



Cohesion and Excellence

Two ways to a better Europe?

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Executive Summary

EU Enlargement in 2004 has created new challenges for EU RTI policy making, as it has led to increased economic disparities among member countries. These differences are reflected in the interests of member countries. Member states which are closer to the technological frontier have an interest in moving EU RTI policy towards "excellence", while countries that are far from the technological frontier call for a stronger orientation towards cohesion. In 2005 the European Commission put forward its proposal for the 7th Framework Programme for Research and Technological Development. The presentation was followed by a debate on the role and rationales of EU research, technology and innovation (RTI) policy. Disagreement on the proposed policy has been voiced from a number of different angles. Conflicts between excellence and cohesion have primarily emerged in three hierarchically interrelated areas:

1. A conflict between excellence and cohesion as selection criteria in the Framework Programme: Given that only a limited number of submitted proposals are funded, selection criteria play an important role.
2. Conflicting views on the goals of European RTI policy and the Framework Programme: Some countries call for a stronger orientation towards cohesion in the Framework Programme, citing the unequal distribution of funds per capita as a reason for changing the orientation of the Framework Programme. Other countries argue that European RTI policy should concentrate on policy measures that aid the provision of EU public goods in RTI and should not be misused as a tool for cohesion policy.
3. A conflict on the distribution of expenditures in the European Budget: While most member countries welcome the proposed increase of RTI funding at the European level, some countries emphasise that this must not lead to an increase of the overall European budget. Old and new cohesion countries emphasise that the increase in RTI funding must not be directed exclusively towards excellence. They emphasize that a sizeable effort of EU RTI policy must focus on building up RTI capabilities.

The aim of this study is to assess these lines of conflict, and to assess whether the proposals of the Commission provide the right underpinning for a coherent and effective European RTI policy.

EU RTI Policy

Since the mid-1980s RTI policy in the European Union has become a multi-level policy area affecting contents, budgets and institutions. The evolution of EU Innovation Policy

has gone through various phases until today. EU RTI policy is more than Framework Programme. It also extends to IPR regulation, standardisation and cohesion policy. This and the focus on policy coordination and learning suggest that the relevance of a European RTI policy should not primarily be measured by comparing budget volumes. In fact, EU RTI funding is small when compared with RTI expenditures by most member states. The main locus of RTI policy is still the national level. EU RTI funding is best understood as an essential supplement to national efforts. The better coordination of RTI policy across different policy levels might prove to be much more important than the financial contribution of EU RTI policy.

The arguments in favour of an supranational European RTI policy emphasise the internationalisation of RTI, the increase of positive externalities through technological spillovers and the internalisation of negative external effects through the coordination of RTI policies and public goods. RTI policies where heterogeneity of preferences are high or where externalities are low should be allocated to a national or even a sub-national level. The multi-level nature of the governance of RTI policy in the EU is here to stay.

The basic rationale of the Framework Programme is to provide EU-wide public goods and the internalisation of externalities at a European level. The proposal of the European Research Council is indicative of the evolution of the orientation of the Framework Programmes over time. While the Framework Programmes were initially mainly based on collaborative applied and business-oriented research, it is now also becoming – in accordance to the subsidiarity principle – an instrument of science policy. At first glance, the Commission proposal for the 7th Framework Programme appears ambitious. It proposes the doubling of the annual research budget for RTI. However, in light of the number of critical reports (e.g. Sapir et al. 2003, Kok 2004) indicating that Europe should invest more in the development of new technology and education in order to achieve higher growth rates, the proposal seems more modest.

The RTI oriented initiatives of the proposed cohesion policy constitute an important element for a coherent RTI policy at the European level. The basic rationales for cohesion policy are redistribution and capacity building. The aim is to help the least favoured regions and countries within the EU catch up. Accordingly, funds for these programmes are allocated specifically by country and region.

The proposed division of labour between the programmes is advantageous and mirrors the needs of countries and regions at a different level of economic development for different policies. If all EU RTI policy were squeezed into the Framework Programme, it would become overloaded. When too many ambitions are compressed into a single policy instrument, evaluation becomes impossible. Using one instrument to achieve several objectives creates confusion and inefficiency.

Excellence vs. Cohesion

The discussion on EU RTI policy and the rationales for the different programmes lead to the following assessment:

1. Based on the rationales, goals and instruments of the Framework Programme, it follows that cohesion or redistribution should play no role in the selection of research projects. The only criteria should be research excellence and the innovation and impact potential evaluated on the EU level. Cohesion may affect the membership of RTD consortia. It is well known that the Commission looks favourably on the inclusion of project participants from Cohesion Countries. However, the involvement of 'weaker' partners in research consortia is a completely different issue to that of the quality criterion on the research projects as such (Sharp 1998).
2. Neither the history of the Framework Programme nor the current Commission proposal shows that the Framework Programme aspires to provide tangible RTI infrastructures other than RTI infrastructures with an EU-wide value added. The provision of tangible infrastructures is the responsibility of member states. For cohesion countries there is the possibility to use Structural Funds to build up infrastructures. The main argument against the provision of RTI infrastructures for national and regional capacity building and, more generally, against the introduction of cohesion goals into the Framework Programme, is that the Framework Programme are the expression of a supranational European RTI policy which is oriented towards the provision of EU-wide public goods. RTI initiatives in Structural Funds show that the building up of RTI capacity is not disregarded. The rationales for cohesion policy and the rationales for a European RTI policy are quite different, and the use of different programmes and policies is therefore appropriate. Goal congestion would reduce the effectiveness of the Framework Programme.
3. The previous two arguments have led to the conclusion that the real conflict between excellence and cohesion lies on the budgetary level. At the level of funding there is always a conflict between expenditure targets. RTI is a central driver of economic development, thus there are efficiency arguments for an EU RTI policy. On the other hand, the reduction of income disparities among member states is a political and economic priority in the enlarged Union. This suggests that the real conflict is not between excellence and cohesion but between policies that foster competitiveness and policies that reduce overall welfare. A focus on the subsidiarity principle would require member states to perceive the EU budget differently than a focus on net payment positions. Guided by subsidiarity, member states would allocate resources to achieve

European objectives. There is no automatic advantage of backwardness. Technology catch-up is not costless; domestic RTI and education investments are crucial. An increase in polarisation could lead to variable geometries, with negative effects for overall EU growth and the EU as a provider of public goods. However, giving redistribution too much weight would send the wrong signals to policy makers by providing the wrong incentives for the implementation of growth-enhancing policies across Europe. Moreover, redistribution can stand in the way of needed adjustments that would promote development and have a structure-preserving instead of a structure-changing effect.

Concluding Remarks

European enlargement has created new challenges for European RTI policy-making. The major decisions on the future of EU RTI policy relate to the overall size of the EU budget, the share allocated to the Framework Programme, the share allocated to cohesion policy and the orientation of the Framework Programme. A coherent European RTI policy is necessary in order to create a European Research Area that includes researchers, businesses and research institutions from less-favoured regions and is at the same time competitive, so that the best projects, researchers and research institutions are selected.

The overall impression is that the commission proposals are not over-ambitious, but on the right track. The Framework Programme is oriented towards EU-wide public goods, while structural and cohesion funds are oriented towards capacity building. The RTI initiatives of the Structural Funds must be recognized as an integral part of EU RTI policy. Only by reducing regional disparities will it be possible to obtain RTI competence in the EU comparable to that of the US or Japan. Excellence and cohesion are inputs that are necessary in order to make Europe more sustainable in economic, political and technological terms.

1. Introduction

Europe is undergoing a challenging period in its integration process. In the political sphere, the rejection of the European constitution in France and the Netherlands has led to renewed discussions on the direction of European integration. At the same time, the growth performance of the larger European countries has been weak. Unemployment rates and budget deficits remain high and productivity developments are lower than in the US. In March 2000, at the Lisbon European Council, the heads of EU governments set the goal of becoming "the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" by 2010. This goal was complemented in 2002 at the Barcelona European Council, where it was agreed that R&D investment in the EU must reach 3 % of GDP by 2010 with a substantial increase in business R&D expenditures which should account for two thirds of total R&D investment. The European Commission has invested considerable effort in building the European Research Area (ERA). The ERA is seen as the R&D equivalent to the common market for goods and services and the European research, technology and innovation (RTI) policy has been regrouped into providing a better co-ordination of research and innovation policy at the national and EU levels.

At the same time EU Enlargement from 15 to 25 member states has substantially increased the diversity of the European Union. Not only the economic but also the RTI capacity show increasing disparities among the member countries. While being one of the world's leading regions for innovative activities, the EU lags significantly behind the US in terms of inputs into the innovation process, such as expenditure on R&D in the business sector and the ratio of total researchers to total employment. Even before enlargement the disparities in terms of innovative activities (i.e. input to and output from innovation) were already quite substantial across EU-15 countries. The 2004 enlargement substantially increased the innovation-related disparities among EU member states. The picture of the EU as a highly developed entity on the world technology frontier is only true for the bigger, industrially advanced member states, the Benelux and Scandinavian countries and Austria. The remaining countries do not fit this description.

The increased economic differences between member states have led to renewed debates on the European budget and on the distribution of expenditure targets. The net paying countries want to limit the redistributive role of the EU budget. In its budget proposal for 2007-13, the European Commission aims to give more weight to innovation. In particular, it is the intention of the Commission to double the resources for the 7th Framework Programme for Research and Technological Development (henceforth FP). At the same time, the reform of cohesion policy gives more weight to poorer countries. This mirrors the fact that, since the Maastricht treaty, the goal of competitiveness has underpinned much of the European RTI policy (the FP) while economic and social cohesion, i.e. social and economic convergence achieved through European integration, have been central goals of all European policy measures.

The purpose of this study is to assess the conflicts of interest between member states with regard to EU RTI policy. There is a need for an assessment of whether the proposals of the Commission provide the right underpinning for a coherent and effective European RTI policy. Disagreement on the proposed European RTI policy has been voiced from a number of different angles. Some countries call for a stronger orientation towards cohesion in the FP, citing the unequal distribution of funds per capita as a reason to change the orientation in the 7th FP. Other countries argue that European RTI policy should concentrate on policy measures that aid the provision of EU-public goods in RTI and should not be misused as a tool for cohesion policy.

