Research, higher education and innovation: redesigning multi-level governance within Europe in a period of crisis[1]

Jo Ritzen and Luc Soete
October 2011

(UNU-MERIT, Maastricht University)

Introduction

Europe is in many ways at a cross-road trying to find its way as a continent in a rapidly changing global environment where individual large European countries are losing quickly their status as world power. The Lisbon goals of 2000 were an exhortation of European Heads of States to retain a vibrant Europe after the success of the Maastricht Treaty in 1992 to come together in monetary affairs as a means to strengthen economic integration. The Lisbon Treaty of 2009 should have reinforced the internal structure and the external representation (foreign affairs) of the Union. However, the recent, relative absence of Europe in the up rise in the Arab world representing another democratic fall of a wall, 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 future competitiveness: ***innovation*** based on sound research and higher education policies in the current period of serious budget deficits which many EU countries are faced with 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 in this period of considerable financial restraint on the part of EU governments. In particular we focus on the division of labour between the EU, Member States (MS) and regions. 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, particularly in Europe but also in China, India, Brazil and many other emerging countries, of the need to address the knowledge "gap" with the scientific and technologically leading country in the world: the United States. It was e.g. the awareness of Europe's falling behind in knowledge creation and knowledge diffusion, which induced the European heads of state to set in March 2000, the objective at the Lisbon summit to become the most competitive and dynamic knowledge economy in the world by 2010. This objective was reconfirmed in Barcelona in the spring of 2002. European countries would aim to spend 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 university-education and -research as the new medicine for Europe's lagging economic growth performance. In some respect this seems to be in contrast to the relatively good performance of many European countries in innovation performance according to the "innovation-index". However, it is evident that

[1] This paper has benefitted greatly from the comments of Amélie Barbier and Eulalia Rubio.

the current low level of economic growth in combination with the sluggish efforts of national governments in research and university education are predictors of a much worse performance of Europe in the "innovation-index" some 5-10 years from now.

At the same time, the coming years will be very much dominated by the way Europe and its MS can find the room for manoeuvre within the European budgetary framework, and in particular the forthcoming negotiations surrounding the post 2013 financial perspectives, and national budgets for such additional efforts in knowledge investment. The coming decade raises some fundamental issues as to the sustainability of public finance in Europe. On the one hand, the financial crisis is today severely constraining member states' future public spending 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 the public debt has risen dramatically in many member states, with rising interest rates as a future time bomb hanging over national public spending. Budgetary austerity has become in other words the dominant economic policy paradigm. In this paper we address this public austerity debate within the context of knowledge investments and innovation in particular. If (some) countries are not in a position to increase spending on knowledge investment in the coming years, are there scenarios possible 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 programs covering R and 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: to the entrepreneurs which seek new opportunities through innovation.

The structure of the paper is as follows. We first provide a brief historical overview of the origins of research policy in Europe, a history which goes back some fifty years and is closely linked to the emergence of industrial policies as means to enhance structural reform and economic integration. Second, we give our vision for investments in research and higher education ("knowledge investments") for economic growth and hence also for solving many of the "big challenges" Europe is being confronted with already today but increasingly so in the coming years. That includes "real" challenges such as ageing, climate change, renewable energy use, urbanization, etc. but also some of 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. ,Third, we fit out our vision onto thehistory to derive a perspective on how our vision could be transferred in budgetary and regulatory terms according to an optimum interplay between the EU, member states and regions (section 3). Finally we draw some conclusions.

1. Europe's recent history in knowledge investments

Ten years after Lisbon, the decade of the Lisbon knowledge strategy appears in retrospect more of a lost decade. Despite an overall real European economic achievement of growth convergence between European Member States (MS), none of the ambitious Lisbon knowledge targets were achieved. The recent crisis, which originated outside of Europe, has hit Europe particularly hard - in

contrast to countries such as China, India or even Brazil[2]. 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 a possible new phase in European economic integration which seems to become 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 programs with local public funds.

From a real 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 the way the crisis hit some Member States more than others highlights this in a striking way.

