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Project "How to spend better together"

Research, Higher Education and Innovation: Redesigning European Governance in a Period of Crisis

Jo RITZEN and Luc SOETE

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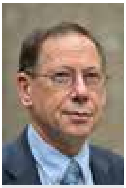

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Presentation of the project: “How to spend better together”

Eulalia Rubio, Senior Research Fellow at Notre Europe

The negotiations of the post-2013 EU Multi-Annual Financial Framework take place at the moment when many member states are making extraordinary efforts of fiscal consolidation. In these circumstances, it is not surprising that calls for “applying austerity” at the European level resurge with force. And yet, due to its limited size (1% of the EU GNP and 2.5% of European public spending), we cannot expect major savings from cutting spending at the EU-level. A more intelligent response to the austerity challenge is to look at what we spent in aggregate terms – that is, at both national and EU level – and to explore whether we can have efficiency gains by re-organising spending tasks or better coordinating national and EU spending.

This is the purpose of the series of publications that *Notre Europe* launches under the title “How to spend better together”. The analysis undertaken in these publications is original in at least three respects:

- First, the papers do not narrowly focus on what happens at the EU level but take into account what is spent in aggregate terms – that is, at both national and EU level – and explore potential synergies between EU and national budgetary interventions;
- Second, each paper focuses on a particular policy domain and it is written by an expert of this policy domain;
- Finally, the analysis goes beyond the question of "spending more or less" to address the question of "spending better". Thus, rather than focusing on the amount of euros spent or potentially saved, the authors reflect on the appropriate design of budgetary interventions in a given domain and the merits of public spending vis-a-vis other types of public interventions.

1. The aggregate approach: an intelligent response to the austerity challenge

As said above, one element that characterises these publications is the adoption of an aggregated approach to study ways of improving the efficiency of public finances in Europe. Thinking in aggregate terms means having a broad picture of how much is spent at the EU, national and sub-national levels in a given policy domain, as well as on how these different levels of spending interact with each other.

As explained by Amélie Barbier-Gauchard in her contribution to this project[1], adopting an aggregated vision of public finances in Europe has multiple advantages. In discussions about the EU budget, it is common to treat EU spending in a quasi-exclusive manner. Thus, it is for instance frequent to criticize the current profile of EU spending on the grounds that it does not adequately reflect the hierarchy of challenges and policy priorities set up by the EU authorities. These types of comments disregard the

1. Amélie Barbier-Gauchard, "Thinking the EU budget and public spending in Europe: the need to use an aggregate approach", *Policy Brief No. 29, Notre Europe*, June 2011.

fact that EU spending represents only 2.5 percent of all public expenditures in Europe. As Amélie Barbier-Gauchard rightly points out, a broader picture allows us to make more well-founded judgements on the hierarchy of resources devoted to different policy priorities in Europe. It also enables us to compare the composition of public spending in Europe with that observed in other confederal or federal entities (such as the USA).

But the aggregate approach can be also very useful to improve the efficiency of public spending in Europe. As said above, the EU budget is very small. It amounts to 1 percent of the EU GDP, while national spending in the EU-27 account in average for 50 percent of national GDP. Reducing the EU budget will thus not be the "panacea" to redress national public finances. A more promising approach is to explore whether we can have efficiency gains by re-organising spending tasks between the EU and the national level or better coordinating national and EU budgetary actions.

Re-organising spending tasks is in fact about asking one of the eternal questions in EU budgetary debates: "who should do what?". Many studies have addressed this question before. What distinguishes our exercise is that we focus on particular policy areas. Thus, rather than identifying the policy domains in which more supra-national action seems desirable, we try to identify, for one particular policy area (see §-2), which concrete spending tasks would be better carried out at the EU level than at the national level.

As concerning coordination, one should note that most EU spending is carried out in fields of competence "shared" with member states, and/or submitted to national co-financing. In these circumstances, improving the efficiency of EU spending depends very much on our capacity to organise in an efficient manner the overlapping involvement of EU and national spending action.

Finally, we believe there is a need for a serious reflection on ways to improve horizontal coordination between national budgetary actions. As pointed out by Amélie Barbier-Gauchard, we frequently hear about the need to use the EU budget to implement the EU2020 strategy, but we should not forget that implementing this strategy is mostly a national responsibility. Until recently, national efforts to achieve the EU2020 goals have been coordinated through the so-called Open Method of Co-ordination, but it is time to incorporate more explicitly the spending element in these efforts of coordination, including the national one. Beyond the framework of EU2020, coordination of national spending actions might also provide important efficiency gains in other policy fields characterised by large cross-country externalities or economies of scale (i.e. security and defence, immigration).

2. The sectoral approach: bringing sectoral expertise into EU budget debates

Another characteristic of this project is the fact that each publication focuses on a specific policy area and is written by an expert on this policy area. Our choice for a sectoral approach is based on various considerations.

First of all, EU spending debates are too much focused on numbers and money and very few on the content and design of the policies financed at the EU level. By offering a sector-based analysis, we aim to reverse this logic, that is, to put more emphasis on the rationale, goal and design of public interventions at both the EU and national level, and less on how much do they cost. In other words, we want to move beyond the question of "spending more or less" to address the question of "how to spend better". Notice that, by emphasizing the quality of spending over the amount of spending, we do not under-estimate the magnitude of the austerity challenge to which we are confronted. We see "better spending" as a more sustainable and sophisticated EU response to the "austerity challenge" than generalized cuts in EU finances. Unlike cuts, better public spending translates into better results in terms of growth, cohesion, security, welfare… which eventually turns into less spending needs in the future and, therefore, more sustainable public finances.

Another reason why we privilege the sectoral approach is that we believe the assessment of the fiscal federalism criteria needs sectoral expertise. Identifying spillovers from policies or the existence of economies of scale is not easy. A good knowledge of the public challenges and the nature of public interventions in a given domain is required in order to assess whether there are cross-national challenges requiring action at the supra-national level, whether public interventions are characterized by increasing returns to scale or what is the degree of heterogeneity in policy preferences among member states.

Finally, while we think sectoral experts provide an interesting insight to debates on EU spending, we are also aware of the limits of their analysis. Policy experts are not necessarily versed in issues of public finance. They may not know in detail the functioning and outcomes of EU spending programmes. Our goal hence is not to finish with precise propositions for the forthcoming EU financial perspectives, but rather to provide some reflections and general recommendations which can differ from those that circulate among EU budgetary experts.

3. The enlarged approach: looking beyond the EU budget

Lastly, while the project aims to contribute to current debates on the post-2013 EU financial perspectives, the analysis is not confined to the EU budget. The latter is treated as one amongst a broad spectrum of policy instruments available at the EU level, including political and regulatory interventions but also other types of EU financial interventions taking place out of the budget.

Adopting an enlarged approach is important for two reasons.

First, we believe that there is a scope to improve the efficiency of national spending through EU non-budgetary interventions (i.e. by removing barriers to competition or by strengthening the coordination of national budgets). By including non-financial EU action into the analysis, the authors can reflect on these other ways of improving the efficiency of public spending.

Second, contrary to what many people think, the EU budget is far from being the only tool used to finance EU actions. A non-negligible part of EU-level spending takes place out of the EU budget, be in form of funds or programmes managed by EU institutions but not included into the EU budgetary process – such as the European Development Fund, providing assistance for the so-called ACP countries, or the Athena mechanism, financing joint military operations – or in form of programmes created by intergovernmental agreements – such as the OCCAR, an intergovernmental mechanism financing joint programmes on military research and equipment[2]. To these various programmes and funds, one should add the use of other EU financial instruments, such as the loans provided by the European Investment Bank (which amounted to €72 billion in 2010) or the more recent "Marguerite Fund", a pan-European equity fund launched in 2010 to finance long-term energy, climate change and infrastructure investments in Europe. To have a complete picture of these various ways of "pooling resources" at the European level is important, as each type of instrument might be more appropriate in different domains.