The study is organised as follows: The next section provides an overview of the background issues. The areas of conflict between excellence and cohesion and the extent of national disparities across member countries are presented. Special emphasis is given to the issues regarding the European budget and the financial perspective for 2007 -2013. In addition to the proposal presented by the Commission and the proposal by the UK presidency, we also present radical scenarios that map the possible futures of EU RTI policy. Section 3 presents the rationales and instruments of European RTI policy. On the basis of the discussion of the rationales for a European RTI policy, it is argued that the Commission proposals for the Framework Programme, the Competitiveness and Innovation Programme (CIP) and for the new Cohesion Policy provide a step towards the creation of a more coherent European RTI policy. Section 4 reassesses the lines of conflict between 'excellence' and 'cohesion' in European RTI policy. Based on the mapping of instruments and rationales, we conclude that a conflict between 'excellence' and 'cohesion' can only be detected at the level of budgetary funding. However, Cohesion Policy and the Framework Programme are complementary in the aim of achieving a more competitive EU. The conflict between expenditure targets is primarily related to the limited size of the European budget. The real line of conflict thus lies in the extent to which expenditure targets are oriented towards making Europe more sustainable in economic, political and technological terms.

2. The starting points: Excellence, competitiveness, diversity and the EU budget

This section provides a short overview of the issues associated with the terms 'excellence', 'competitiveness' and 'cohesion', as well as an overview of the economic and RTI-related disparities among member countries and the discussion on the European budget. These are essential in order to map out the discussion on excellence and cohesion in European RTI policy.

2.1 Excellence, Competitiveness and Cohesion

The conflicts of interest between the member states revolve around

- a) the size of the budget,
- b) the composition of funding and
- c) the single chapters of funding and the content of programmes.

While it is clear that the most important source of disagreement is related to the size of the budget, (b) and (c) also carry some weight. With regard to European RTI policy, this becomes clear when the national positions on the FP are considered in detail. Some countries, in particular the former Cohesion Countries and the new EU-10 countries, emphasise that the 7th FP should include measures for building up absorptive capacities. Other countries, in particular the industrially developed countries, reject such goals for the 7th FP, indicating that such measures should be funded by structural policies. Thus, one can identify a line of conflict between more 'cohesion-oriented' and more 'excellence-oriented' approaches to European RTI policy.

In a strict sense, the contrast between 'excellence' and 'cohesion' is an issue of the FP. Research *excellence* is a central criterion of the selection of projects in the FP. Excellence implies that only the best projects are accepted. *Cohesion* in contrast emphasises the catch-up process of less prosperous regions within the European Union. Article 2 of the Treaty on the European Union states that one of the objectives of the EU is "to promote economic and social progress and a high level of employment (...) in particular (...) through the strengthening of economic and social cohesion". Much of the discussion on cohesion is framed in a macroeconomic context. However, it is well known that the convergence of income and productivity depends not only on indicators such as inflation, public sector deficits or expenditures for RTI, but also on microeconomic factors such as regional specialisation, the level of technological development and the associated externalities and spillovers that drive the process. This view on cohesion is shared by Schumpeterian economics (e.g. Aghion and Howitt 2005, Fagerberg and Verspagen 1996) and new growth theory. The catch-up process is fostered or limited by social institutions, policies and capabilities (Abramowitz 1986, Nelson and Sampat 2001, Aghion and Howitt 2005). The development of complementary capabilities and the build up of appropriate institutions alongside investments in physical and knowledge capital are necessary in order to make sure

that the potential of that investment is realised. In fact, there is a large body of literature on absorptive capacities which emphasises, that in order to reap the benefits of spillovers, firms and organisations need to spend considerable resources on absorptive capacities in order to be able to understand and afterwards apply the technological knowledge that is 'freely' available (e.g. Cohen and Levinthal 1989, Blomström and Kokko 2003, Keller 2004).

2.1.1 Excellence, cohesion and competitiveness

There is a close relationship between excellence, cohesion and competitiveness. The discussion on whether EU RTI policy should be primarily concerned with competitiveness or with cohesion dates back to the 5th FP (cf. Sharp 1998). In the context of the FP, cohesion became a contested issue in relation to the selection criteria on projects. The objective of EU RTI policy is to strengthen science and technology and to promote competitiveness on the European level. RTI policy became a Community responsibility in the Single European Act. The cohesion principle states that the EU should strive for a reduction of disparities between levels of development of the Union's various regions. It was also introduced with the Single European Act. It is important to note that competitiveness is not considered an end in itself but rather a means to achieve prosperity, jobs and sustainable development. The shared objective of the cohesion and competitiveness goals is to promote growth, high employment and low unemployment. The difference is in the emphasis of the spatial dimension by the cohesion goal, which takes into account the particular strengths, weaknesses and structural opportunities of individual regions.

2.1.2 Excellence, Cohesion and the Framework Programme

Possible conflicts between excellence and cohesion primarily emerge with regard to the FP and the relative importance of the two goals in the European Budget. The conflict between excellence and cohesion can be boiled down to three lines of conflict:

1. A conflict between excellence and cohesion as selection criteria in the FP: Given that only a limited number of submitted proposals are funded, the selection criteria play an important role. For example, the oversubscription rate for the new instruments in the 6th FP was 4.9 for Integrated projects and 4.2 for Networks of Excellence while the financial oversubscription rate was 6.8 and 8,1 respectively (see Marimon 2004) .
2. Conflicting views on the goals of European RTI policy and the FP. Some cohesion countries, for example, have called for the possibility of infrastructure funding in the new 7th FP to increase RTI capacities and call for a stronger integration of FP with Structural Funds. Some 'excellence-oriented' countries have made clear that EU R&D expenditures should not be considered a tool of cohesion policy. In fact most countries suggest that Cohesion and other Structural Funds money should be used to build up research capabilities. Some

countries have called for a more explicit link between FP funds and Structural Funds in order to create an integrated financial tool to foster the development processes of research capability. A further issue which has been voiced by some member states is related to the comparatively low level of business expenditures on R&D (BERD) in the new EU-10 member states. In the view of some of these countries, their relatively low ratio of applications in the bottom-up approach of the FP requires some form of national quotas.

A separate issue regards the new instruments introduced with the 6th Framework Programme (see also Marimon 2004A). Smaller and poorer countries expressed their unhappiness about large scale projects (Integrated Projects and Networks of Excellence), as these would in their view favour large countries and focus on the established EU RTI champions. They fear that the goal of consolidation of research effort in large projects and networks will encourage a concentration of RTI capability and thus lead to 'exclusion'.

3. A conflict over the distribution of expenditures in the European Budget: While most member countries welcome the proposed increase of RTI funding at the European level, some countries emphasise that this must not lead to an increase in the overall European budget, which they want to be limited to 1% of GNI. On the part of old and new cohesion countries it is emphasised that the increase in RTI funding must not be directed exclusively towards excellence, but that instead EU RTI policy must also make a significant effort to build up capabilities.

2.1.3 Excellence, cohesion and project selection

Before moving on to the differences across European countries and to the European Budget, it is useful to focus on the core differences between excellence and cohesion in RTI policy. The conflict between research excellence and cohesion can be mapped into the distinction of exploration and exploitation of knowledge. In this case excellence is clearly related to the exploration and creation of new knowledge, while cohesion is related to the exploitation of available knowledge. In the context of European RTI policy, this implies that the goal of creation of new knowledge is best served by projects that are excellent with respect to the possibility of creating new and useful knowledge, while the exploitation of knowledge is best served by projects that use the available knowledge or aid the diffusion of knowledge across regions. In a simplistic setting it can be argued that science policy primarily considered to be a policy that fosters the exploration of new knowledge, thus excluding the education aspect of higher education - should be primarily be guided by the criterion of research excellence, while technology and innovation policy should be motivated by both excellence and diffusion goals. While excellence is indisputable as a criterion for the selection of projects, excellence must always be evaluated against the goals of the programmes. The evaluation of the excellence of applied research projects is difficult, as both research

excellence and the diffusion aspect must be taken into account. Moreover, with projects that concern different subject matter it is not possible to identify a better project by using the yardstick of research excellence. A better criterion for the selection of projects for applied research would be "innovative and impact potential". Until recently European RTI policy was primarily oriented towards technology and innovation policy and concentrated on collaborative research projects. Here, cohesion and impact potential is related to membership of RTI consortia. It is well known that the Commission looked more favourably on consortia that include cohesion partners and may have even asked applying consortia to widen membership to this effect.

However, on the basis of this simple setting it is not possible to draw any conclusions regarding the other lines of conflict. Goals, instruments and rationales of European RTI policy need to be taken into account in order to map the conflicts in detail. Here, it is also important to see that RTI policy at the EU level should not be limited to the FP but also needs to include other policies (regional, structural) that are aimed at decreasing regional and national disparities within the Union. These policies follow different goals than those of the Framework Programme.

2.2 Diversity of economic and innovation performance among member countries

The existence and importance of a wide diversity of production structures, knowledge infrastructures, institutional set-ups and RTI policies across European countries and regions is recognised. This diversity affects the innovation performance of the individual member states and the European Economy as a whole.

2.2.1 Economic disparities among EU member states

The EU was not a homogenous block before the 2004 enlargement. But with the enlargement the differences between countries increased substantially. Table 1 reports the differences among member countries in terms of GDP per capita at purchasing power parity and disparities in terms of the unemployment rate. The diversity across member Countries is measured by the coefficient of variation.¹

Table 1 shows there is a slight reduction of the differences across EU-15 countries for both GDP per capita and the unemployment rate between 1995 and 2005. The coefficient of variation for the EU-25 countries suggests that there is a reduction of disparities in terms of GDP per capita and at the same time an increase in disparities in terms of the unemployment rate between 1995 and 2005. A comparison of the coefficients of variation shows that enlargement resulted in increased disparities.

¹ The coefficient of variation is a relative measure of variation and is defined as the standard deviation over the mean.