The European integration process of the last 50 years appears to have focused mostly on capital, money and labour, where research and higher education as supply factors for innovation played a marginal role. With respect to capital, the Single Market, and broadly in line with the origins of the Economic Commission for Coal and Steel, focused primarily on achieving European scale advantages linked to energy (coal) and capital (steel), considered in the 50's and 60's of the last Century as strategic production. It paved the way for an integration process with as common economic aim the reduction of barriers to trade. Consumers benefited from cheaper prices and from enlarged product choices. The large Single Market became the economic foundation for the European Union, laying the basis of reaping the allocation and economic scale advantages of the growing size of the EU in manufacturing and agriculture, very much in line with the predictions from economic growth models like the Solow model which highlighted 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[3]. Thus, migration flows across the EU played, contrary to expectations, 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 90's, 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.

But the factor where the least progress was made at the level of European integration was knowledge in its different forms. National policies with respect to R&D, patents and licensing, policies aimed at attracting foreign direct investment, the regulation of telecoms, the Internet and more broadly the use of ICT, all remained first and foremost governed by national member states policies and concerns. With respect to RTD support policies, only 5% or so of the total amount of public funding[4] for RTD came from the European Union, an amount of funding which the EC was

[2] See, for instance, the "Emerging Markets" column in the Economist, 23 October 2008.
[3] 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.
[4] See the different EU surveys of R&D investment produced by DG Research/Joint Research Centre (EU, 2009).

entitled to distribute through its various research network policies (Framework Programmes, etc.). The remaining 95% was governed through national RTD policies. At the same time the structural, so-called cohesion funds – the EU funds granted to backward and peripheral regions in the Union, some of which are used to finance research investment- became in their execution the sole prerogative of national and/or regional governments. The Commission's role was limited to control and accounting. Finally, higher education remained the prerogative of national and/or regional governments: progress occurred primarily outside of the formal EU framework such as in the case of the Bologna agreements on degree reforms. The result of all this was that, contrary to the Lisbon growth strategy, innovation and, more broadly speaking, knowledge creation and diffusion did ultimately not play any significant role at the European level in enhancing European growth dynamics. National and regional policy prerogatives remained by and large dominant.

As in other cases, a crisis brings diagnostic clarity. It highlights often 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 resulted in severe but temporary reductions in the private funding of research; in the longer terms it is reflected in reductions in the national public funding of R&D and higher education in those countries most directly confronted with major fiscal deficits and large sovereign debts. The long term 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 euro-zone member states..

From this perspective the current financial crisis points to the need to re-think EU and national public spending on knowledge. It is a time to reflect back on the meaning of subsidiarity between the EC and MS within the context of the public support for research, knowledge and innovation diffusion from a more "systemic" perspective (section 1a) and for higher education (section 1b). We start with the public support for research.

1a 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 corner stones of economic policy with the need felt in many national policy circles, and most notably in those economies which had been most devastated by the war, to support a more rapid structural transformation of their economies towards internationally stronger, large industrial sectors and complexes. Quite rapidly, it included alongside the traditional heavy, capital and scale intensive industrial sectors such as coal and steel mining – the European Coal and Steel Community , created in Paris in 1952 and dismantled (formally integrated in the EC) in 2001) also the agricultural sector with the development of national, and in the case of Europe, a Common Agricultural Policy. Over time 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. From the old coal and steel mining sectors to more traditional labour intensive sectors suffering from increased international competition, such as clothing and textiles. 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 80's 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 Europe 1992 Single Market Initiative, resulting in the removal of internal trade barriers, led to a further inter-sectoral shift in various manufacturing sectors amongst European countries and, as a consequence, European industrial specialisation and increased international competitiveness. In many ways, this implies a recognition of the virtues of a European as opposed to a national industrial policy.