2. Amélie Barbier-Gauchard, Yves Bertoncini, "Les dépenses européennes et non communautaires : une réalité substantielle et en devenir ?", *Note de veille n° 105, Centre d'analyse stratégique*, juillet 2008.

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Introduction

Europe is in many ways at a cross-road, trying to find its place as a continent in a rapidly changing global environment where individual large European countries are quickly losing their status as world powers.

The 2000 Lisbon Strategy goals were an exhortation of European leaders to retain a vibrant Europe after the 1992 Maastricht Treaty's success in strengthening economic integration through the establishment of a common monetary policy. In 2009, the Lisbon Treaty should have reinforced the internal structure and the external representation of the Union. However, the recent, relative absence of Europe in the Arab up rise makes clear that Europe still has a long way to go in order to zoom to a new renaissance. The same applies to what can be considered as belonging to the **core of the EU's future competitiveness: innovation based on sound research and higher education policies**. These policies are at stake at the moment when many EU countries are faced with serious budget constraints as a result of the crisis.

In this paper, we present a **vision for the course Europe should take in its research and higher education policies** in order to fully live up to the expectations of its citizens to provide a safe, comfortable, affluent and sustainable environment. We focus in particular on the **division of labour between the EU, the national governments and the regions**.

The coming years will be very much dominated by the way Europe and its Member States can find the room for manoeuvre for **additional efforts in research, innovation and higher education ("knowledge investments")**.

- On the one hand, the crisis has severely constrained Member States' capacity to spend, with deficits running way above the 3% target for the last three years now and unlikely to come back under this target before 2015 in most countries.
- On the other hand, public debts have risen dramatically in many Member States, with rising interest rates as a future time bomb hanging over national public spending. In this **context of national budgetary austerity**, what is the **role of the EU concerning knowledge investments and innovation**? If (some) countries are not in a position to increase spending on knowledge investment in the coming years, are there plausible scenarios in which the EU could compensate? Should one e.g. increase the EU spending on research and higher education to "compensate" for the fall of national spending? Or are European programmes, such as the EU framework programmes covering R&D, more examples of the inefficiency of European handling of R&D support policies? Or has the European focus been on the wrong parts of knowledge investments?

These questions are raised for research policies and higher education policies separately but in close connection to each other against the emerging consensus among experts that the **challenge lies in linking the supply of knowledge** derived from research and transmitted through (higher) education **to the demand side**, i.e. to the entrepreneurs which seek new opportunities through innovation.

To deal with such challenges, **this Policy Paper is structured as follows**:

- We first highlight **Europe's historical failure to integrate the core knowledge production factors**. This leads us to retrace the history of European interventions on research, which starts some fifty years ago and which is closely linked to the emergence of industrial policies as means to enhance structural reform and economic integration.
- Section 2 then discusses how the current crisis has pointed to the **need to re-think EU and national public support on knowledge**. We reflect back on the meaning of subsidiarity within the context of the public support for research, knowledge and innovation diffusion, both from a more "systemic" perspective and for higher education.
- Section 3 then discusses the **role of investments in research, innovation and higher education to stimulate economic growth** and to solve many of the challenges to which Europe is currently confronted. That includes "real" challenges such as ageeing, climate change, renewable energy use, urbanisation, etc. but also the "financial" challenges mentioned above. Ultimately it will indeed be higher growth (both in terms of higher efficiency and a better quality of products and services) which will contribute to increase Member States' competitiveness and reduce their public deficits and pressures of fiscal austerity.
- Finally, section 4 set out some **proposals to develop a "layered" European innovation system** by means of changes in regulation and finance.

I. Europe's historical failure to integrate knowledge investment

There is by now a substantial literature on the *raison d'être* of science and technology or research policy. Since the beginning of this century, this literature has been strongly influenced by the perception of the need to address the knowledge gap with the scientifically and technologically leading country in the world: the United States. This is particularly the case in Europe but also in China, India, Brazil and many other emerging countries.

It was indeed the awareness of Europe's lagging behind the United States in knowledge creation and knowledge diffusion which prompted European leaders to set the objective of becoming "the most competitive and dynamic knowledge economy in the world by 2010" at the Lisbon European summit in March 2000. This objective was later on concretised into specific EU targets on research and innovation in Barcelona in the spring of 2002. There, European countries committed themselves to devote approximately 3% of their Gross Domestic Product on investments in research, development and innovation by 2010 (a figure roughly comparable to the research investment percentage in the United States). A new voluntary, modern version of Harold Wilson's (1963) celebrated "White Heat" science and technology policy had emerged at the European level: innovation policy and a European-wide approach to higher education and research was seen as the new medicine for Europe's lagging economic growth performance.

Ten years after Lisbon, the decade of the Lisbon knowledge strategy appears in retrospect more as a lost decade. Despite an overall achievement of growth convergence between European Member States, none of the ambitious Lisbon knowledge targets have been achieved. More recently the crisis, which originated outside Europe, has hit Europe particularly hard – in contrast to countries such as China, India or even Brazil[1]. The fear is that the second decade of the 21st century becomes a decade of European growth decline, with the European Union no longer capable of addressing the challenges of a rapidly growing older part of its population likely to be confronted with declining purchasing power and wealth. These future trends appear very different from country to country, but they highlight the eventuality of a new phase in European economic integration characterized by a tendency towards growth divergence between countries, with some Member States and/or regions awash with money and others no longer even being in a position to match European support programmes with local public funds.

From a growth economic perspective, the hypothesis put forward in this paper is that the current European crisis appears illustrative of the failure to integrate across Europe the core knowledge production factors behind economic growth, such as science and technology, higher education, research and innovation. The difference in how the crisis hit some Member States more than others highlights this in a striking way.

1. See, for instance, the "Emerging Markets" column in the *Economist*, 23 October 2008.

The European integration process of the last fifty years appears to have focused mostly on capital, money and labour. Research and higher education as supply factors for innovation played a marginal role. With respect to capital, the European Coal and Steel Community (ECSC) focused on achieving European scale advantages linked to energy (coal) and capital (steel), two areas considered strategic for industrial production in the 1950s and 1960s. It paved the way for a process of European integration mainly focused on the reduction of trade barriers. The large Single Market became the economic foundation for the European Union, laying the basis to reap the allocation and economic scale advantages of the growing size of the EU in manufacturing and agriculture. This was very much in line with the predictions from economic growth models like the Solow model which highlights the induced capital formation effect generating a medium-run growth bonus (Baldwin and Wyplosz, 2004). The various enlargement waves provided the EU with more or less continuous, new catching-up growth opportunities, increasing its overall growth and productivity performance. With respect to labour, economists and politicians alike missed out on the opportunity to take a broader human capital view instead of the classical "quantity of workers" view[2]. Thus, contrary to expectations, migration flows across the EU played a much less significant role. In some countries such as the UK, immigrants from new Member States provided a major impulse to economic growth in the 90s, but the effect faded away as the catching up growth of new Members States started to run into critical labour shortages resulting from their own rapidly ageing population trends.

The factor where the least progress has been made at the level of European integration is knowledge in its different forms. Research and development policies, regulations on patents and licensing, policies aimed at attracting foreign direct investment, the regulation of telecoms, the Internet and

2. A rare exception among economists is the study of Eckey *et al.* (2006) which considers the effects of European integration in a human capital augmented Solow growth model.

more broadly the use of ICT, all remain first and foremost governed at the national level. As shown in Table 1, only around 5% of the total amount of public funding for Research, Technology and Development came from the European Union, an amount of funding distributed by European Commission through its various research network policies (Framework Programmes, etc.).