Table 1: Economic disparities among member countries 1995-2005

	GDP per capita at PPP		Unemployment rate	
	1995	2005	1995	2005
Belgium	18.31	27.28	9.70	7.70
Denmark	19.03	28.30	6.70	4.90
Germany	18.19	24.56	8.00	9.70
Greece	10.99	19.23	9.20	10.50
Spain	13.33	22.62	18.80	10.40
France	17.55	25.61	11.10	9.40
Ireland	15.11	31.55	12.30	4.60
Italy	17.72	24.03	11.20	7.90
Netherlands	18.32	27.34	6.60	5.20
Austria	19.68	28.00	3.90	4.10
Portugal	11.14	16.75	7.30	7.00
Finland	16.11	26.90	15.40	8.40
Sweden	18.02	27.05	8.80	5.90
United Kingdom	16.83	27.93	8.50	4.70
Cyprus	13.04	18.85	3.90	4.80
Czech Republic	10.62	16.46	3.90	8.30
Estonia	5.17	12.25	9.70	8.70
Hungary	7.56	14.58	10.00	6.30
Lithuania	5.20	11.62	12.70	10.20
Latvia	4.55	10.65	18.90	9.40
Malta	11.38	16.57	5.00	7.10
Poland	6.21	11.24	13.20	18.30
Slovenia	10.43	18.47	7.00	5.90
Slovakia	6.79	12.86	13.30	17.60
EU-15 - coeff. of var.	0.16	0.15	0.37	0.31
EU-25 - coeff. of var.	0.38	0.31	0.42	0.43

Sources: WIFO, AMECO Database Notes: The 2005 data are estimates. The coefficient of variation is calculated on the basis of unweighted data and is not corrected for country sizes. Luxembourg was not used for calculation of coefficients of variation.

2.2.2 RTI-related disparities between EU member countries

Table 2 reveals the disparities among member countries in terms of common RTI indicators. It is clearly visible that both the EU-15 and the EU-25 show much larger disparities when RTI is taken into consideration. The coefficients of variation are much larger for the RTI indicators in table 2, GERD/GDP, BERD/GDP and EPO patents per million inhabitants. Moreover, with the exception of EPO patents per million inhabitants, the coefficients of variation show that the disparities have not decreased. In fact, as the data suggest, there was an increase in disparity among member countries from 1995 to 2001 for both total expenditures for R&D and business R&D expenditures. The disparities in business R&D, which is identified in a number of studies as one central element of innovation performance and economic growth, increased substantially over this period for both the EU-15 and the EU-25 countries.

The huge differences between European countries suggests that the new EU-10 member countries are at a different overall technological level from the EU-15 group. However, with regard to some indicators on RTI potentials the new EU-10 are on par with the Mediterranean countries (Italy, Spain, Greece and Portugal).

Table 2: Disparities in RTI Indicators among member countries, 1995-2004

	Gross expenditure on R&D (GERD) as percentage of GDP		Business expenditure on R&D (BERD) As percentage of GDP		Patents (EPO) Per mill. Population	
	1995	2004	1995	2003	1995	2003
Belgium	1,72	1,93	1,15	1,16	87,95	70,20
Denmark	1,84	2,63	0,83	1,59	127,40	110,76
Germany	2,19	2,49	1,31	1,67	175,34	155,96
Greece	0,49	0,58	0,12	0,19	3,41	6,19
Spain	0,81	1,05 ^a	0,36	0,51	12,57	14,36
France	2,29	2,16	1,11	1,11	96,90	76,28
Ireland	1,35	1,20	0,98	0,69	37,77	36,89
Italy	1,00	1,14 ^a	0,42	0,55	47,23	46,95
Netherlands	1,99	1,77	0,92	0,90	124,10	113,31
Austria	1,53	2,26	0,70	0,96	95,37	103,11
Portugal	0,55	0,78 ^a	0,11	0,25	1,52	3,94
Finland	2,26	3,51	1,34	2,44	177,17	143,05
Sweden	3,35	3,74	2,19	2,59	213,50	136,75
United Kingdom	1,97	1,88 ^a	0,94	0,83	80,25	122,34 ^b
Cyprus	0,20 ^c	0,37	0,04 ^c	0,07	1,55	4,89
Czech Republic	0,95	1,28	0,60	0,65	3,13	7,37
Estonia	0,57 ^c	0,91	0,16 ^c	0,27	2,42	4,67
Hungary	0,73	0,89	0,28	0,29	9,38	8,73
Lithuania	0,45	0,76	0,09 ^c	0,11	1,65	2,68
Latvia	0,48	0,42	0,12	0,13	2,16	2,67
Malta		0,29			2,71	8,81
Poland	0,65	0,58	0,23	0,17	0,71	1,88
Slovenia	1,59	1,61	0,73	0,91	20,27	21,89
Slovakia	0,93	0,53	0,56	0,26	4,04	3,42
EU 15 coeff. of variation	0,47	0,49	0,62	0,67	0,73	0,65
EU 25 coeff. of variation	0,61	0,64	0,81	0,89	1,21	1,09

Sources: WIFO, AMECO Database, New Cronos. The coefficient of variation is calculated on the basis of unweighted data and is not corrected for country sizes. GERD is gross expenditure on R&D, BERD is business expenditure on R&D, patents as registered with the European Patent Office (EPO). Luxembourg and Malta were not used for calculation of coefficients of variation. Notes: ^a value for 2003, ^b value for 2002, ^c estimated.

Overall, the European 'periphery' of scientific and technological change has become larger and the low-tech area of the EU has considerably increased. This suggests that there is indeed an inconsistency between the Lisbon Strategy adopted at the Lisbon

European Council in March 2000, with its RTI policy goal of achieving leadership in growth and competitiveness in knowledge-intensive economic activities by 2010, and the political goal of extending the European Union to 25 and later to 27 countries, many of which are not contenders for knowledge-based competitiveness in this timeframe (cf. von Tunzelman and Nassehi 2004).

Even if the new member Countries display growth rates that are on average higher than the EU-15 countries, Radosevic and Ariol (1999) emphasised that the economic catch up process of the former Central and Eastern European Countries was quite unrelated to RTI expenditures. The Central and Eastern European countries exhibited a transition shock which was accompanied by a substantial reduction of gross investment in R&D, especially in applied business-oriented research. Thus the advantages in terms of size of R&D which were inherited from the socialist period have been lost. According to many researchers, growth during the transition period was mainly based on removing distortions and implementing reform policies, and not on factor accumulation or technology (see Campos and Corricelli 2002 for a survey). In fact, when the European Commission (2004B) for the first time included the new member Countries in its recommendations on economic policies in the member states, it emphasised, among other points, the low investment in research, innovation and retraining activities and the low efficiency of education systems. Together, this indicates that there is widespread 'network failure' within the innovation systems of the Central and Eastern European countries (cf. von Tunzelman and Nassehi 2004, Muller et al. 2005). Network failures are related to missing or dysfunctional local linkages organising the resource flows, as well as to missing coordination in the network.² The misalignment of networks hinders the formation of long-term growth-enhancing institutions and lowers the effectiveness of growth-enhancing policies. A failure to redevelop national and regional systems of innovation also results in the danger of a brain drain that would further increase social and economic inequalities and RTI imbalances of the Cohesion Countries, in particular of the CEE countries within the EU-25.

2.2.3 Regional disparities

The disparities are not only related to the national level. There are substantial disparities within European countries (see table 3). While for most countries the disparity level remained approximately the same, there are clear indications of rising disparities for the CEE member states. Regional disparities increased substantially for the Czech Republic, Hungary and Poland. In 2002 the ratio between GDP shares of

² In fact, under the socialist systems proximity was not an important element of the respective national innovation systems that were organized along a 'linear model' within sectors or even within large combines whose backward and forward linkages were rarely located in the same region. In the transition period national systems of innovation imploded and in some regions multinational enterprises (MNC) have become the main source of technological development (von Tunzelman and Nassehi 2004).

the wealthiest 20 % of the regional population and the least wealthy 20 % was above 2 for Belgium, the Czech Republic, Hungary, Slovakia and the UK. As the European redistribution policy is primarily of a regional nature, this phenomenon has attracted considerable interest. There are a number of studies that analyse regional economic dynamics and the persistence of these dynamics within the EU-15. For example, Magrini (1999) found considerable persistence of regional disparities for GDP per capita. Courado-Roura et al (2000) find evidence for unconditional convergence in regional productivity but they emphasise that this finding does not imply that significant regional differences will not persist. In contrast to Courado-Roura et al (2000), Boldrin and Canova (2001) found only weak evidence for convergence in labour productivity in the EU regions over the period between 1980-1996, while Fotopoulos (2005) shows that there is evidence that polarisation will persist for labour productivity in the EU-15 regions and that the persistence of differences in labour productivity appears to be more related to the service sector of the economy than to the manufacturing industries. This mirrors the fact that the differences in productivity between Europe and the US are also related to specific and in particular to some service industries (Gordon 2004, Denis et al 2005), and suggests that the innovation aspect that also includes non-technical innovation of RTI policy is of importance for successful regional growth policy.

Table 3: Regional disparities within member states (1995 – 2002) – ratio between GDP shares of the wealthiest 20 % of regional population and the least wealthy 20 %.

	BE	CZ	DE	EL	ES	FR	IT	HU	NL	AT	PL	PT	SK	FI	SE	UK
1995	2.3	1.8	1.4	1.5	1.8	2.0	2.1	2.0	1.4	1.8	1.6	1.8	2.2	1.4	1.4	1.9
2002	2.3	2.1	1.4	1.5	1.8	2.0	2.0	2.6	1.5	1.8	1.9	1.8	2.2	1.5	1.6	2.1

Source: European Commission (2005B)

The available empirical evidence for the EU-15 countries presents a very different picture depending on whether one looks at the 15 member states or at the regional level. At the regional level there is evidence of increasing inequality, while at the country level convergence is observed (see table 1). European regions have become more specialised after economic integration, reflecting both comparative advantages and agglomeration effects.

2.3 The European Budget

The most pronounced conflicts in the European Union have been about the EU budget. It was not only the financial framework for 2007 – 2013 which provoked a fierce row; the financial frameworks for 1993 – 1999 and for 2000 – 2006 were also heavily contested. Many of these conflicts are related to the fact that the budget is perceived as a zero-sum game: more for one country is less for the others. The national financial flows are substantial, although the EU budget is small when compared to EU GDP and EU-wide public spending.

However, one can argue that the present tensions are stronger than usual. The positions are quite clear. As early as December 2003, six net contributing countries demanded that the budget be limited to below 1 % of EU GNI, despite the enlargement in 2004 and the likely accession of Bulgaria and Romania in 2007.