It was not governments or organized researchers or university organizations which pushed for cross-European cooperation in research. This push came from the multinationals like Siemens, Philips but also FIAT. The CEO's of many of those firms organized themselves to push European countries towards "Framework Programmes": common European research themes, financed by European money and always implemented in industry-university cooperation across EC borders. Over the years and accompanying the implementation of these framework programmes (currently FP7), an expanding set of specific European industrial and technological policies, fostering intra-European cooperation in the field of pre-competitive R&D, mobility of European researchers and university students, and various technology transfer and local innovation policies have been implemented. These policies, which started from industrial policy concerns aimed at strengthening European competitiveness in high-tech sectors, have probably been most successful in some of the "big science" (Gallison and Hevly, 1992) Research, Technology and Development (RTD) areas, where essential scale and allocation economies could be achieved and a number of regional high tech clusters could be established[5]. The further strengthening of European research policy over the last decade with amongst others the creation of the European Research Council (ERC), the European Institute of Innovation and Technology (IIT), and more generally the coming into operation of a European Research Area (ERA) – which allows for increased mobility of researchers and new forms of financial transfers based on portability of research grants - further strengthened the emergence of 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. European research policy offered, in the spirit of the Lisbon agenda, scope for institutional reform, searching for opportunities for better coordination between Community and Member States' research policies. One may think in particular of the creation, over the last decade of the new European concepts and institutions mentioned above such as the ERA, the ERC and the EIT. Their creation aimed at improving the European networking between the national comparable institutions (such as the national research councils, the public research and/or applied technology organisations) and at 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: there is today even a clear tendency within Member States

[5] 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).

towards further integration of their national research policies in a European framework through concepts such as the "joint programming" of research. Furthermore, while EU RTD support policies currently represent only a small fraction of most national RTD support policies in volume terms, they have over the years had a growing leverage effect on national policies through various initiatives such as the so-called "joint" technology initiatives and research programming. The leverage effect on national R&D support programmes of such initiatives 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 or for some member states. In some areas such as energy technologies and sustainability, the EC has been successful in creating new RTD frameworks such as the SET plan[6]. The main policy question is now what the implications are for recasting further those national frameworks into a European one for present 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 this issue 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 the picture, except for concerns with respect to the possible emergence in European high-tech sectors of market dominance and as a result a possible lack of competition.

1b Higher education as the missing European knowledge dimension

Elsewhere, one of us argued in a joint contribution with Parasvekas Caracostas some 15 years ago[7], that a "European innovation system" would be unlikely to emerge within the EU. The main argumentation was that some of the institutions which could be considered essential for a well-functioning innovation system would be primarily governed by purely national or regional policy prerogatives. Higher education would be the typical case in point. It is within this framework that the establishment of the ERA, as originally 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 specialization 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 a European Higher Education Area (EHEA) at a European Community Ministerial meeting in 1992, together with ministers of education from Central Europe in Warsaw, with the gradual harmonisation of degrees and courses and the exchange of students. The Bologna declaration has advanced this process without a special role for the EU or the European Commission. Downstream the ERA is leadingto the emergence of real European technological hotspots , through an increased geographically concentrated research specialisation, and pulling together academic and public research institutes, as well as private research and innovation. In contrast, the EHEA is desperately seeking new avenues (Ritzen, 2010c).

[6] 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).
[7] 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 with in some countries even a further devolution of responsibilities for institutes of higher education to regions. There have however, been attempts to move in the opposite direction in both higher education and research. 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[8]. 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, 6 member states. Intergovernmental attempts during the 1960s only led to the decision, in 1969, to participate in a European University Institute which was formally established in 1972 at Florence, Italy. This Institute is now largely providing PhD training in the fields of economics, social sciences, history, culture and law, while gradually in total some 6 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 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 framework programs it was the industrialists which pushed, and the ERC emerged because of a lack of opposition, EU involvement in higher education was from the beginning of the EC 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 programs (the Erasmus programs). The absence of a truly European area for higher education concurs at present with a relatively small presence of European universities among the world top as measured in different rankings. This indeed is more than concurrence. A causal link is highly likely.

2. Europe's "real" economic challenges: prioritizing knowledge investments now

The financial 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

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

particular, the euro-crisis has brought to the forefront the fragility of the Growth and Stability Pact as a credible tool to coordinate fiscal policies within the euro-zone. 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[9]. 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 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 will have to fully take into account the rapid globalisation of knowledge accumulation and knowledge diffusion. Globalization refers tothe 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 globalization leads to an increasing multiplicity of global linkages and interconnections between companies, research organisations, universities and countries, which make up today the globalized R&D system.