Table 1. Public spending on R&D, higher education and innovation at national and European level (in million € and as % of total spending), 2009

	EU spending		National spending		Total	
R&D	4.846	6%	78.887	94%	83.733	100%
Higher education	1.569	1%	108.563	99%	110.132	100%
Competitiveness/ innovation	71	1%	10011,7	99%	10.082	100%
Total	6.485,3	3%	197.461,3	97%	203.947	100%

Sources: For EU spending, Official Journal of the UE L68, 15/03/11; for national spending, total GBAORD by socio-economic objective from the NABS 2007 (OECD), for R&D, Education at a Glance 2010 (OECD), State aids (DG Competition). All spending refers to executed payments in 2009.

Part of the EU funds granted to backward and peripheral regions (the so-called Structural Funds) are also used to finance research investment. However, their deployment is the sole prerogative of national and/or regional governments, the Commission's role being limited to control and accounting. Finally, higher education remains the prerogative of national and/or regional authorities – although there has been some progress outside the formal EU framework through for instance the Bologna agreements on academic degree standards. The result of all this is that, despite the Lisbon growth strategy, innovation and, more broadly speaking, knowledge creation and diffusion does ultimately not play a significant role at the European level. National and regional policy prerogatives remain by and large dominant.

As in other cases, a crisis brings diagnostic clarity. It often highlights already well-known and well studied existing weaknesses. In this case, the crisis raises some fundamental issues with respect to the future of Europe's long term knowledge based growth strategy. In its immediate impact, the crisis has result in severe but temporary reductions in the private funding of research. In the long term it will entail reductions in the amount of national public funding for R&D and higher education in those countries most directly confronted with high deficits and large public debts. The result will be a further widening in productivity growth levels between rich and poor Member States, in particular within the eurozone area, thus exacerbating the fiscal pressures within Eurozone Member States.

II. Re-thinking multi-level governance in knowledge investment

From this perspective the current crisis points to the need to re-think EU and national public support on knowledge. It is time to reflect back on the meaning of subsidiarity within the context of the public support for research, knowledge and innovation diffusion, both from a more "systemic" perspective (section 2.1) and for higher education (section 2.2). We start with the public support for research.

2.1. From reaping allocation and scale economies in production to reaping allocation and scale economies in research

In Europe, and certainly in devastated post-war Western Europe, industrial policy became rapidly one of the cornerstones of economic policy. This resulted from the need felt in many national policy circles, and most notably in those countries most devastated by the war, to support a rapid structural transformation of their economies towards internationally stronger, large industrial sectors (such as the traditional heavy, capital and scale intensive industrial sectors but also the agricultural sector). Later on, with the subsequent GATT rounds of international trade liberalisation, industrial policy became much more dominated by the need to assist the international "adjustment" (as it was called euphemistically) of an increasing number of sectors suffering from increased international competition, from coal and steel mining to more traditional labour-intensive sectors such as clothing and textile. Policies assisted those sectors by providing focused financial support for mergers, job displacement and cross-border integration in the process improving the allocation of capital and labour. Scale and allocation became the driving motive of industrial policy. The economic recession of the early 80s with its rising levels of unemployment, became, however, a major concern for European policy makers in how to sell those policies to the public. A different route based on the same principles of reaping scale economies became the core European goal: the Single Market. Under the auspices of the European Roundtable of Industrialists (created in 1983) the European 1992 Single Market Initiative led to the removal of internal trade barriers. This favoured inter-sectoral shifts in various manufacturing sectors amongst European countries, resulting into increasing European industrial specialisation and increased international competitiveness.

It is in this context that the current EU research policy was born. It was not governments, organized researchers or university organisations which pushed for cross-European cooperation in research. This push came from the multinationals like Siemens, Philips or Fiat. The CEOs of many of those firms pushed the European governments to set up European "Framework Programmes" to finance research. These programmes established common European research themes and financed projects under these lines of research, always implemented through industry-university cooperation across EU borders. Over the years, accompanying the implementation of successive framework programmes (we are currently implementing the 7th Research Framework Program), an expanding set of specific EU industrial and technological policies have been developed (aimed at fostering intra-European cooperation in the field of pre-competitive R&D and the mobility of European researchers and university students), and various technology transfer and local innovation policies have been implemented. These policies have probably been more successful in some of the “big science” areas (Gallison and Hevly, 1992), where essential scale and allocation economies can be achieved and a number of regional high tech clusters can be established[3].

Over the last decade, there has been a further strengthening of European research policy with the creation of the European Research Council (ERC) and the European Institute of Innovation and Technology (EIT), and with the coming into operation of the European Research Area (ERA). These institutional reforms, which have allowed for an increased mobility of researchers and new forms of financial transfers based on portability of research grants, have further strengthened research specialisation and research excellence across Europe.

Most of these latest research and innovation policies, implemented in the context of the so-called Lisbon Agenda, sought to promote the supply of knowledge. The rationale for this can be easily understood. In the spirit of the Lisbon strategy, the European research policy offered scope for institutional reform, searching opportunities for better coordination between Community and Member States’ research policies. Thus, for instance, the creation of the European institutions mentioned above (the ERA, the ERC and the EIT) was intended to improve the European networking between national comparable institutions (such as national research councils, public research agencies and/or applied technology organisations) as

3. One may think of Sophia-Antipolis as the first and probably most well-known case with amongst others, alongside the local University of Nice departments, a local hub of the French national research institute INRIA, European institutions such as the European Telecommunications Standard Institute and the European Research Consortium for Informatics and Mathematics (ERCIM), and the European location of the World Wide Web Consortium (W3C).

well as allowing for greater mobility of researchers across Europe – the so-called "fifth freedom". And admittedly, the gradual transformation of Europe's research system on the supply side has actually been impressive: today there is even a clear tendency within Member States towards further integration of their national research policies in a European framework, through concepts such as the "joint programming" of research. Besides, while EU spending on research, technology and development represents a small fraction of the total public spending on Research and Innovation (RTD) in Europe (as seen in Table 1), it has had over the years a growing leverage effect on national spending, thanks to various initiatives such as the so-called "joint" technology initiatives and research programming. The leverage effect of such initiatives on national R&D support programmes has been substantial. Today European RTD policies either directly or indirectly represent between 10 and 15% of total RTD support in Europe, still a relatively small percentage at the aggregate level, but one that is substantial in particular scientific fields for some Member States. In some areas the EU has been successful in creating new specific RTD frameworks, such in the area of energy technologies and sustainability with the SET plan[4]. The main policy question now is whether further recasting these national frameworks into a European one is a good answer to current public finance challenges and whether other financial instruments could strengthen the leverage not only of Member States' public funds but also of private funds. We come back to these issues in the last section. The underlying conceptual idea of the focus on the supply side of knowledge was, and still is, that such supply-side institutional reforms would feed, and be driven by, broader Single Market achievements. Demand did not really enter into the picture, except for concerns with respect to the emergence of market dominant positions in European high-tech sectors and as a result a possible lack of competition.

4. We do not discuss here the environmental R&D and innovation challenges associated with a green economy. For more in depth discussion on this topic, we refer to David, Huang, Soete and van Zon (2009).

2.2. Higher education as the missing European knowledge dimension

Some fifteen years ago, one of us argued in a joint contribution with Parasvekas Caracostas[5] that a "European innovation system" would be unlikely to emerge. The main argumentation was that some of the sectors considered essential for a well-functioning innovation system are primarily governed by national or regional policy prerogatives. Higher education is the typical case in point.