Let us first consider the net positions in 2004. Columns 2 and 3 in table 4 report the net positions in Mill. Euro and in per cent of GNI, respectively. The largest net contributor to the EU budget in absolute terms is Germany with 7140.5 Mil. Euro, followed by France, Italy the UK and the Netherlands. The largest net receiver of the EU budget is Spain, followed by Greece, Portugal and Poland. In terms relative to GNI the largest net payment comes from the Netherlands, followed by Luxembourg and Sweden, while the EU payments to Greece and Portugal are substantial, amounting to 2.52 % and 2.37 % of the national GNI, respectively. Columns 6 to 9 in table 4 report the allocation of expenditure by heading and member State as per cent of total allocation to the expenditure reported, which is reported in columns 4 and 5. In 2004 there was a specific compensation for new member states. The main beneficiaries of the Structural funds were Portugal, Spain, Greece and Italy. In these countries the funds allocated with structural expenditures made up 40 % of the national contributions. Overall, structural expenditures accounted for 37.14 % of the EU budget in 2004. The largest item in the EU budget is agriculture which accounted for 47.46 % of overall EU budgetary expenditure. Here, the countries with the largest share of agricultural expenditures in their overall allocation were Denmark, France, Ireland, Finland and the Netherlands. In these countries over 60 % of the overall allocation was via agricultural expenditures. The overall amount spent under the heading of research and technological development was small, accounting for 3.81 % of overall EU expenditures. This makes clear that the distributional conflict is centred on the issues of the size of the budget and the distribution of allocations on the large issues such as agriculture and Structural Funds. In 2004 these two expenditure targets accounted for 84.6 % of total expenditures including administrative spending. Therefore, these expenditure items to a large extent determine the net budgetary position of member states.

Table 4: Distribution of net operating positions, allocation of EU expenditure by member state and allocation of expenditure by heading and member state (2004)

	Operating net positions 2004		Allocation of EU operating expenditure 2004		Allocation of 2004 EU expenditure by heading and by member state (in % of total member state expenditure)			
	Mio EUR	% GNI	Mio EUR	% of overall budget	Compensation for new member states	Structural Expenditures	agriculture	Research & techno. dvpt
Belgium	-536,1	-0,19	2164,3	2,5		7,12	21,95	8,67
Czech Republic	272,2	0,33	802,6	0,9	64,18	19,83	11,13	1,50
Denmark	-224,6	-0,12	1543,4	1,8		11,53	76,80	4,60
Germany	-7140,5	-0,33	11587,0	13,3		39,48	51,64	5,51
Estonia	145,0	1,79	195,7	0,2	53,56	18,61	7,73	1,76
Greece	4163,2	2,52	5787,4	6,7		48,95	47,86	1,62
Spain	8502,3	1,08	16308,1	18,8		58,86	38,80	1,13
France	-3050,8	-0,19	12582,7	14,5		18,57	72,87	3,73
Ireland	1593,8	1,30	2772,8	3,2		29,82	65,60	1,09
Italy	-2947,0	-0,22	10239,2	11,8		43,59	48,63	3,73
Cyprus	63,5	0,53	143,4	0,2	72,69	3,59	5,12	3,39
Latvia	197,7	1,82	260,3	0,3	47,05	24,35	12,31	1,11
Lithuania	369,3	2,13	479,5	0,6	45,47	19,38	10,15	0,34
Luxembourg	-93,1	-0,41	136,6	0,2		2,68	3,60	1,52
Hungary	193,4	0,25	700,7	0,8	48,36	28,50	8,52	2,33
Malta	45,0	1,02	74,4	0,1	71,90	8,22	3,43	1,01
Netherlands	-2034,9	-0,44	2054,3	2,4		16,80	63,02	12,10
Austria	-365,1	-0,16	1600,4	1,8		19,44	70,69	4,64
Poland	1438,3	0,75	2697,1	3,1	50,73	31,02	10,94	1,15
Portugal	3124,0	2,37	4396,1	5,1		78,65	18,76	0,87
Slovenia	109,7	0,43	275,9	0,3	51,25	8,67	17,55	3,01
Slovakia	169,2	0,51	379,7	0,4	48,55	29,95	10,61	1,16
Finland	-69,6	-0,05	1347,5	1,5		26,37	63,41	5,71
Sweden	-1059,9	-0,38	1425,5	1,6		28,18	58,61	7,92
United Kingdom	-2865,0	-0,16	6989,8	8,0		31,01	56,92	7,16
EU-25	0,0		86944,3	100,0	3,48	37,14	47,46	3,81

Source: WIFO based on data in European Commission (2005C)

The three proposals for the next financial perspective 2007 – 2013 serve as the starting point for our discussion on the European budget. The first is the Commission's proposal (European Commission 2004G), the second is the compromise reached during the UK presidency, which was rejected by the European Parliament (European Council 2005) and finally the third is proposal reached at the Trialogue of 4 April 2006 (Austrian Pres in table 5).

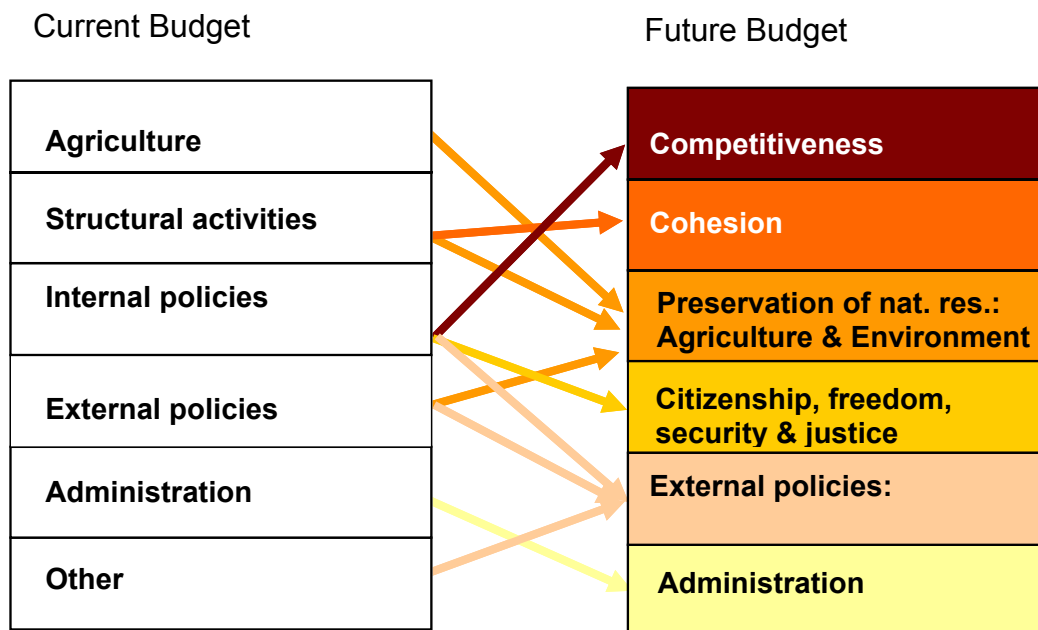
The Commission proposed to increase the payment appropriations from 1.08 % of the 2000 – 2006 financial perspective to 1.14 % of the GNI over the period from 2007 to 2013. This contrasts with the position of net paying countries who want to freeze commitments to future spending at 1 % of the EU GNI which implies actual payments of at most 0.94 %. The compromise proposal during the UK presidency is closest to the status quo (see table 5). The commitments are set at 1.03 % of the EU GNI on average (declining from 1,08 % in 2007 to 0,99 % in 2013) which implies actual payments of 0,98 % (declining from 1,05 % in 2007 to 0,93 % in 2013). The Commission proposed a reform of headings. Figure 1 shows the reallocation of expenditures from the current to the future budget of the EU. While this proposal cannot be labelled as the status quo because it represents a partial departure from the current spending structure, it cannot be labelled revolutionary, either. In fact, the Commission proposal can be considered timid, as there is no substantial departure from the 2000 – 2006 financial perspective with the exception of a doubling of European RTI funds. The comparison of the Commission's budget proposal (columns COMM in table 5) with the status quo shows that the most significant departure from the 2000 – 2006 financial perspective, is the increase in European RTI funds under the heading of competitiveness. The increased economic disparity in the EU is solved by means of a compromise (Richter 2005, p. 40). A total of 78.5 % of the expenditures for structural action would be concentrated on convergence-objective regions and national economies with levels of development below the EU average. An additional 18.7 % of Structural Funds is reserved for regions in the EU-15 that cope with specific structural problems. Box 1 discusses some radical scenarios, including the Sapir proposal in more detail.

The UK presidency compromise (UK pres in table 5) appears to be a compromise solution between the status quo and a scaled back commission proposal (see box 1). It fulfils the request position of the net paying countries who wanted to freeze commitments to future spending at 1 % of the EU GNI. Compared with the Commission proposal, competitiveness receives less importance. Thus, the compromise reached during the UK presidency was less oriented towards investment in the future and public goods than the original Commission proposal. The UK presidency proposal was rejected by the European parliament, and a new proposal was presented after the Trialogue of 4 April 2006 (Austrian pres in table 5). The new proposal is similar to the UK proposal, except it gives competitiveness and RTI slightly more weight at expense of external policies and conservation and management of natural resources. But remember that the funding allocated to the FP is 66 % of the original Commission Proposal.

Thus, the EU budget is and will remain limited in size (+/- 1 percent of the EU GNI) when compared to national budgets, which are around 45 percent of national income. Thus, the economic effects of the European budget are likely to be modest, as within the EU nearly all public expenditure is effected through national and regional budgets, and many EU regulations have no visible impact on the EU budget. The implementation of growth-enhancing policies remains a mainly national responsibility. The Sapir proposal indicates that EU expenditure can be further targeted if the subsidiarity principle is followed more strictly. According to this principle, EU policies are only warranted if they bring about additional gains over policies implemented at the national or regional level (see also Gelauff et al. 2005).

However, it is more than likely that the conflicts on the CAP will be postponed and some compromise scenario will be adopted where both cohesion and RTI do not figure as importantly as in the Sapir scenario (see box 1). And in order to provide funds for the creation of an European Research Area as well as a functioning cohesion policy, it is likely that the new budget will be somewhere in the region of the 1 % of GNI proposal of the net payer group. A scaled down commission proposal such as the current proposal seems to meet the requirement of political compromise.

Figure 1: Planned reallocation of expenditures in the current and future Budget of the EU



Source: Richter (2005).