These are the features European countries as well as the European Commission will have to focus upon if strategically opting for a renewed prioritization 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.
- In so far as the Lisbon Strategy was rooted in the idea that the EU's productivity problems were of an internal structural nature[10], such European competitiveness vision has become challenged by the way new pervasive technologies, such as Information and Communication Technologies, have broken down the distinctions between high and low tech sectors[11]. 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

[9] See http://ec.europa.eu/economy_finance/eu/forecasts/2010_spring_forecast_en.htm
[10] In short: the EU was lagging behind in R&D because of the failure to strongly develop high-tech sectors and knowledge-intensive services.
[11] See Snower, D.J., AJG Brown, and C. Merkel (2009).

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.

Because of these growing tensions, European research and innovation policies need to take fully on board the implications of globalization and spatial agglomeration, and develop institutional solutions addressing some of those tensions. We first address the nature of the knowledge investment target (subsection 2a), and subsequently the spatial agglomeration and social cohesion challenges (subsection 2b).

2a: Towards a new European knowledge investment target

As proposed in the recent Expert Group's Report on the future of the ERA[12], 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 basic or business 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[13]. 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[14], business investment should rather be considered as the output of such efforts: ultimately as the reflection of the success of a persistent public effort that makes the country or region attractive (and visible) to private knowledge investment.

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). The proposed new 3% target[15] has two clear policy advantages over the previous Barcelona 3% target.

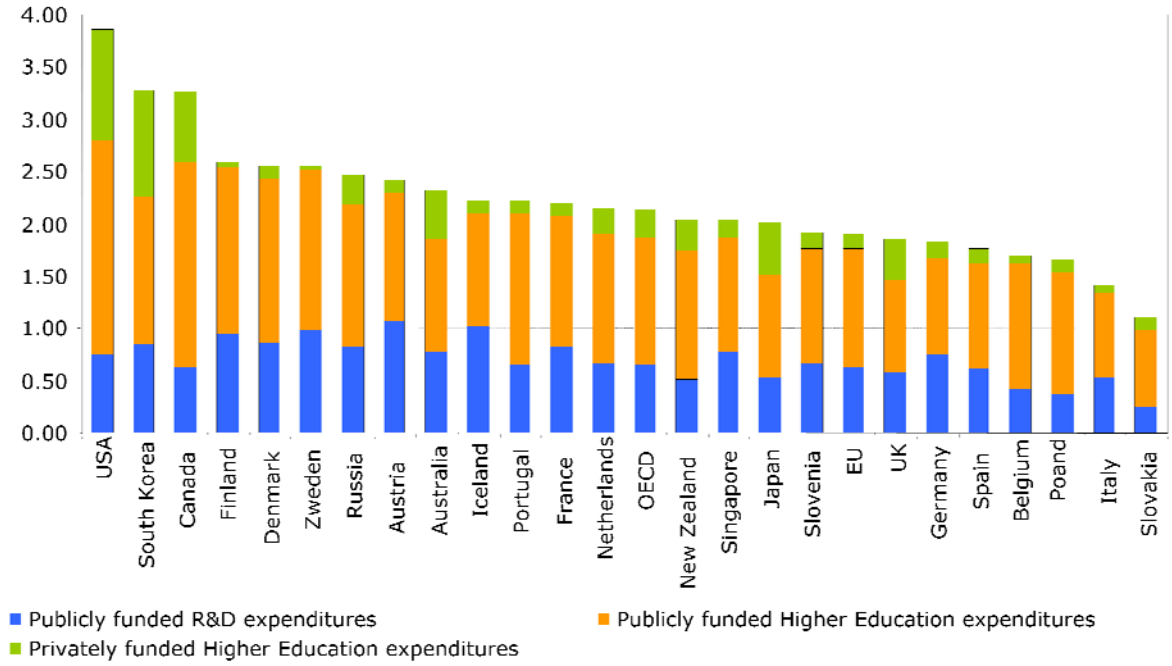
Figure 1: *Higher education and public knowledge investments as a % of GDP (2008)*

[12] See http://ec.europa.eu/research/era/pdf/community_research_policy_role.pdf

[13] 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.

[14] In the latter case based on public or private contributions.