It is within this framework that the establishment of the European Research Area, proposed by Commissioner Busquin at the Lisbon summit in 2000, corresponded only to a very partial implementation of a European innovation system (that is, a framework geared towards increased research excellence in Europe allowing for increased research collaboration, mobility and ultimately research specialisation in Europe). Viewed in retrospect, the influence of the ERA as a bottom-up process has nevertheless been instrumental in drawing more quickly the contours of a multi-layer European innovation system than we taught at the time could happen. While limited to research, the impact of the ERA upstream has been significant with the simultaneous creation of the notion of European Higher Education Area (EHEA) at a European ministerial meeting in 1992 together with ministers of education from Central Europe in Warsaw, with the gradual harmonisation of degrees and courses (thanks to the Bologna process) and the exchange and mobility of students facilitated by the Erasmus program. Downstream, the European Research Area is leading to the emergence of real European technological hotspots thanks to an increased geographically concentrated research specialisation. It is also pulling together academic and public research institutes, as well as private research and innovation. In contrast to this, the EHEA is desperately seeking new avenues (Ritzen, 2010c).

5. Caracostas and Soete (1997).

But it was only since the November 2005 Hampton Court Summit, under the UK Presidency, that higher education became recognized as the core missing item within knowledge policies aimed at implementing the Lisbon goals strategy. As is enshrined in the EU Treaty, the responsibility for (higher) education rests first and foremost with the Member States. There have however been attempts to move in the opposite direction. The idea to create a European Institution to complement the development of Europe in the field of higher education was considered as far back as the 1940s[6]. In 1955, Hallstein, the German Secretary of State, promoted the development of a full-fledged European University in the context of the Euratom Treaty. However, the concept and its further development was never realized or supported. While there was strong support from the European Parliament, the opposition was stronger, especially in France, where there was a preference to collaborate between existing universities within the then, six Member States. Intergovernmental attempts during the 1960s only led to the decision, in 1969, to participate in a European University Institute formally established in 1972 in Florence (Italy). This Institute is now largely providing PhD training in the fields of economics, social sciences, history, culture and law. Gradually, other six European Institutes of higher education emerged.

One of the first lessons to be drawn from the many attempts to create European institutional solutions for higher education and research is that a rationale to do so was often not apparent. A second lesson is that success is only possible when the legal basis and implementation instruments in the Treaty are coupled with a strong political support. The European Research Council is maybe the first instance where external pressure convinced reluctant ministers and an equally reluctant Commission to create a new institution. The rationale in this case was provided by the success of the US federal funding system. On the contrary, the rationale

6. Largely based on information on website of the European University Institute: http://www.iue.it/About/CreationOfEUI.shtml

for establishing a European Institute of Innovation and Technology turned out to be strong but absence of evidently applicable legal instruments in the Treaty constituted again a serious hurdle (see Tindemans and Soete, 2007). While in the case of the "framework programmes" it was the industrialists which pushed, and the European Research Council (ERC) emerged because of a lack of opposition, EU involvement in higher education was from the beginning of the European integration a bone of contention. This is particularly understandable if one realizes that in Germany education – including higher education – is under the authority of the "*Länder*" (the States, rather than the Federation). How then could Europe play a role? Other major European countries quickly acquiesced in the German position purely for political reasons leaving only space for small scale mobility programmes (the Erasmus programmes). The absence of a truly European area for higher education coincides at present with a relatively small presence of European universities among the world top as measured in different rankings. This indeed is more than a coincidence. A causal link is highly likely.

III. Europe's economic challenges: prioritising knowledge investments now

The current crisis has not just wiped out many years of progress in Europe, both social and economic. It has also questioned the sustainability of European economic integration itself. In particular, the euro-crisis has brought to the forefront the fragility of the Stability and Growth Pact as a credible tool to coordinate fiscal policies within the Eurozone. With the mounting pressures for fiscal austerity and structural reforms across the board and affecting EU countries to different extents, the recovery growth forecast for the coming years remains precarious[7]. A future vision of Europe can no longer be just confined to reaping allocation and scale advantages in new areas (the economic rationale for integration), nor can it be limited to restructure the supply side of Europe's knowledge (research and higher education) and innovation system. While the allocation and scale logic still offers some opportunities for reaping efficiency gains at European level (in particular in services) through further integration, there are increasing

7. See http://ec.europa.eu/economy_finance/eu/forecasts/2010_spring_forecast_en.htm

trade-offs in terms of loss in diversity – in language, in culture but also in macro-economic adjustment and local growth dynamics.

Achieving smart growth depends crucially on a better use of knowledge whatever its origin and whatever its form: it depends on new product and process technologies developed in Europe as well as the systematic re-use and new combinations of knowledge developed elsewhere, across both public and private sectors, in manufacture, agriculture or services, and across borders. Smart growth has to fully take into account the process of globalisation of knowledge accumulation and knowledge diffusion. Globalisation refers to the entry of new players and new countries in knowledge production as well as to the increase in the circulation of knowledge and the mobility of skilled people at the international level among existing and new players. In this sense globalisation leads to an increasing multiplicity of global linkages and interconnections between companies, research organisations, universities and countries, which make up today the globalised R&D system.

These are the issues European countries as well as the European Commission will have to focus upon if strategically opting for a renewed prioritisation of knowledge investments in both national budgets and the post-2013 EU financial perspectives. It will indeed not just be the total amount of public or private R&D investments which will count, but also the way those additional investments are "matched" by strongly needed institutional reforms. Those institutional reforms will have to address a number of major challenges, summarized as follows:

- Research and innovation policies are still developed within a national or (in the case of the EU) European context, while knowledge and investment flows are driven by firms' and individuals' motives which increasingly take place at a global level.

- The Lisbon Strategy was rooted in the idea that the EU's productivity problems were of an internal structural nature[8]. This vision has been challenged by the way new pervasive technologies, such as Information and Communication Technologies (ICT), have broken down the distinctions between high- and low-tech sectors[9]. The new EU challenge is how to deal with the increasing fragmentation of value chains and the increasing heterogeneity of required knowledge inputs. This requires stronger cooperation in R&D with third countries and a stronger focus on the deployment of ICT based technologies.
- Within Europe, the drive towards excellence in research has benefited from Europe's regional cultural diversity and autonomy. At the same time, though, the drive towards excellence demands that no consideration is given to maintaining diversity in terms e.g. of the country or region of origin of the researcher. For countries and regions that are in need of qualified human capital for their own catching up effort, and which are in no position to match the working conditions and real income levels of richer countries or regions, this represents a major problem.
- The financial and economic crisis has further exacerbated some of the structural problems the process of globalisation and the spatial agglomeration of research raise with respect to Europe. The higher fragmentation of European national markets (e.g., in high-tech services) compared to other regions of the world is likely to increase the uncertainty of the expected rate of return to R&D investments in Europe, and represents today an impediment to an increase of private investment in R&D in Europe. In addition to that, the sovereign debt crisis will accentuate the national differences in capacities of public spending on research and innovation.

8. In short: the EU was lagging behind in R&D because of the failure to strongly develop high-tech sectors and knowledge-intensive services.
9. See Snower, D.J., AJG Brown, and C. Merkel (2009).

Because of these growing tensions, European research and innovation policies need to take fully into account the implications of globalisation and spatial agglomeration, and develop institutional solutions addressing some of those tensions. We first address the nature of the knowledge investment target (3.1), and subsequently the spatial agglomeration and social cohesion challenges (3.2).