Table 5: The composition of expenditures in the European Union's budget in 2007 and in 2007 in various scenarios

Expenditures	2006 status quo	2007				2013							
		Proposals		Scenarios		Proposals		Scenarios					
		Austrian Pres	UK Pres	1B	2A	2B	COMM	1B	2A	2B			
1. Sustainable growth													
1a Competitiveness	7.3	7.0 ^a	6.8 ^a	9.1	7.8	11.4	0.0	10.2 ^a	9.95 ^a	16.3	14.5	20.5	6.6
R&D	4.4	4.6 ^{bc}	4.2 ^{bc}	4.7	4.1	6.0	0.0	7.4 ^a	7.0 ^{bc}	8.6	7.7	10.6	3.5
Other	2.9			4.3	3.7	5.4	0.0			7.7	6.8	9.9	3.1
1b Cohesion	32.1	35.5^a	35.5^a	35.6	30.6	19.0	44.8	35.7^a	35.7^a	32.2	28.7	14.7	40.4
Convergence	23.7	26.0 ^{bc}	26.0 ^{bc}	26.0	22.3	13.9	32.7	28.0 ^{bc}	28.0 ^{bc}	25.3	22.6	11.5	31.8
Regional competitiveness	5.8	7.3 ^{bc}	7.3 ^{bc}	7.4	6.3	3.9	9.2	5.3 ^{bc}	5.3 ^{bc}	4.7	4.2	2.1	5.9
Other	2.6	2.3 ^{bc}	2.3 ^{bc}	2.3	1.9	1.2	2.9	2.4 ^{bc}	2.4 ^{bc}	2.2	1.9	1.1	2.7
2. Conservation and management of natural Resources	46.4	45.6^a	45.6^a	42.8	49.8	53.8	51.9	40.3	40.4^a	36.5	42.3	45.9	44.5
Direct payments and market intervention in agriculture	36.2	35.7 ^a	35.8 ^a	32.6	41.0	41.0	41.0	32.0 ^a	32.1 ^a	26.7	33.6	33.6	33.6
Rural development	8.7	8.8 ^a	8.4 ^a	8.7	7.4	10.9	10.9	7.3 ^a	7.0 ^a	8.2	7.3	10.3	10.3
Other	1.4	1.1 ^a	1.4 ^a	1.5	1.4	1.9	0.0	1.0 ^a	1.2 ^a	1.6	1.4	2.0	0.6
3. Citizenship, freedom, security & justice	1.1	1.0^a	0.9^a	1.2	1.0	1.5	0.0	1.6^a	1.5^a	2.3	2.0	2.9	0.9
4. External policies	9.3	5.1^a	5.2^a	8.5	7.3	10.7	0.0	6.3^a	6.4^a	9.9	8.9	12.5	4.0
5. Administration	2.8	5.8^a	5.5^a	2.8	3.5	3.5	3.3	6.0^a	6.0^a	2.8	3.6	3.2	3.6
Commitment appropriations													
Million Euro (2004 prices)	120668	120.702	120601	133560	106191	106191	106191	127091	126646	158450	125983	125983	125983

Source: WIFO, Council (2005), Richter (2005) Notes: ^a The Council compromise of the UK presidency is not directly comparable to the other numbers. The administration expenditures are concentrated under the heading 5 Administration, while in the other scenarios some administration expenditures are allocated to other budgetary headings. ^b estimate.

Box 1: Five scenarios and the Sapir proposal

Although the UK presidency proposal and the proposal of the Triologue of 4 April 2006 (Austrian pres in table 5) are most likely closest to the future financial perspective, it is useful to consider some radical scenarios as a thought experiment in order to clarify the possible impact of different possibilities. Table 5 displays the Commission proposal, the UK presidency proposal, the Austrian presidency proposal, three scenarios developed by Richter (2005) and the 2006 status quo. The three scenarios developed by Richter (2005) are illustrations of the consequences of alternative approaches. They were selected because they offer characteristically different solutions, not because they are predictions of what will be achieved in reality.

All scenarios presented in table 5 have been calculated based on the assumption that expenditures for competitiveness will increase substantially during the period between 2007 and 2013. The scenario labelled 1B is a scaled back version of the Commission proposal to the extent demanded by the main net payer countries, i.e. to commitment appropriations of about 1 % of the GNI.

The two radical scenarios are *2A more competitiveness* and *2B more cohesion*. The 1% GNI ceiling is applied in both cases. The direct payments to farmers and market interventions in agriculture are obligatory expenditures and cannot be cut. This follows from the decision of the European Council in October 2002 on agricultural expenditures after 2006. The guiding principles are reflected in the change of breakdown by policy areas:

- In scenario 2A the expenditures for cohesion undergo dramatic shrinkage while expenditures for competitiveness increase. The expenditures for cohesion policy are lower in any year in the 2007 – 2013 period than in 2006, the final year of the current financial perspective. The guiding principle behind this scenario is that all items with a 'European value added' (competitiveness, external policies and citizenship, freedom, security and justice) gain when compared to the reference scenario.
- In scenario 2B the guiding principle is more cohesion. The expenditures for RTI will be cut back to zero in 2007 and reach a level of 3.5 % of the budget in 2013 (cf. table 5). This is less than in the current financial perspective. In this scenario the expenditures for external policies and citizenship, freedom, security and justice are also scaled back. However, when compared to the COMM Commission scenario the expenditures for cohesion in scenario 2B are still 20 % lower due to the 1 % of GNI ceiling.

The differences between the two radical reform scenarios are substantial. Table 5 shows clearly how the scenarios differ: The budgets available for RTI policy and cohesion policy would change dramatically with these scenarios. Expenditures for RTI policy would be extremely reduced with scenario 2B while on the other hand scenario

2A would lead to substantial cut-backs of cohesion policy. This would have substantial effects on the net positions of countries (Richter 2005: p. 83):

- In scenario 2A (more competitiveness) the new member countries, the former Cohesion Countries but also problematic regions in rich member states would get substantially fewer resources, while the net positions of the developed old member countries would improve.
- Scenario 2B (more cohesion) would mean that new member states' would remain roughly unchanged compared with the Commission proposal. A European RTI policy would be virtually impossible given the substantial cuts in expenditures for competitiveness. The net position of those countries which are above the limits of the general correction mechanism would remain unchanged while it would worsen for the minor net payers.

Although the scenarios are extreme cases, they still give important insights into the effects of changing the composition of the budget. Not only would the net position of member states be affected, but the orientation of the EU would be substantially changed. The strong reduction of redistribution would probably be coupled with a delegation of implementation of the EU's objective to member states. This would increase the contradiction between the strong regulatory and weak redistributive powers of the EU. However, an increase of redistribution seems to be unlikely in light of the opposition of the net payer countries to an increase in the budget. In fact, there is now substantial evidence that an allocation of expenditures between member states is not only dependent on the needs of the countries or based only on efficiency criteria but to a large extent reflects the distribution of voting power. Recent research shows that past EU budget allocations in the EU 15 can largely be explained by measures of the distribution of voting power in the relevant Council of Ministers (cf. Kandogan 2000, Kauppi and Widgren 2004).

In these scenarios the allocations for the common agricultural policy (CAP) remain unchanged, because of the decision of the European Council in October 2002 on agricultural expenditures after 2006. In fact, the CAP, the UK rebate and cohesion policy are main areas of disagreement in addition to the size of the budget. The CAP has been reformed recently, and its share is declining. Nevertheless, it still remains the largest component of the EU budget. A radical reform would be a move to national cofinancing in the area of agricultural policy. This would free budgetary resources for both competitiveness and cohesion, while at the same time the 1 % GNI goal of the net paying countries could be met. However, there is strong opposition to national cofinancing in the CAP by those countries which reap the most benefits, especially France. With regard to cohesion policy, the Commission proposal is not entirely oriented towards convergence, in fact substantial amounts of money are still reserved for regions in the wealthier countries of the European Union. Some experts call for a substantial concentration of the funds to the neediest member states and for a concentration of EU redistributive policy to the national level (e.g. Boldrin and Canova

2003). This would represent a departure from the pre-enlargement 'doing something for everyone' formula in EU redistribution policy at the regional level.

The Sapir proposal

An even more radical budgetary reform proposal has been put forward by the high-level study group headed by Andre Sapir (Sapir et al. 2003). The group recommends a radical restructuring of the EU budget in order to support the growth agenda of the Lisbon target (Sapir et al. 2004: 168). Their proposal is to re-organise expenditures into three funds:

1. A fund to promote growth through expenditure on R&D, education and training, and cross border infrastructure (45 % of the budget);
2. a fund to promote low income countries to catch up (35 % of budget)
3. a fund to support economic restructuring (15 % of budget)

Overall the budget would be limited to 1 % of GNI. It is proposed that the resources for growth be allocated to recipients on a competitive basis. Transfers for convergence should target member states that qualify for such transfers on the basis of income levels. Funds for restructuring should be available based on circumstance. This proposal is in fact radical. It would reduce CAP to 5 % of the budget. It would require a complete overhaul of the current European RTI policy, as 25 % of funds would be allocated for R&D purposes. Cohesion policy would also change into a proper convergence policy that would be focused on countries, rather than regions using national per capita GDP as eligibility criterion. With regard to revenue, an EU-level tax would replace national treasury contributions. This proposal is radical but it clearly indicates that the primary conflict regarding the budget is not related to conflicts between the goals of competitiveness, excellence and cohesion but rather related to a conflict between growth-enhancing expenditure targets and other expenditure targets. A European policy oriented toward making Europe more competitive must account for both the convergence of member countries toward, and the development of potentials to move the technological frontier of the European Union. This includes institution and infrastructure building in the poorer regions and countries and coherent efforts to increase innovation and investment in physical and human capital.

3. European RTI policy

Before assessing the importance of excellence and cohesion in European RTI policy, it is necessary to reiterate the rationales, goals and instruments of this policy.