[15] The difference with the old Barcelona target is apart from the explicit imclusion of higher education expenditure, the fact that private R&D expenditure is not included but now rather considered as an output, performance indicator.



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 MS, the target also provides sufficient political freedom to MS to decide how they intend to try to achieve the target by 2020.

2b: 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 area, real convergence in the peripheral countries will crucially depend on productivity growth and increased knowledge investments in those countries.

The influential, so-called Barca report (2009) saw innovation as one of core priorities within a co-called "place-based approach" to EU cohesion: 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 endogenous only approach to development: massive injections of EU funds in regional knowledge economies are not nearly enough by themselves; on the contrary they might well have been detrimental. Instead, Barca (2009) pleaded for combined exogenous and endogenous push: the main purpose of cohesion policy is not in redistribution but in triggering institutional change and breaking 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 1000 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 and 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 specialization should not be associated with a strategy of specialization 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 specialization deals *with R&D and innovation* specialisation. The current financial crisis, certainly in the euro-zone countries, brings to the forefront the question of "how to specialize or what specialization 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, 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 laggard? How should one position one selves in the knowledge economy?

For a euro-zone 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 specialization, a process which avoids the problems of "locational tournament" competition amongst regions in 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 networks 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 will 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, the 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. By conditionality one 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.[16] The basic idea is that, in order to build on learning about local conditions for growth, it is essential that actors share the risk of policies. Research and innovation policies are by nature subject to uncertainty and risk. Doing so, a policy maker 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 implementation of policies.

.

[16] 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).

3. Re-thinking public action on 'knowledge investment': Regulate or 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, focused almost unilaterally on the supply side, clearly lost in economic policy influence. Instead, it became widely recognised that economic growth is founded on a broader, well-functioning "knowledge and innovation system" in which the performance of all actors would be crucial. The concept of a National (or Regional) Innovation System emerged in the late 80's 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 put the emphasis away from the sectoral dimension towards the broader national (or regional) institutional framework within which firms and other organisations operated and which appeared of crucial importance to the speed, extent and success by which innovations got introduced and diffused in the economy.

As highlighted elsewhere by one of us (Soete, 2005), four factors appear at the outset rather essential for the functioning of a "national" (or regional) system of innovation and can be considered as the essential features.

- First there is the investment of the country in ***social and human capital***: 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 will be crucial for the continuous feeding of fundamental and applied research. With the development of 'new growth' models in the economics literature, the role of education and learning in continuously generating, replacing and feeding new technology and innovation has received much more emphasis over the last decade. 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.
- The second central node of any system of innovation is the ***research capacity*** of a country or region and the way it is closely intertwined with the country's higher education system. From a typical "national" (or regional) innovation system perspective, such close interaction appears important; 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 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, education establishments, etc. 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.

- In addition to human capital, research and the related phenomenon of local networks, and particularly inter-firm networking, 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, 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.

3.1. Higher education

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 programs 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 and cross-border flows in studies – which are limited in terms of admissions only in a couple of Member states (Austria-Germany, Flanders-The Netherlands, Wallonia-France) - has remained low, with the exception of the inflow of students in the UK and Ireland. This low level of mobility is explained by the existence oflanguage 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.

Indeed, a European Higher Education Area would provide one upward quality spiral of competition between universities across borders and promote mobility beyond the very low levels of this moment.

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 world-wide competitive (Ritzen, 2010a) the subsequent European Framework Programs, 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 programme, Erasmus Mundus and other such programs. It is time hence for some more radical proposals, as put forward in the empowerment of European universities `manifesto'.

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 programs.

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 labour 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 organizations 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 amounts of cross-charges). 1992 was a time of very low student mobility in the EU. 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 space 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 programs: they have reached a saturation point because of the limited fit of the stay abroad in the curriculum (Ritzen, 2010, p. 110). 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.

3.2. Research

Public research could be thought over to 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, next to 27 individual MS' research councils[17], 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 specialization. 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[18]. 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

[17] In countries such as Belgium, there are regional research councils. There are in other words even more than 27 "national" research council in Europe.

[18] Everey 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.