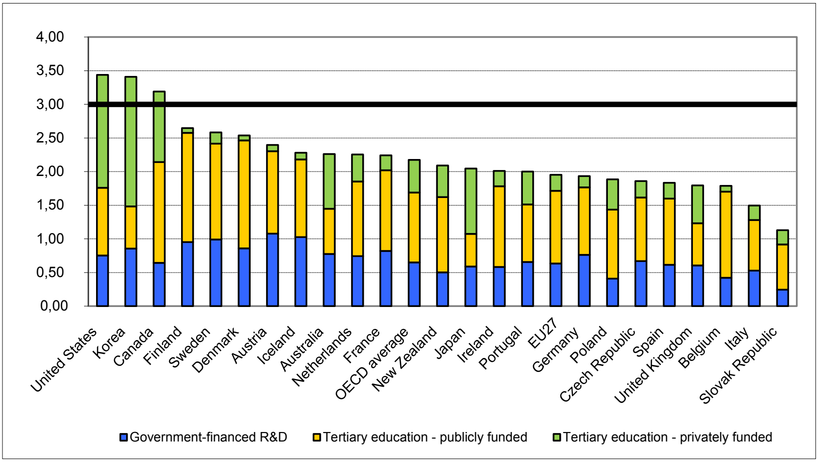
3.1. Towards a new European knowledge investment target

As proposed in the recent Expert Group's Report on the future of the European Research Area[10], a renewed commitment to knowledge investments from all EU Member States in the years to come is in a period of crisis more than ever required. Contrary to the Europe 2020 strategy and the recent Innovation Union flagship initiative, which still focus on the old Barcelona 3% R&D target, such a commitment should address not just R&D but all components of knowledge investments, including higher education and lifelong learning, and the deployment of ICT-based innovations and applications in services[11]. Another difference with the old 3% target is the exclusion of private R&D expenditure. While public commitment and financial efforts can indeed be translated into "input" targets, such as the 2010 Barcelona 1% public R&D funding target or the 2% higher education target[12], business investment should rather be considered as the output of such efforts, as the reflection of the success of a persistent public effort that makes the country or region attractive (and visible) to private knowledge investment. Private R&D investment should thus be considered as an output, performance indicator.

10. See http://ec.europa.eu/research/era/pdf/community_research_policy_role.pdf
11. While US and European firms are more or less similar in R&D intensity "within sectors", they are not similar in the service sector. In services European firms appear particularly R&D adverse.
12. In the latter case based on public or private contributions.

The proposed new 3% investment target consists of public expenditures on R&D (the blue coloured part of the bars in Figure 1) and higher education expenditures, both publicly funded (the orange part of the bars in Figure 1) and privately funded higher education expenditures (the green part of the bars in Figure 1).

Figure 1: Higher education and public knowledge investments as a % of GDP (2008)



Source: Own calculations from OECD, Education at a Glance 2011.

The proposed new 3% target has two clear policy advantages over the previous Barcelona 3% target. First, it focuses directly on what governments and policy makers are directly responsible for. The proposed new 3% knowledge investment target is directly under the control of governments, whether in terms of funding or setting funding rules such as in the case of tuition fees with respect to higher education. It is a target for which governments and policy makers in Member States can hence be held both responsible and accountable for. Second, and as illustrated in Figure 1, none of the EU Member States is close, or likely to come close to this target in the near future.

In political terms the new target thus offers credibility. All countries are being challenged to either find their own public resources to increase such knowledge investments, or alternatively to call upon private resources to invest in individual's future human capital. By leaving the latter to the individual choices of Member States, the target also gives Member States sufficient political freedom to decide how they intend to try to achieve the objectives by 2020.

3.2. Spatial agglomeration and safeguarding social cohesion in Europe

It was noted above that globalisation is having a clear impact on the way R&D investment (especially private) occurs and where it occurs. We also highlighted that there is a logical pattern of concentration of R&D geographically. Within the EU, a challenge along the same lines is that posed by the increasing gap between those countries involved in research and innovation at the knowledge frontier and the laggards that are some way behind. The main concern today is that this gap is likely to increase, spurred by the financial crisis. At the same time, within the Eurozone, real convergence in the peripheral countries will crucially depend on productivity growth and increased knowledge investments in those countries.

The influential Barca report (2009) saw innovation as one of the core priorities within a so-called "place-based approach" to EU cohesion. It called for selecting in each region a limited number of sectors in which innovation could most readily occur and a knowledge base built up. The report argued that policy effectiveness would be achieved "when cohesion policy has been implemented as a coherent part of a national development strategy" (p. 106). At the same time, the report recognised the limits of an exclusively exogenous approach to development: massive injections of EU funds in regional knowledge economies are not enough by themselves. On the contrary, they might well be detrimental. Instead, Barca pleaded for a combined exogenous and endogenous push: the main purpose of cohesion policy is not to redistribute but to trigger institutional change and to break inefficiencies and social exclusion traps through the provision of public goods and services. This triggering of institutional change can come only through "an exogenous public intervention (which) can improve things by upsetting the existing balance. But for this intervention to be effective, it needs to be accompanied by increased local involvement" (p. 40).

The importance of local involvement points to a second major problem in cohesion policies: the lack of knowledge specialisation at national and regional level. The argument goes as follows: if all countries and regions in Europe fight to reach the frontier of science and innovation, the majority will miss the goal. To reach the frontier there are extremely severe conditions in terms of scale, scope and critical mass. As an example, only four US universities account for 15% of the overall career mobility of top worldwide 1 000 scientists in computer science. For countries, regions and institutions that cannot play this game, it would be better to search for a suitable specialisation in the global competitive landscape. It is most likely that this specialisation will take place along applications, exploiting business segments, niches, or markets that require adaptation of general technologies to specific user needs, so-called "smart specialisation" (Foray and Van Ark, 2007; Foray, David and Hall, 2009). This framework suggests strategies that can be pursued with advantage both by regions that are at the scientific and technological frontier and by those that are less advanced. While the leader regions invest in the invention of a General Purpose Technology (GPT) or the combination of different GPTs (e.g. bioinformatics), follower regions often are better advised to invest in the "co-invention of applications" – that is the development of the applications of a GPT in one or several important domains of the regional economy. Some examples would be biotechnology applied to the exploitation of maritime resources; nanotechnology applied to the wine quality control, fishing, cheese and olive oil industries; information technology applied to the management of knowledge about the maintenance of archaeological and historical patrimonies. By so doing, the follower regions and the firms within them become part of a realistic and practicable competitive environment – defining an arena of competition in which the players are more symmetrically endowed, and a viable market niche can be created that will not be quickly exposed to the entry of larger external competitors. The human capacities and resources formed by the region, thanks in particular to its higher education, professional training and research programmes, will constitute "co-specialised assets" – in other words the regions and their assets have mutual needs and attraction for one other – which accordingly reduces the risk of seeing these resources go elsewhere.

Smart specialisation should not be associated with a strategy of specialisation of say Greece, for instance in tourism. What smart specialisation rather suggests is to specialize in the co-invention of ICTs application in the sector of tourism. Smart specialisation deals with R&D and innovation specialisation. The current financial crisis, certainly in the Eurozone countries, brings to the forefront the question of "how to specialize or what specialisation to go for?" in regions/countries that are not leading in any science and technology fields. These regions/countries have to increase their intensity of knowledge investments and intangible capital in the form of high education and vocational training, public and private R&D and other innovation activities assets. The question is whether there is something better to do than investing a little in biotechnology, in information technology, in nanotechnology. Is there a better strategy than being subcritical and inefficient in allocating resources to fields in which one will always be a laggard? How should one position oneself in the knowledge economy?