Since the mid-1980s RTI policy in the European Union has become a multi-level policy area regarding contents, budgets and institutions (cf. Grande 2000, Borrás 2003), so that RTI policy is no longer exclusively in the hands of national authorities. The national policies are supplemented by regional innovation policies and supranational programmes, in particular the initiatives of the EU. Since the mid 1980s the EU (and its predecessor the European Community) has complemented national policies with a transnational dimension. The true Europeanization of RTI policy was realised with the Single European Act of 1987 when competencies for a common research and technology policy were transferred to the European Union. In particular the Single European Act gave the Commission a procedure for implementing multiannual Framework Programmes. However, multilateral mission-oriented technology programmes have been in place since the early 1980s (e.g. ESPRIT, EUREKA). The Maastricht treaty gave EU RTI policy an even stronger base. The Treaty enabled the Commission to take initiative to ensure coordination between member states and Community activities in RTI. Nevertheless, the largest part of RTI policy is still pursued at the national level. Banchoff (2002) argues that the member states pay close attention to retaining their individual decision-making powers in RTI policy. The subsidiarity principle is one of the central instruments for the preservation of national sovereignty and compels the European Commission to justify its actions with the generation of a European "added value". In 2000 the Lisbon European Council decided to apply the "open method of coordination" to innovation policy which allows for the alignment of learning processes and actions among member states. The benchmarking, monitoring, and evaluation of national policies and frameworks belong to the instruments of the "open method of coordination". However, this system is not binding in the sense that it is not accompanied by a system of legal sanctions. It is based on peer pressure and aims for a diffusion and transfer of best-practice. However, this has led to the contestation of the multi-layer decision making on RTI policy. The ambitious effort to create a European Research Area (ERA) (European Commission 2000B) would give the European Commission more autonomy to initiate projects and programmes that affect national research actors and would lead to a stronger coordination of national policies. The rationale behind this approach is that the European Integration of the Single Market needs to be complemented by the creation of an integrated research, technology and even innovation policy, as only this could guarantee the optimal usage and development of critical research and innovation infrastructures in an integrated Europe.

However, when one looks at the budgetary frame which is available for a European RTI policy and the conflicts on the budget as reviewed in section 2.3, it becomes clear that

the centralisation of RTI at the European level is not a feasible option in the near future. If one compares the expenditures for RTI of the EU with those of the member states, it seems as if the European level exists only in the shadow of national technology and innovation policy. Pavitt (1998) went as far as to suggest that the EU budget for RTI is too small to have an effect on technological change and economic growth in Europe. However, this view neglects the importance of a European RTI policy as a supplement to national efforts and coordination device.

3.1 Rationales for an EU RTI policy

The subsidiarity-principle limits the scope of EU policies to cases where national policies are not already in place and where supra-national governance indeed leads to better results as compared to governance at the national (or regional) level. Only in this case is the EU empowered to undertake actions, in particular to define and implement programmes. But the rationales for government innovation policies that are derived from market failure arguments and from the systematic perspective on Science, Technology and Innovation (STI) do not provide specific arguments for a supranational European RTI policy.

3.1.1 Rationales for RTI policy

The arguments derived from market-failure theory and the systemic perspective on Science, Technology and Innovation differ with regard to the ranking of priorities. Although the theoretically motivated rationales for public intervention differ, perceptions of the main fields for such intervention are not that distinct from each other. The focus of traditional market failure arguments is the generation of knowledge, while the systemic approach emphasises issues like knowledge acquisition and diffusion.

Market failure theory links the rationales for government support to the partly 'public good' nature of RTI activities, indivisibilities and the high risk and uncertainty of R&D investment. It provides a strong rationale for public intervention. A socially suboptimal level of innovation provides an important argument for policy intervention to foster innovation activities by provision of basic R&D or increasing incentives by subsidies. The systemic approach to RTI policy focuses on the network of institutions and organisation that foster research and innovation, and stresses the links between different types of policy. This approach is gaining increasing importance across the EU member states (European Commission 2005D).

The main difference between the two approaches is that the systematic approach emphasises that innovation is to be seen as a process instead of an outcome, and that innovation takes place in systems of market and non-market institutions (hence the synonym "systemic approach"). The market failure rationales are often linked to a 'product line' interpretation of RTI – the so-called linear model - and to an associated technology push orientation that primarily suits research and science, but does not suit technology and innovation. The innovation system approach emphasises that technological advance is characterised by constant interplay and mutual learning in a

network of knowledge and actors. The interaction between firms, government institutions, universities and other institutions forms the innovation system. Mismatches between the elements in an innovation system are called system failures. These are related to missing bridges between organisations or to dysfunctional institutions, and provide rationales for public intervention. The systems approach emphasises that RTI policy must also take into account other policy domains and provides the basis for comprehensive enterprise-oriented innovation policies that go beyond the provision of subsidies.

The rationales provided by the approaches to national RTI policy in principle also apply to supranational RTI policy, but they do not provide any specific rationales. The main rationale for the Europeanization of RTI policies is that it enables national systems to collectively take on tasks that these systems would not have been able to tackle independently, to avoid duplication or the under-provision of certain assets and to develop complementarities between different national research systems. The challenges imposed by the internationalisation of innovation, supranational public goods, international IPR legislation and international standardisation provide rationales for a supranational European RTI policy, because they entail considerable external effects on the EU level (cf. Falk et al. 2005).

3.1.2 Fiscal federalism and the rationales for an EU RTI policy

At this stage it is useful to confront the rationales for a European RTI policy with the basic results of the Economic Theory of Federalism which builds on the Theory of Public Goods (cf. Oates 1972, 1999, Box 2).

Box 2: Subsidiarity, the economic theory of federalism and the European Union

The European Union is a collection of countries that decide together on policies regarding the provision of public goods (e.g. single money, regulation). The question of what and how much of public goods provision should be centralised in the European Union is subject to the subsidiarity principle. The principle of subsidiarity has been formally adopted as part of the Maastricht Treaty for the European Union. The precept is that public policy and its implementation should be assigned to the lowest level of government with the capacity to achieve the objective. There is a close relationship between the subsidiarity principle and the economic theory of federalism. The main task of the economic theory of federalism is to define the assignment of allocative responsibilities to decentralised government levels. A basic statement of the economic theory of federalism is the decentralisation theorem. The decentralisation theorem is a normative proposition which states that there is a presumption in favour of the decentralised provision of public goods with localised effect. The Union's choice of what and how much should be centralised is subject to a basic trade-off arising from economies of scale or externalities and the costs of harmonising policies in light of the

heterogeneity of preferences in a Union of countries and regions. Thus, it offers an appropriate theoretical framework for the assessment of rationales for a European RTI policy (cf. Alesina et al. 2001, Inman and Rubinfeld, 1998).

As a guiding map we use the main arguments as identified by Breuss and Eller (2003):

1. A high *diversity of regional preferences* leads to a strong case in favour of decentralisation (Oates 1972) as smaller units can better account for the preference of its constituencies. With RTI policy this is primarily related to regional sectoral specialisation. However, this argument is a theoretical one, as a number of factors accompanying decentralisation would offset efficiency gains - for example, the potential administrative weakness at the sub-national level. Others are included in the arguments that follow. However, the size of the jurisdiction is a decisive factor in evaluating heterogeneity as well as realising economics of scale. Therefore, the larger the jurisdiction, the more responsibilities should be assigned to a decentralised level.
2. The realisation of *economies of scale* is a main decisive factor for the assignment to a central level of decision-making. In fact, the argument of “critical masses” is key to the EU’s self-conception on appropriate cases for supranational policy intervention. Some research or innovation projects are not divisible into small pieces; they require a large minimum efficient scale of operation. In the case of physical indivisibility of respective technical infrastructure, single countries may rate the necessary technical or capital equipment as unaffordable. Similarly, the research project might be very complex involving a whole team of highly sophisticated experts. If it is only the cross-country pooling of resources which makes projects feasible, then the subsidiarity principle is fully satisfied.
3. The *internalisation of external* effects is closely related to the realisation of economies of scale and introduces a coordination argument in favour of centralised decision-making. It is well known that RTI has substantial interregional spillover effects. A primary example for the internationalisation of external effects is related to *global public goods* (GPGs, see Box 3).

A second argument in favour of some degree of centralization in RTI policy is quite unique to the EU. It is related to *policy coordination, learning and cohesion policy* on the European level. While it is generally acknowledged that innovation is central to economic growth, innovation policy does not receive the same amount of attention across EU member states. In many New member states innovation policy is still in a formative phase: Innovation related issues rank low in the national agendas, since absorption of funds and political reasons oblige

policy makers to give priority to 'visible' projects like construction. Here the European Union (to be more precise the Commission) has the possibility to push the innovation policy agenda and to lead the policy discussion, to facilitate the transnational exchange of innovation knowledge and to support mutual (policy) learning by establishing and promoting respective networks. This situation shows that innovation is an important instrument in catching-up strategies (knowledge diffusion). On the other hand, innovation policy gains in importance as countries approach the technological frontier and are forced to strongly invest in their own technology development to further improve their competitive position (knowledge deepening). The two major tools in the hands of the Commission are the Framework Programme and cohesion policy.

Box 3: Global public Goods and RTI policy

The opening of national borders has increased the volume of cross-border influences and led to an extension of the list of global public goods. GPGs are public goods whose benefits reach across borders, generations and population groups (Kaul et al., 1999). GPGs cover issues that range across the whole spectrum of the sustainable development agenda, from the global environment, international financial stability and market efficiency, to health, knowledge, peace, security and humanitarian rights. Global public goods are closely related to the prevention of global public bads (e.g. averting or alleviating the risk of global pandemics, civil wars). With global public bads the rationale for transnational policy intervention is straightforward: If the prevention of global public bads corresponds to national needs and self-interest, then coordinated action among states is required to escape from the prisoner's dilemma scenario. This dilemma originates from the non-excludability of GPGs nullifying incentives for any state to act positively, but rather providing incentives for it to wait in hope for others to take the initiative. Although the joint payoff for countries would be higher if they cooperated, each one has an individual incentive to cheat - even after promising to cooperate (Gardiner and Le Goulven, 2001). Stiglitz (1999) argues that the GPG-nature of knowledge calls for supra-national government intervention and institutions for research in science related to GPGs. Scotchmer (2005, p. 347) argued that the dearth of international efforts to coordinate public spending on innovation led to an inefficient shift from public sponsorship of research towards the private sector via IPR policies. In the case of GPGs the market mechanism does not provide the necessary incentives for investing in research and development. Therefore, the GPGs lend support for supranational 'mission oriented' RTI policies.

It is sometimes argued that the specific themes selected for the Framework Programme help to set RTI agendas in the member states. Thus the

Framework Programme is crucial for the European RTI policy landscape, despite limited resources when compared to the public expenditures of some member countries. Structural funds on the other hand, are targeted towards less favoured regions. Cohesion policy was an important element that helped to shape RTI policy in a number of countries. Given the intention to further orient Cohesion policy towards RTI initiatives, this will also be the case for the majority of the new member states. The pronounced horizontal and vertical fragmentation of RTI policy in Europe is a main reason for the Union to engage in a more intense policy coordination. Georghiou (2001) attributes the more efficient coordination of national and European RTI policies to the European level.