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 "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. What Foray describes as the "innovate here, benefit elsewhere" pattern characteristic of poorly locally integrated regional innovation policies. Regions are likely to lack though the capacities 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 Growth and Stability 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 in 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 programs, individual EU country programs 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 programs points to a sigificant amount of overlap;
- Gradually, national research themes should be brought in the domain of bi-national or multinational programs finally to emerge on the EU level. The present splintered approach (almost every EU country has a program 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 would be important 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) is primarily encapsulated within a multi-annual grant provision system under the Framework Programmes (FP). While substantial in

volume (FP7 amounts to € 50 billion, Horizon 2020 foresees € 80 billion), it remains small compared to the total amount of national research budgets.

- Third, up to 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 FP R&D support system 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 EC uses alternative funding instruments to a very limited extent. The Risk-Sharing Finance Facility (RSFF) for instance represents a first "European scale programme" by the European Commission (EC) which uses debt-based finance to complement the more traditional FP 7 grant financing for RDI[19]. 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)[20]. 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 when banks were becoming hesitant in taking on board such risky investments on their own[21].

Conclusions

[19] The risk-sharing feature refers to the sharing of risks between the EC and the European Investment Bank (EIB). The RSFF was established on June 5th, 2007, through a co-operation agreement between the EC 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 EC and EIB level on how the broad Lisbon strategic goals could be implemented.

[20] 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.

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

Crises are also periods of structural change: of creative destruction both at the level of sectors and of firms, but also of reforming, transforming 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 ones. 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.

This prospect should spur the EU 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, 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 specialization. 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. By contrast European fiscal austerity in line with Member states' fiscal austerity would have a particularly negative impact on Europe's future knowledge economy.

- By contrast, the difference in the assimilation of knowledge across European countries and regions appears closely related to national budgetary policies. In particular, they reflectdifferences in the ***quality*** of Member states' budgets as well as intheir 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, as discussed here (section 4) remained first and foremost a nationally organized and funded activity: 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 globalizing 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 globalized 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 institutional arrangements in research, innovation and higher education which do create an ERA and an EHEA in such a way that a robust growth effect occur in the order of magnitude of 1-2% per year – the traditional arrears to US growth in the 90's and early part of the 2000s.

Despite the many concerns about Europe's future integration process as expressed here, 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.

References & Bibliography

Baldwin, R and C. Wyplosz (2004), The Economics of European Integration, McGraw Hill,: London.

Barca, F. (2009), "An Agenda for a Reformed Cohesion Policy: A place-based approach to meeting European Union challenges and expectations.", Independent Report prepared at the request of Danuta Hübner, Commissioner for Regional Policy. Brussels: DG Regio.

Bonaccorsi, A. (2009), "Towards Better Use of Conditionality in Policies for Research and Innovation under Structural Funds: The Intelligent Policy Challenge", Report Working Paper. Available at: http:// ec.europa.eu/regional_policy/policy/.../3_bonnacorsi_final-formatted.pdf

Caracostas, P. and Soete, L. (1997), "The building of cross-border institutions in Europe: Towards a European System of Innovation?", In: Edquist, C., (Ed.) Systems of Innovation: Technologies, Institutions and Organizations , London: Routledge, pp. 395-419.

Chambers, E.G., M. Foulon, H. Handfield-Jones, S.M. Hankin, and E.G. Michaels III (1998), "The War for Talent", McKinsey Quarterly, August 1998, No. 3

Chang, H-J. (1993), "The Political Economy of Industrial Policy in Korea" Cambridge Journal of Economics, 17(2), pp. 131-157.

David, P. and D. Foray (2002), "An introduction to economy of the knowledge society ", International Social Science Journal, Vol 54, issue 171, pp. 9-23.

David, P., C. Huang, L. Soete and A. van Zon (2009), "Toward a Global Science and Technology Policy Agenda for Sustainable Development", United Nations University Policy Brief, No. 4, 2009.

Dosi, G. (1988) "Sources, Procedures, and Microeconomic Effects of Innovation," Journal of Economic Literature, 26(3), pages 1120-1171.

Eckey, H-F., C. Dreger and M. Türck (2006), European regional Convergence in a Human Capital Augmented Solow Model", Discussion papers 631, DIW Berlin.