For Europe, with its multitude of still highly fragmented layers of governance and sub-critical institutions, it is actually essential that the ongoing process of knowledge accumulation leads to regional smart specialisation. This is a process that avoids the problems of "locational tournament" competition amongst regions developing many, similar knowledge peaks. The basis of such regional peaks should be sufficiently large and locally "deeply" integrated (Veugelers and Mrak, 2009). There is a great deal of differentiation amongst the EU countries in terms of R&D specialisation profiles. Typically, countries tend to be more specialised in terms of technology than in terms of science. The most striking pattern is often the lack of parallelism between public and private sectors as far as the structure of the respective knowledge bases are concerned. There is a need for mechanisms creating new network opportunities – private-public partnerships and programmes that bring together the better performing segments of the public sector in an attempt to relax and unblock binding constraints on regional growth. The focus should be on missing connections which, once established, are likely to have synergetic and increasing effects. One may think of examples such as the Basel area, Oresund (Denmark, Sweden), Lyon, Louvain or Munich where substantial private investments are made in applied research and infrastructure in combination with public research and focused higher education within an overall framework in which entrepreneurs seek to create new, innovative business opportunities.

This new perspective recognizes that growth constraints are never general and generic, but are most often locally specific. In Barca's words, "design of integrated interventions must be tailored to places, since it largely depends on the knowledge and preferences of people living in it" (p. 6). If binding constraints are local and require a specific approach, policy must focus on local knowledge. The policy process becomes a learning activity in itself (Radosevic, 1997: 192). Such policy goals are in any case better implemented if the principle of conditionality is adopted on a large scale. Conditionality means introducing a regional policy framework that makes financial support from the European Union Structural Funds conditional on a number of achievements on the part of those receiving the resources[13]. The basic idea is that, in order to build on learning about local conditions for growth, it is essential that actors share policy risks (research and innovation policies are by nature subject to uncertainty and risk). Doing so, the policymaker provides strong incentives to those actors that have the best available knowledge on how to reach results, while discouraging opportunism and rent extraction. In this way the burden of risk is placed on the shoulders of those that have the best local knowledge, combined with the best global or "engineering" knowledge on policy implementation.

13. The idea of conditionality traces its origin to the idea of performance requirements as exemplified in development economics through the analysis amongst others of Korea's industrial policy by Chang (1993) and by the World Bank in its *East Asian Miracle* study (1993). At the European level it has been taken on board by the Barca Report on the basis of a contribution by Bonaccorsi (2009).

IV. Looking forward: A "layered" European innovation system by means of changes in regulation and finance

Over the past twenty years or so, a major shift occurred in one's understanding of the relationships between industrial research, innovation, (university) education and socio-economic development. Sectoral explanations as those highlighted in section 1, which focused almost unilaterally on the supply side, have clearly lost policy influence. Instead, it has become widely recognised that economic growth is founded on a broader, well-functioning "knowledge and innovation system" in which the performance of all actors is crucial.

The concept of National (or Regional) Innovation System emerged in the late 80s and was coined to describe the many "elements and relationships which interact in the production, diffusion and use of new, and economically useful, knowledge... and are either located within or rooted inside the borders of a nation State" (Lundvall, 1992). It clearly puts the emphasis away from the sectoral dimension towards the broader national (or regional) institutional framework within which firms and other organisations operate and which appears of crucial importance to the speed, extent and success by which innovations get introduced and diffused in the economy.

As highlighted elsewhere by one of us (Soete, 2005), at the outset four essential factors predetermine the well functioning of a "national" (or regional) system of innovation:

- The investment in social and human capital is the cement, one may argue, that holds the knowledge and innovation systems together. It is incorporated in a number of knowledge-generating institutions in the public as well as the private sector, such as universities, polytechnics and other skills' training schools. Higher education is crucial to continuously feed fundamental and applied research. An initial stock of human capital in a previous period is likely to generate innovation growth and productivity effects, downstream as well as upstream with lots of "spill-overs" and positive "externalities", affecting other firms, regions and countries[14].
- The second central element is the research capacity of a country or region and the way it is closely intertwined with the country's higher education system. Such close interaction appears important from a typical "national" (or regional) innovation system perspective. From an international perspective the links are likely to be much looser, with universities and research institutions being capable of attracting talent worldwide.

  In many technology-driven growth models, these two first supply-based nodes form the essential "dynamo effects" (Dosi, 1988) or "yeast" and "mushroom" effects (Harberger, 1998) implicit in the notion of technological change. Knowledge and human capital act like yeast to increase productivity relatively evenly across the

14. This role of education in continuously generating, replacing and feeding new technology and innovation has received much more emphasis over the last decade, with the development of "new growth" models in the economics literature.

economy, while other factors such as a technological breakthrough or discovery suddenly mushroom to increase productivity more dramatically in some sectors than others.

- The third "node" holding knowledge together within the framework of a national (or regional) system of innovation is, maybe surprisingly, geographical proximity. The regional clustering of industrial activities based on the close interactions between suppliers and users, involving learning networks of various sorts between firms and between public and private players, represents often a more flexible and dynamic organisational set-up than the organisation of such learning activities confined within the contours of individual firms. Regional or local learning networks allow for much more intensive information flows, mutual learning and economies of scale amongst firms, private and public knowledge institutions and education establishments[15].
- Finally, the fourth and last notion essential to any innovation system approach is the "absorptive capacity" of agents (firms, clients, consumers, government services) in a particular region or country. The ability of companies to learn will of course in first instance depend on their internal capabilities represented by the number and level of scientifically and technologically qualified staff. Firms must do enough R&D to be economically dynamic and to have the "absorptive capacity" to conduct a professional dialogue with the public research sector and other external sources of knowledge. At the same time, consumers, clients, and citizens might be very open to new designs, products, even ideas, enabling rapid diffusion of such new products created by R&D in knowledge-intensive sectors,

15. In a well-known study Putnam (2000) compares the impact of Silicon Valley and Route 128 in the US. He cites Silicon Valley in California where a group of entrepreneurs, helped by research effort in the local universities, contributed to the development of a world centre of advanced technology. As he puts it: "The success is due largely to the horizontal networks of informal and formal cooperation that developed among fledgling companies in the area". By contrast, in the Route 128 corridor outside Boston, lack of inter-firm social capital led to a more traditional form of corporate hierarchy, secrecy, self-sufficiency, and territoriality. The comparison shows that the innovativeness and technological performance of firms strongly depends on close interaction between them.

or very conservative, resistant to change and suspicious of novelty. The absorptive capacity amongst countries, regions, even suburbs, varies dramatically.

From this systemic perspective, the core European challenge is that the governance mode for each of these four key nodes has historically grown in totally different directions. The remaining of this section is devoted to put forward proposals to develop a real and effective European Higher Education Area (section 4.1) to improve action on research (section 4.2).

4.1. Creating a real and effective European Higher Education Area

As seen in section 1, higher education has remained first and foremost a nationally organized and funded activity even though the curricula, the evaluation and accreditation of an increasing number of study fields became internationally organised. Over the last decades students in Europe and beyond have become partially mobile thanks to the Erasmus programmes and the Bologna reforms, which have made the study load involved in courses and degrees more transparent thanks to the allocation of a common framework of study points. Yet, student mobility has remained low with the exception of the inflow of students in the UK and Ireland, and this despite the fact that foreign students are limited in terms of admissions only in a couple of Member States (Austria-Germany, Flanders-The Netherlands, Wallonia-France). This low level of mobility is explained by the existence of language barriers, the huge perception costs of knowing the value of education abroad as well as the acceptance of study abroad on the national labour market. In addition to that, there is the fact that study grants and loans remain by and large linked to study in the home country. However, masters' studies are increasingly been taught in English in the "war for talent" (Chambers *et al.*, 1998) across European universities, and the Bologna reforms here has reduced perception costs somewhat. Overall, though, the dominance of national students in higher education is such that national governments (or regional governments in those federal Member States where higher education is governed at the regional level) are likely to remain in control both in terms of administering as well as in terms of financing. This being said, it is clear that higher education reforms in Europe are absolutely crucial.

A European Higher Education Area would provide an upward quality spiral of competition between universities across borders and promote mobility beyond the very low current levels.