The existence of interregional spillovers does not necessarily require the exclusive concentration of competence upward to the central level. Grants-in-aid, fiscal transfers or horizontal co-operation among jurisdictions are tools to internalise externalities. In these cases a supra-national entity plays a catalytic role. But there may be remarkable negotiation and transaction costs associated with interjurisdictional coordination that will likely lead to an unsatisfactory internalisation of externalities and welfare losses. Uncooperative behaviour and substantial free-rider-effects make centralisation necessary (e.g. Thomas 1997: p. 168).

4. The implications of the competition argument are not entirely clear cut. On the one hand policy competition in decentralised systems can strengthen political and organisational innovation and can therefore realise efficiency gains (cf. Oates 1999). On the other hand *inter-jurisdictional competition* can have negative effects: These are especially emphasised in the literature with regard to tax competition.

With regard to RTI policy the increasing internationalisation is challenging the role of the nation state as the central locus of regulatory regimes and legislation governing production and exchange in a number of ways. Consumers and collaborating and competing firms are less bound to national borders. From an economic perspective, the European project is synonymous with the creation of a harmonised internal market. While this applies foremost to the basic legal underpinnings of economic activities, it also justifies policies that help to bring about progress in specific areas. For example, while multinational enterprises (MNE's) are hardly influenced by the insulated policy measures of one national innovation system, there is a risk of policy competition between countries when all governments are willing to subsidise the inflow of R&D activities in order to promote RTI intensity in their territory (Lundin et al., 2004, p.20). In this case supranational coordination can mitigate wasteful rent seeking behaviour. Scotchmer (2005, p. 347) argues that the dearth of international efforts to coordinate public spending on innovation has led to an inefficient shift from

public sponsorship of research towards the private sector via IPR policies. Narula and Dunning (1998, p. 14) argue that international IPR policies are necessary in order to encourage and monitor cross-border R&D alliances and to reduce uncertainty attached to it.

5. Political economy arguments in favour of decentralisation involve the augmentation of democracy in decentralised systems and the reduction of rent-seeking behaviour which leads to a suboptimal consideration of preferences of some constituencies and hence to welfare losses. On the other hand the issue of corruption and quality of the administration is less clear cut: There is a trade-off between local corruption on a small scale and central corruption on a large scale on the one hand, and the attraction of more qualified personnel and the development of a skilled administration by direct participation on the other hand (cf. Breuss and Eller 2003: p. 13).

The arguments in favour of an supranational European RTI policy emphasise the internationalisation of RTI, the increase of positive externalities through technological spillovers and the internalisation of negative external effects through the coordination of RTI policies and public goods. In fact, “policies where economies of scale and/or externalities are predominant should be allocated at the union level, or even at the world level. Instead, policies where heterogeneity of preferences are high relative to externalities should be allocated to a national or a sub-national level.” (Alesina et al. 2001:1). This makes clear that the subsidiarity principle is vindicated for innovation policies with an exclusive national and regional orientation. The multi-level nature of the governance of RTI policy in the EU is here to stay.

It becomes clear that EU RTI policy involves more than just the Framework Programme. It extends also to IPR regulation, standardisation and cohesion policy. This and the focus on policy coordination and learning suggest that the relevance of a European RTI policy must not primarily be measured by comparing volumes of budgets. In fact, EU RTI funding is small when compared to RTI expenditures by most member states. It needs to be understood as an essential supplement to national efforts. With regard to innovation policy, the contribution of a better coordination of RTI policy across different policy levels might prove to be much more important than the financial contribution of EU RTI policy.

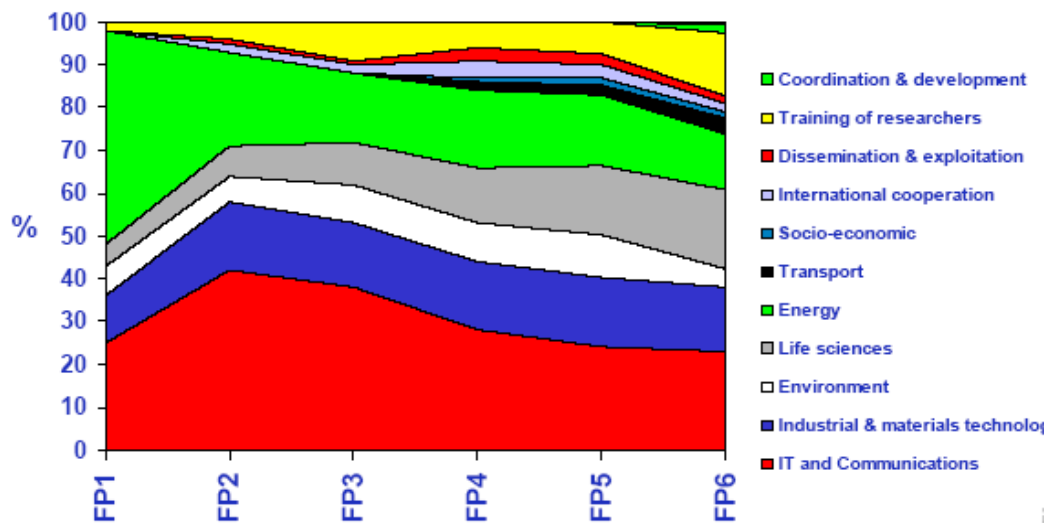
3.2 The evolution of EU RTI policy

EU RTI Policy has gone through various phases until today. RTI Policy as a European Commission policy practice was initiated in parallel to the 1st Framework Programme (1984-87). The Europeanization mainly emerged as a response to the growing technology gap between European economies on the one hand, and those of the U.S. and Japan on the other (Peterson and Sharp, 1998). A number of Framework Programmes have been launched since then to assist European industry in developing scientific and technological inventions.

3.2.1 The first five Framework Programmes

The first Framework Programme established in 1984 focused on industrial technology, information technology, telecommunications and biotechnology. Each of the subsequent Framework Programmes has been broader than its predecessor in the scope of technologies and research themes. Also, the thematic priorities of the Framework Programmes have shown remarkable changes. Figure 2 presents the relevant importance of the various technological areas and horizontal actions. Over time the share of training of researchers has increased, as has that of life sciences, while funding for energy has been substantially reduced in relative terms over time. Socio-economic research has been a European RTI topic since the 4th Framework Programme. Coordination and development has only been present since the 6th Framework Programme. This heading includes the ERA-NET initiatives which aim at the mutual opening of national and regional research programmes in order to realise the ambitious project of the European Research Area by improving the coherence and coordination of research programmes across the European Union.

Figure 2: Changing priorities – the relative importance of the various technological areas and horizontal actions in the overall budgets of the Framework Programmes

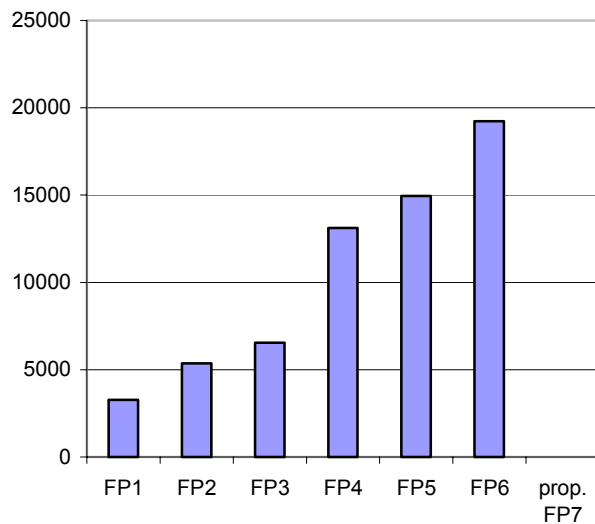


Source: European Commission (2004C)

The growth of funding of the Framework programme is depicted in figure 3. As a consequence of the growth of the Framework Programme, a considerable policy-making administration developed at the European level. In fact, if one considers the evolution of the share of Framework Programme funding by type of participant, one clearly sees that the participation of business enterprises declined substantially from approximately 60 % during the 2nd Framework Programme to approximately 33 % in

the 6th Framework Programme. In terms of participation, the decline proceeded from 40 % to approximately 27 %, while the share of participation of institutions of higher education increased substantially. This indicates that the Framework Programme is shifting more and more from an applied and precompetitive orientation towards a more science-based orientation. Officially, the EU innovation policy initiatives are restricted to the creation of "European value added". In addition to the arguments put forward in the preceding section, the substantial leverage effects on private investment are increasingly used as an argument for RTI at the EU level (cf. EU 2005: pp. Annex1-21). This has led to a situation in which the Framework Programme is formally differentiated from national institutions by the subsidiarity principle, but sometimes competes with national policies (e.g. in the field of innovation support for SMEs).

Figure 3: Evolution of the FP budget (in million Euro)



Source: EC 2005

The 4th Framework Programme was an important milestone in EU RTI policy. During the 4th FP a number of policy lines were developed that were implemented in the next FPs. Attention turned to the establishment of a more 'systemic approach' to European RTI policy. The former policy of mere funding has been replaced by more comprehensive innovation policies, because mere funding has proved insufficient for European firms to raise their international competitiveness. In addition to research and technology policies, the new comprehensive approach includes education policies, competition policies and environmental policies, among others (Grande, 2000).

The 5th Framework Programme was the partial implementation of the first action plan on innovation. Key policy initiatives like the Trend Chart, Innovation Financing, start-up support and IPR. Special emphasis was put on the innovation activities of SMEs.

3.2.2 The Lisbon Strategy, ERA and the 6th Framework Programme

In 2000 the Lisbon Strategy was adopted and the basic principles of a European Research Area (ERA) were discussed and agreed upon. Those initiatives represented a major shift for EU RTI policy. With ERA, the European Commission challenged the current division of labour in RTI policy by promoting a further integration of research systems and their governance.

The 6th FP was designed to promote this process. It aspires to having a structuring effect on the often heterogeneous research concepts and research projects in the ERA. The New Instruments implemented with the 6th Framework Programme aim to establish self-organised, long-term transnational cooperation across Europe. While the structure of the Framework Programme is based on the support of priority research areas, the organisation of the ERA is based on horizontal measures with the aim of strengthening the basis of ERA by means of coordination and support measures.