Economist (2008) A Taxonomy of Trouble: How are Emerging Markets Suffering, Let Us Count the Ways. 23 October 2008. Available at: http://www.economist.com/node/12481004?source=hptextfeature&story_id=12481004

European Commission (2002),Presidency Conclusions, Barcelona European Council, 15 and 16 March 2002, SN 100/1/02 REV 1, Brussels: EC.

European Commission (2005), "Implementing the Community Lisbon Programme", Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions: More Research and

Innovation - Investing for Growth and Employment: A Common Approach, SEC(2005), 1253, Brussels: EC.

European Commission (2010), "Europe 2020: A Strategy for Smart, Sustainable and Inclusive Growth", Brussels: EC, COM(2010)2020. Available at: http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf

European Commission (2010), "European Economic Forecast - Spring 2010". Brussels: EC. Available at: http://ec.europa.eu/economy_finance/eu/forecasts/2010_spring_forecast_en.htm

European Commission (2010), "The role of community research policy in the knowledge-based economy: Expert Group Report", Luxembourg: Publications Office of the European Union

Foray, D. and B. van Ark (2007), "Smart specialisation in a truly integrated research area is the key to attracting more R&D to Europe". Knowledge Economists Policy Brief No 1, Brussels: Expert Group "Knowledge for Growth".

Foray, D., P. David, and B. Hall (2009), "Smart Specialisation – The Concept", Knowledge Economists Policy Brief No.9, Brussels: Expert Group "Knowledge for Growth".

Galison, P. and B. Hevly, eds. (1992), "Big Science: The Growth of Large-Scale Research", Stanford: Stanford University Press

Harberger, A.C. (1998), "A Vision of the Growth Process," American Economic Review, 88(1), pages 1-32

Lundvall, B-A. (1992) "National Systems of Innovation. Towards a Theory of Innovation and Interactive Learning ", London: Pinter Publishers.

Pottelsberghe, B. van (2009), "Lost property: the European patent system and why it doesn't work", Bruegel Blueprint, Brussels: Bruegel

Putnam, R.D. (2000). "Bowling Alone: The Collapse and Revival of American Community", New York: Simon & Schuster.

Radosevic, S. (1997), "Strategic Policies for Growth in Post-Socialism: Theory and Evidence based on Baltic States", Economic Systems, 21(2), pp165-196.

Ritzen, J. ((2010a), A Chance for European Universities, Amsterdam/Chicago University Press.

Ritzen, J. (2010b), "Manifesto: Empower European Universities", Expert group on European Universities Meeting, June 15-16, 2010, Brussels. Available at: http://www.chanceforuniversities.eu/images/stories/manifesto_version20100617.pdf

Ritzen, J. (2010c), "A New Avenue: A European Statute", Opening speech Belgian Presidency, October 14th, see www.empowereu.og

Snower, D., A. Brown, and C. Merkel (2009), “Globalization and the Welfare State: A Review of Hans Werner Sinn’s ‘Can Germany be Saved?”, Journal of Economic Literature, 47(1), pp. 136-158.

Soete, L. (2005) “On the dynamics of innovation policy: A Dutch perspective”, In: P. de Gijsel and H. Schenk (eds.), *The Birth of a New Economics Faculty in the Netherlands*, Springer, Dordrecht, pp. 127-149

Soete, L. (2009) “The European Research Area as industrial policy tool”, in: H. Delanghe, U. Muldur, L. Soete (eds), *European Science and Technology Policy. Towards Integration or Fragmentation?*, Edward Elgar Publishing Ltd, Cheltenham, 312-327

Tindemans, P. and Soete, L. (2007), “European Institute of Technology: Assessment of the Feasibility and Possible Impact of the Establishment of a European Institute of Technology”, Brussels: European Parliament, IP/A/ITRE/IC/2006-157

Veugelers, R. and M. Mrak (2009) “The Knowledge Economy and Catching-up Member States of the European Union”, Knowledge for Growth Report No. 5.

Wilson, H. (1963) Speech at Labour Party conference, Scarborough, October 1, 1963. Labour Party Annual Conference Report, 1963, pages 139-140.

World Bank (1993), *The East Asian Miracle: Economic Growth and Public Policy*, Oxford: Oxford University Press.