Today, the rationale for a full empowerment of universities within the European space is particularly strong (Ritzen, 2010b). As we highlighted above, in order to have the innovation power to be globally competitive (Ritzen, 2010a) the subsequent European Framework Programmes, the European Science Foundation, the European Research Council and the European Institute of Technology were forceful instruments of change in making Europe more competitive on the research side. On the teaching side, though, progress has been less notable, and this despite “Bologna”, the Erasmus program, Erasmus Mundus and other such programmes. It is time hence for some more radical proposals, as put forward in the empowerment of European universities “manifesto” (Ritzen, 2010b).

One of these proposals is the creation of a European Statute (Ritzen, 2010c) for universities in Europe. Under such a scheme, around 10% of the universities of individual member countries of the EU would be governed and financed through European funds and by EU legislation by 2020. Such a statute would increase student mobility and make cooperation between universities operating under the statute far more simple.

Many European universities have noticed that the transaction costs of joint degrees are exceedingly high, because of the requirements of two or more different legal systems governing higher education. It is an illustration of the desperate need for change in European universities that despite these difficulties so many good applications were made for Erasmus Mundus support for joint masters and PhD programmes.

A European Statute could make it easy to work together across boundaries for those universities selected to participate in this scheme. These universities would be drivers of competition between universities in Europe. Presumably, the quality of their graduates on the European labor market would stand out. This would translate into more interest on the part of potential students to study at a European university, forcing national universities to upgrade their offering. Of course, universities which operate under a European Statute would still be eligible to apply for research grants from the national organisations in the countries in which they are located and continue to receive the base financing for research and for education in those countries. Yet the recurrent financing of students should come from the EU level.

A second avenue could be to reward countries if their universities are able to attract students from other EU countries, in such a way that a net inflow of foreign EU students would be compensated for through European funds. This would give rise to more competition between European universities with an upward quality spiral.

The compensation of the net inflow of foreign EU students in EU countries through Structural Funds could be implemented simultaneously to the creation of a European Statute for universities. In several European countries, there is now some anxiety over the number of foreign EU students, paid by the taxpayers of the country concerned. The Copenhagen Agreement of 1992 was based on the principle of money following the students, but also on the practice of "closed wallets" (no charges from one country on another for individual students or groups of students, assuming a balance in the amount of cross-charges). This was decided at a time when student mobility within the EU was very low. Fortunately, mobility has increased somewhat; too little, but sufficient for imbalances to be noticed, with the dangerous undercurrent appearing where some countries would like to restrict inward student mobility. This would give rise to a downward spiral: a breakdown of the European Higher Education Area before it had even outgrown its infancy. Compensation of the net inflow of foreign EU students in EU countries through Structural Funds could be a solution. This would "reward" the attractiveness of countries for students from other EU countries. It would, at the same time, encourage the use of Structural Funds to upgrade the quality of higher education in the EU countries which see large numbers of their students leave to study elsewhere in Europe. It would – in short – be an upward quality spiral.

These different proposals should have as final goal to increase higher education student mobility needs to the 20% level "promised" in the Bologna agreements. This cannot be accomplished by the Erasmus programmes: they have reached a saturation point because of the limited fit of the stay abroad in the curriculum. Joint degrees are a possibility for expansion of mobility, but suffer from tremendous overhead costs because of the different legal frameworks of countries. A European Statute would be a solution.

Finally, it is important to take into account that the financial conflicts in higher education can only be taken away by providing more leeway for tuition fees. However difficult this is politically, it is essential that this should be envisaged for Europe to prosper, in such a way that student loans and grants continue to provide equality and opportunity.

4.2. Exploiting the economies of scale and the benefits of better cooperation in research

Public research should be governed in a more straightforward way at a supra-national, European level. There are clear disadvantages of small scale in many public research areas. The current existence of a European Research Council (ERC), next to 27 individual national research councils[16], each limited in their research calling, selection of submitted proposals and the granting of research funds to their respective national geographical boundaries, is not very efficient to say the least.

Research excellence is heavily dependent on scale: the European scale seems to be the most logical scale for most publicly funded research activities, for reducing the costs in selecting and evaluating research proposals and for enabling high quality research specialisation. The flurry today of individual EU countries' plans for achieving research excellence provides the perfect example of a "locational tournament" in Europe of inefficient public research allocation[17]. The normative claim could be made here that European research policy should ultimately evolve into a Common Research Policy, similar to the Common Agricultural Policy governed at the level of the EU and no longer at the level of Members States. From this perspective, it is interesting to note that research integration had been historically considered as one of the core areas for European integration at the time of the early days of the European Carbon and Steel Community (ECSC).

Applied research, technology transfer, the use and re-use of technology from elsewhere as well as innovation and entrepreneurship have by contrast a strong regional and local focus. One of the core problems of the

16. In countries such as Belgium, there are regional research councils. There are in other words even more than 27 "national" research councils in Europe.
17. Every Member State has today some national research programme promoting research excellence: see e.g. the German Science Council's Excellence Initiative (www.excellence-initiative.com), or the Dutch NWO Veni, Vidi, Vici programme or the "*investissements d'avenir : initiatives d'excellences*" in France.

"locational tournament" tendencies amongst competing regions in public research excellence is to some extent the lack of local anchorage of many of such public policy initiatives. It is what Foray describes as the "innovate here, benefit elsewhere" pattern characteristic of poorly locally integrated regional innovation policies. Though regions are likely to lack the capa cities to design the sort of "smart" innovation policies discussed above. Would Europe be able to play this role?

Finally the difference in the assimilation of knowledge across European countries and regions is most closely related to national macro-economic policies as reflected in the quality of Member States' budgets rather than just the Stability and Growth Pact's quantitative targets.

Here we plead for a layered EU innovation system, by means of changes in regulation and in finance. It is layered in this sense that we would propose a devolution of finance from national sources "upward" (towards the EU) and "downwards" (towards (inter)regions).

Our main emphasis is on regulation. There are too many examples of bottlenecks in cooperation in research and teaching between European countries; there are too few examples of cross-border cooperation in (national) research themes. It is a long list of items where Europe could exploit the benefits of better co-ordination:

- In social security and pension provision, Europe should quickly come with a European agreement to allow seamless mobility of European researchers across borders;
- In research excellence programmes, individual EU country programmes should be carried over either to the ERC or to a sub-ERC working for a limited number of countries: To have next to the ERC similar national excellence research programmes points to a sigificant amount of overlap;

- Gradually, national research themes should be brought in the domain of bi-national or multinational programmes finally to emerge on the EU level. The present splintered approach (almost every EU country has a programme on bio-informatics or logistics, for example) is highly inefficient;
- A merging of national science foundations would be highly stimulating for EU research efforts.

Apart from these regulatory items, there is a need for re-thinking the logic of EU spending on R&D.

- First, by shifting finance flows. In particular, it is essential to increase the public outlays for research by shifting resources away from agriculture towards innovation and by using new (private) financing arrangements for research.
- Second, by increasing the leverage impact of EU public funding support on private knowledge and innovation investments. At present, the European R&D and innovation budget (as well as most national R&D budgets) are primarily encapsulated within a multi-annual grant provision system under the Framework Programmes (FP). While substantial in volume – FP7 amounts to € 50 billion, the programme proposed for the period 2014-2020 ("Horizon 2020") foresees € 80 billion – it remains small compared to the total amount of national research budgets.
- Third, until now the main purpose of European policies has been to increase the leverage of such EU funding on national public research budgets. Many of the new initiatives under the heading of "joint" technology initiatives and research programming have contributed to increasing such leverage. However, the main policy question in a fiscal crisis period such as the current one, should not be whether the R&D support system of the Framework Programme could have a higher leverage on national public R&D funding but how it could be

more efficient (driving a higher quality and more specialisation) and have a higher leverage on private funding: national or European.

