge intensive FDI and ultimately their rapid, significant economic growth and development (Honohan and Walsh, 2002; Ahier and Esland, 2013).
- b) **Brain drain:** A weak economic fabric limits the opportunities of finding jobs locally for those with the highest drive and best level of training. The limited capacity of a large mass of very small firms, often in not very dynamic sectors, pushes the most highly qualified away. Regions in the Eastern periphery have experienced this type of brain drain with different levels of intensity since the beginning of the transition from communism, but the crisis and levels of youth unemployment higher in some cases than 50% are pushing qualified job-seekers away from the Southern periphery as well.
- c) **Weak economic fabrics:** The panorama in lagging areas of Europe is dominated by large numbers of relatively weak SMEs, with little or no innovative capacity. Many of these firms are, moreover, in traditional or mature sectors where the potential for innovation is limited.
- d) **Deficient institutional settings:** Weak institutional settings significantly curtail the returns of innovation efforts. In particular, areas with a high degree of corruption and low government efficiency are struggling to fulfil their innovation potential.

Recommendations and related action plan

The potential of individuals, firms and territories to generate and absorb knowledge and produce innovations is essential for economic development and is likely to remain so for the less developed areas of the EU in the foreseeable future. Firms and regions at the fringes of the EU need to innovate if they are to remain competitive in a more open and integrated world, and to generate the productivity and jobs needed in order to fulfil the aims of economic growth and well-being. So, despite past failures, R&I support needs to continue, **but** simultaneously to become more selective and more ambitious. Continuing R&I support in the same way as in the past will lead to partly wasted resources. Conversely, stopping R&I support may lead to throwing the baby with the bath water: accumulated experience and research infrastructure will soon become obsolete if not updated. In this process it is important to avoid allowing local stakeholders representing a rent-seeking, out-dated mentality to take over.

There is thus an immediate need to adopt a new approach to innovation policy in the less developed areas of the EU that complements and goes beyond simple R&D or S&T indicators. Such an approach must acknowledge the importance of territorial specificity and needs to be adapted accordingly to the specific conditions of each territory. Recognizing that research and knowledge generation is not synonymous with, nor does it automatically yield innovation, especially in the periphery of the EU, the approach must focus more explicitly than before on innovation and concentrate on the capacity of individuals and firms to innovate, to generate and participate in innovation systems, to exploit the potential of related variety, and to establish networks and value-chains. Education, training and capacity building policies, as well as regional development strategies would also require greater coordination, not only to ensure a better matching of the supply of human capital to local demand but also to enhance the capacity of a territory to absorb knowledge and innovation generated elsewhere and to convert knowledge into economically viable activities. It is also imperative that the approach addresses institutional bottlenecks, promotes institutional efficiency and works to alleviate fundamental institutional barriers that may inhibit innovation. Finally, the approach must promote the integration of the territory and its actors into international networks and global value chains and foster the creation of 'pipelines' that encourage the inflow of new knowledge.

In particular, the line of action should include:

- a) ***Spatially-targeted intervention***: There is simply no one-size-fits-all approach to innovation that is appropriate for the whole of Europe. Region-specific structures which cannot be transferred from one place to another shape the returns of any innovation policy. General innovation guidelines and strategies thus need to be adapted to the specific conditions of different territories.
- b) ***Greater focus on innovation***: The problem of the less developed areas of the EU is no longer one of research and knowledge-generation, but mainly one of lack of innovation. This implies strategies which go beyond the simple investment in R&D and concentrate on the capacity of individuals and firms to innovate, to generate innovation systems, and to establish networks and value-chains. Strategies must acknowledge the dynamism and collaborative nature of the innovative process and that innovation is the outcome of interactions between members within a network or 'system' consisting of firms, universities, research institutes and a host of other actors in both the private and public spheres (Iammarino, 2005). This implies that specific attention must be paid to the creation of partnerships and networks and fostering trust, collaboration and cooperation between actors within a system to ensure the collaboration necessary for innovation.
- c) ***Coordinating innovation policies with education and training and with regional development policies***: The capacities and potential of a place's human capital is essential in the process of knowledge-generation and assimilation. Increasing the education and training level of the population and a better matching of the educational supply to local needs have been proven to increase the absorptive capacity of firms in a given territory (Cohen and Levinthal, 1990; Lund Vinding, 2006). Consequently, policies targeted at improving overall education, training, and skill levels, need to be considered in coordination with the innovation strategy. European cohesion and regional development policies, especially after the 2014 reform, may provide an adequate setting to achieve this.
- d) ***Addressing institutional bottlenecks***: The institutional context is of particular relevance to the innovative capacity of a given territory (Rodríguez-Pose and di Cataldo, 2015). There is a need to complement innovation strategies with measures aimed at addressing the institutional barriers limiting a region's capacity to innovate. In particular, efforts aimed at reducing corruption and improving government efficiency should be considered in conjunction with innovation strategies.
- e) ***Promotion of international networks and global value chains***: Research has shown that economic actors in the periphery of Europe often benefit more from interaction at a distance, with innovators located outside the region, through the formation of arm's length networks and value chains (Simonen and McCann, 2010; Fitjar and Rodríguez-Pose, 2011; Iammarino and McCann, 2013; Araújo et al. 2014). It is therefore essential that the development of targeted 'pipelines' (Bathelt et al., 2004) to permit the inflow of new knowledge – or investing in building channels of communication external to the peripheral region – is made an essential constituent of innovation policies for the periphery of Europe.

The **Commission** can play an important role in achieving these objectives. First, it can exercise its **soft power** (in the context of the European Semester) to improve institutional capabilities in less developed countries and help them engage in policies with higher ambitions. This in the short-run may lead to reduced absorption of Structural Funds (in a period of austerity), but will pay off in the

long-run. In particular the **Smart Specialisation** approach introduced in the current programming period will need to maintain its ambitions and block any small, liquidity-driven rather than innovation-driven support schemes. While this is the responsibility of DG Regional Development, the Commissioner for Research, Science, and Innovation can exercise significant influence in the context of inter-service consultations. DG R&I is the most appropriate place to support long-term investments in research with tight monitoring of short-term results in the context of ESFRI and research infrastructures.

Second, in specific calls on **Horizon 2020 eligibility criteria** can include the collaboration of companies in less developed countries and regions with the aim to **fostering the generation of global value chains**. Similarly criteria in other calls can reinforce the idea of **related variety** requesting clear complementarity and new recombinations as the target of support schemes. If this is too specific to be included in Horizon 2020 DG R&I can exercise its influence in the Steering Committees of the Structural Funds to push Member states towards this direction.

Greater intervention is also needed in **technical assistance** to make sure that it is adequately used with the target of improving institutional capabilities, rather than resolving small problems. DG R&I can take a leading role in supporting institutional change. Using specific evaluation criteria (beyond the institutionalized mid-term review) to investigate the long term performance of actors and policies will contribute to empirical evidence of what works and what does not.

Finally, one support study can be requested in the context of the Framework Agreement of RISE looking into the potential exploitation of successful research results originating in the periphery in the core countries of the EU or even beyond. It will help address the question, whether these funds are eventually only contributing to knowledge or to economic outcomes, even if not in the country of origin.

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This Policy Brief presents the findings of a Policy Paper developed on the same topic. It highlights that while research capabilities in less developed regions have improved, this has not necessarily been translated into improvements in innovation and economic growth; it brings attention to the fact that R&I policies thus far have focused on inputs rather than outputs; it underlines the persistence of trade-offs between European and regional competitiveness and points at the need to overcoming structural hurdles faced by developing regions. The Brief presents a concise diagnosis of the problem and the resulting recommendations.

Studies and reports