- Fourth, currently, the EU uses alternative funding instruments to a very limited extent. The Risk-Sharing Finance Facility (RSFF) from the European Investment Bank (EIB) for instance represents the first "European scale programme" which uses debt-based finance to complement the more traditional FP7 grant financing for Research Development and Innovation (RDI)[18]. As a debt-based finance facility for RDI, the RSFF is also (in contrast to RDI grants and/or subsidies) first and foremost a demand-led instrument. The public RSFF funds complement first and foremost other sources of debt capital available for low to sub-investment grade RDI intensive entities, including large as well as small and medium-sized enterprises (SMEs), research infrastructures and universities and other public research institutions. In all cases, RSFF concerns companies, institutions or projects mature enough to demonstrate a clear capacity to repay debt on the basis of a credible business plan. Based on its own financial evaluation, the EIB assesses the level of financial risks and decides the value of the provision and capital allocation (for expected and unexpected loss)[19]. Viewed in retrospect, the establishment of the RSFF was well-timed and its success actually greatly enhanced by the financial crisis. RSFF, which was originally designed as a demand-led, debt financing based programme for high risk activities such as RDI, suddenly appeared a particularly welcome risk crisis instrument greatly "facilitating" access to private finance for R&D intensive companies in Europe at a moment

18. The risk-sharing feature refers to the sharing of risks between the EU and the European Investment Bank (EIB). The RSFF was established on June 5th, 2007, through a co-operation agreement between the EU and the EIB. The origins of the RSFF go back to discussions at the beginning of the 2000s with the Lisbon declaration and the ensuing internal discussions at both EU and EIB level on how the broad Lisbon strategic goals could be implemented.
19. The mid-term evaluation of the RSFF, which has only been operational for three years, highlights that the leverage effect of RSFF loans has been substantial. In this sense the facility appears institutionally well designed. The leverage on private funding achieved so far reached a factor of 14, triggering some € 16.2 billion of investments in RDI in Europe.

when banks were becoming hesitant in taking on board such risky investments on their own[20].

20. The RSFF had been set up with the aim to create additional financing capacity in Europe of up to € 10 bn. in support of RDI in all sectors covered by the Framework Programme 7 (FP7) and covering all Member States. Both the EIB and the EU capital contributions at € 1 bn. each to the RSFF underpin the risk. The EIB contribution to the RSFF comes out of the Bank's own reserves; the EU contribution comes out of the FP7.

Conclusion

Crises are periods of structural change: of creative destruction both at the level of sectors and of firms, but also of the reform and transformation of failing institutional set-ups. Europe is and will continue to be a laboratory for institutional experimentation. In the area of knowledge investments, we are still in the early phases of experimentation and understanding the welfare dynamics of “knowledge” integration. We have been and are still experimenting with new European institutions operating complementary to, but increasingly overshadowing national institutions. They have been set up with the idea to address research fragmentation, a lack of research excellence in many Member States, growing but still low research mobility, and a perceived unsatisfactory innovation performance compared to the US. As we have argued here, the reform of European higher education systems has been the missing element in this supply-based portfolio of knowledge institutions.

The crisis should spur the EU efforts to quicken its pace along this route. However, in political reality, the crisis has challenged the financing of this European experimentation. The pressures for “budget austerity” Member States are currently confronted with have stalled the political willingness for increased European budget experimentation in the area of knowledge investment in the short run. And yet, it is high time for a more radical reform of national and European policies in the area of research, knowledge and innovation systems and higher education. That reform, as argued here, should start from a number of relatively straightforward policy subsidiarity arguments:

- Member States should transfer a large part of the public funding of fundamental, basic and applied research from their National Research Councils to the European Research Council. Research excellence is heavily dependent on scale: the European scale is a much more efficient scale for selecting the best research proposals, for reducing the costs in evaluating proposals and ultimately for enabling high quality research specialisation. Borders are a major limiting factor here. It is urgent to create a Common Research Policy similar to the Common Agricultural Policy, governed and financed at the level of the EU. It is national budgetary austerity which could be the driving factor here with the European budget becoming the absorber. European fiscal austerity in line with Member States’ fiscal austerity would have a particularly negative impact on Europe’s future knowledge economy.
- The difference in the assimilation of knowledge across European countries and regions appears closely related to national budgetary policies. In particular, they reflect differences in the quality of Member States’ budgets as well as in their knowledge policies rather than differences in how well do countries stick to the Growth and Stability Pact’s quantitative targets. The issue is not here one of

budgetary austerity at the EU or Member States' level, but one of raising the leverage impact of public funding support for private knowledge and innovation investments at both levels.

- Higher education has remained first and foremost a nationally organized and funded activity. In this respect, it has become the weak link in Europe's knowledge and innovation system. There is today an urgent need for mission differentiation within higher education, along with differentiation of strategies, improved governance and financial arrangements. Much of today's diversity is stuck, however, in European regional or national contexts. Increased differentiation is needed in order to integrate the full spectrum of students who aspire to an adequate participation on an international labour market in the emerging innovation society. This includes a substantial part of presently untapped talent, like underrepresented groups and life-long learners. But European universities must also become more attractive to the best and brightest worldwide in order to maintain Europe's competitive position in a globalising world. They need to become much more international. This means attracting more students and researchers from Europe itself, but also from other parts of the world. Education should be based on effective learning and geared towards problem solving, preparing them for a global labour market embedded in responsibility for a sustainable future. The development of broad, general education in the introductory part of renovated curricula has the potential to enhance cultural awareness and democratic citizenship among students. Universities themselves need to develop a stronger culture of placement, a sense of responsibility for the destiny of their students in society and in the labour market. In short, European universities should train for globalised leadership.
- Europe is too much bogged down in discussions on institutional arrangements taking place between Heads of State. The European Parliament could lead the way to provide the entrance to institu-

tional arrangements in research, innovation and higher education which do create a European Research Council (ERC) and a European Higher Education Area (EHEA) in such a way that a robust growth effect occurs in the order of magnitude of 1-2% per year – the traditional arrears to US growth in the 90s and early part of the 2000s.

Despite the many concerns about Europe's future integration process expressed in this paper, these are exciting times. These are times for stronger policy emphasis on knowledge investments in the current crisis period which might offer new opportunities to address in a more radical fashion some of Europe's major structural weaknesses in R&D, in innovation and in higher education. These are times for the search of a new division of labour between Member States and the European Commission in designing and implementing policies. These are times for using alternative funding instruments more appropriate in terms of budgetary austerity, and calling on the large amount of private savings which Europe's ageing population is in need of finding interesting investments for.

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Competition, Cooperation, Solidarity

Research, Higher Education and Innovation: Redesigning European Governance in a Period of Crisis

The negotiations about the EU budget after 2013 cannot ignore austerity concerns. However, due to its limited size, we cannot expect major savings from applying austerity at the EU-level. A more intelligent response to the austerity challenge is to look at ways to make savings by better coordinating EU and national-level spending or by re-organising spending tasks. To explore these potentialities for efficiency gains, *Notre Europe* launched a set of publications under the title "How to spend better together", which contains both transversal and sector-focused analysis.

In this context, and at a moment when many EU countries are faced with serious budget constraints as a result of the crisis, this Policy Paper by Jo Ritzen and Luc Soete discusses ways to improve the EU action on research, innovation and higher education ("knowledge investments"). It also underlines that it is essential to re-think the division of labour between the EU, the national governments and the regions in these sectors but also to re-define EU and national support to knowledge investments in order to better respond to the challenges of globalisation and the spatial agglomeration of research, which have been exacerbated by the financial and economic crisis. The authors conclude by putting forward some proposals to advance towards the development of an efficient "layered" European innovation system through new regulations and finances.

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