Key priorities of the Lisbon Strategy are *the realisation of the knowledge society*, the reinforcement of the internal market, the creation of a favourable climate for entrepreneurs, the building of an inclusive market for stronger social cohesion and the support of an environmentally sustainable future. The main purpose of the Strategy is to commit EU countries to a strategy to raise the rate of growth and employment to underpin social cohesion and environmental sustainability, and becoming the most competitive economy in the world by the year 2010. The Lisbon Strategy and the 3% on R&D Barcelona objective are milestones in EU RTI policy. The Lisbon strategy placed RTI at the heart of EU policy goals and led to a reorganisation of EU RTI policy by putting in place new European initiatives such as the European Research Area (ERA), the Innovation 2000 initiative and the provision of new policy-making tools like the open method for coordination.

Table 6: Comparing the Single Market and the Lisbon strategy

	Single Market	Lisbon strategy
Ultimate aim	Integration and growth	Growth, social cohesion, employment
Intermediate objectives	Cuts on cost of cross-border transactions for products and services	Fostering RTI and education Increases in labour force participation
Means	Elimination of border controls Harmonisation of laws	Open method of coordination
Instruments	EU directives Enforcement by case law of courts	Mostly national (spending, taxation, regulation)

Source: Sapir et al. (2003) p. 85.

The development of the ERA not only requires the provision of resources and the setting up research facilities but also more importantly the coordination among national research programmes and national RTI policy. The 'Innovation 2000' initiative was developed in parallel to ERA. Managed by the European Investment Fund, the initiative

aspired to mobilise money towards new technology based firms, start-up companies and research spin-offs by partially re-directing the Venture capital market into more early stage categories of 'deal flows'. The Innovation 2000 initiative 'squeezed' the subsidiarity principle by investing in national markets.

Box 4: The open method of coordination and EU RTI policy

The open method of coordination (OMC) consists of four main ingredients: (i) definition of common guidelines for national policies, (ii) performance reporting to compare best practice, (iii) adoption of national actions plans to implement guidelines and (iv) monitoring. The process is based on voluntary coordination and networks. Outcomes are open. The Commission has no grip on what is needed to make the open method of coordination work.

In the realm of RTI policy the starting point was the diversity of RTI systems across Europe. OMC was not limited to the exchange of information and indicators, but included discussions about 'best practice' of policy instruments and mix. In early 2005 a second cycle of OCM was launched with the following topics (EC 2005 D):

- Encouraging the reform of public research centres and universities, in particular promoting technology transfer to society and industry;
- Design measures to promote the growth of young research-intensive SMEs;
- Design and evaluation of the fiscal measures to promote business research, development and innovation
- Improving the design and implementation of national policy mixes, and
- IRP ownership regimes in the public sector.

However, for the time being OMC is oriented toward the integration of discursive practices and norms rather than toward the integration of policy making itself. Nevertheless, the OMC has led to an increased awareness and europeanization of the RTI discourse that has also had normative effects on national RTI policy (cf. Edler and Kuhlmann 2005).

In contrast, the ERA-NET projects of the FP aim at increasing the cooperation of research administrations and funding bodies provide a tool for coordination and integration of RTI policy from below.

Given the importance of the Lisbon strategy for EU policy, it is useful to compare it to another great process of the EU: the creation of the Single Market. Table 6 provides an overview of the differences. In comparison to the 1985 Single Market Programme, narrow objectives, defined means and effective instruments have been replaced by

broad objectives, softer means and quite weak instruments (Sapir et al. 2003: 85). Overall, the Lisbon strategy identifies a large number of policy objectives that are more or less shared by all EU countries, but includes topics that were previously outside the direct influence of centralised EU policy such as education, research and labour markets. Thus, main policy responsibilities are subject to the subsidiarity principle and remain with the member states. The open method of coordination reflects the subsidiarity principle and is oriented towards a discourse across national governments (see Box 4).

Following the Lisbon Summit, almost all European Councils focused much of this discussion on the ways that Lisbon targets could be achieved. The intention of FP6 (2002-2006) was to support and strengthen the ERA concept and thus to contribute to the fulfilment of the Lisbon Strategy on the part of the Commission. However, severe criticism was raised concerning the ambitious targets set in Lisbon and the apparent inability of the member states to fulfil these. For example, the Kok Report (Kok 2004) concludes that the disappointing implementation and results are also due to a lack of determined political action. It claims that the agenda has been overloaded, that coordination has been poor and that the priorities are conflicting. The Commission proposals on the 7th Framework took up these challenges.

While the FP is the main pillar of EU RTI policy, the European Commission developed a number of regional policy initiatives in the so-called "less favoured regions". Over time there has also been some orientation towards RT in the Structural Funds (cohesion funds and regional funds). Especially in the new Structural Funds there is a strong emphasis on European cohesion policy backing the priority of sustainable development. In light of the discussions on the Lisbon strategy, considerable effort went into the creation of synergies and complementarities between European RTI policy and European cohesion and regional policy. This led to the Commission's proposals for the 7th Framework Programme, the new Structural Funds (2007-2013) and the Competitiveness and Innovation Programme (2007-2013) with the aim of forming a more coherent European RTI policy.

3.3 The instruments of EU RTI policy

The main pillar of the architecture of the European RTI policy system is the FP which concentrates on precompetitive scientific and applied research and also includes the Commission's instruments that aim at structuring the European Research Area. In addition to the FP, the new Competitiveness and Innovation Framework Programme (CIP) and the Structural and Cohesion fund programming follow the main direction of the Lisbon Strategy.

3.3.1 The Framework Programme

The FP follows the rationales of RTI policy at the European level, and is oriented towards the provision of EU-wide public goods and policies in the fields of science, technology and research. Increasingly the FP not only aims at generating EU-wide spillovers by supporting cross-national collaborative research projects, but also at internalising negative externalities by attempting to coordinate national RTI policies within member countries through ERA-NETs and the open method of coordination.

The rationales for EU RTI policy imply that the FP ignores any systematic locational aspect in the selection of projects. There is a strong focus on supranational collaboration, i.e. the requirement that participants in research projects come from different countries. The FP is organised at a European level and projects are selected on a competitive basis with research excellence and innovative potential as the primary criteria of selection. The FP has no country-specific financial allocation. This would contrast with both the goals and rationales of the FP.

The Commission Proposal for the 7th Framework Programme seems to be ambitious, as it proposes the doubling of the annual research budget resources for RTI. However, in light of a number of critical reports (Sapir et al. 2003, Kok 2004) that indicate that Europe needs to invest more in the development of new technology and education in order to achieve higher growth rates and the task of creating a European Research Area, the proposal seems to be quite modest. In fact the most important changes between the previous 6th Framework Programme and the proposed 7th Framework Programme are: (i) the size of the budget, (ii) the duration of the Framework Programme, which has been increased to a duration of 5 to 7 years, (iii) the orientation towards frontier scientific research outside collaborative research, and (iv) a new organisation for the FP.

There will be four programmes:

- **Cooperation**
The objective of the specific programme on Cooperation is to support the entire range of research activities carried out in transnational cooperation and organised in nine thematic categories.³ The instruments to structure the European Research Area (ERA-NET, ERA-NET+) are considered under this heading. The bulk of this programme is industry-driven and concentrates on collaborative research.
- **Ideas**
This programme is oriented towards scientific frontier research. Competition on the European level should assure that the best research projects across all

³ see table 7 for the nine thematic categories.

scientific fields are selected. This programme is overseen by the European Research Council.

- **People**
The aim of this programme is to increase the human potential of research and technology in Europe. The set up of a coherent set of Marie Curie actions focuses on increasing the mobility of researchers and thereby reducing the fragmentation of the European research area.
- **Capacities**
The objective of this programme is to support research infrastructures, research for the benefit of SMEs and the research potential of European regions (Regions of Knowledge), as well as to stimulate the realisation of the full research potential (Convergence Regions) of the enlarged Union.

Table 7 presents the budget breakdown of the 7th Framework Programme as proposed by the European Commission. It is clearly visible that a large chunk of the Framework Programme is oriented towards the cooperation programme. The theme Information and Communication Technologies alone is larger than all other programmes assembled under the FP. The second largest theme is Ideas, the proposed EU initiative for frontier research which accounts for 16.3 % of the proposed funding. Issues with a clear regional or cohesion objective have a minor importance. The themes of regions of knowledge and research potential account for 0.2 % and 0,8 % of the funding, respectively. The dimension of the new objective frontier research gives a clear indication of the evolution of the orientation of the FPs over time. While the FP was initially oriented more toward collaborative applied and business-oriented research than national applied RTI initiatives, the FP is now also becoming an instrument of science policy.

Overall, the impression emerges that the 7th Framework Programme is primarily motivated by a 'technology push' conception of technological change. The proposal aims to foster ERA through a restructuring of the European research fabric to overcome fragmentation and create critical mass. This is especially visible in the further implementation of coordination programmes of national research programmes (ERA-NET and ERA-NET+), the institution of the European Research Council and the promotion of the mobility of researchers. An important question is whether this proposal does conform to the rationales of a European RTI policy as described in section 3.1.

Table 7: Budget breakdown of the Commissions proposal for the 7th Framework Programme (2007-2013)(in EUR million)

programme	Theme	Mio Euro	Per cent
COOPERATION	<i>Health</i>	8317	11.4
	<i>Food, Agriculture and Biotechnology</i>	2455	3.4
	<i>Information and Communication Technologies</i>	12670	17.4
	<i>Nanosciences, Nanotechnologies, Materials and New Production Technologies</i>	4832	6.6
	<i>Energy</i>	2931	4.0
	<i>Environment (including Climate Change)</i>	2535	3.5
	<i>Transport (including Aeronautics)</i>	5940	8.2
	<i>Socio-economic Sciences and the Humanities</i>	792	1.1
	<i>Security and Space</i>	3960	5.4
	Total Cooperation	44432	61.1
	IDEAS	<i>European Research Council</i>	11862
PEOPLE	<i>Marie Curie Actions</i>	7129	9.8
CAPACITIES	<i>Research Infrastructures</i>	3961	5.4
	<i>Research for the benefit of SMEs</i>	1901	2.6
	<i>Regions of Knowledge</i>	158	0.2
	<i>Research Potential</i>	554	0.8
	<i>Science in Society</i>	554	0.8
	<i>Activities of International Co-operation</i>	358	0.5
	Total Capacities	7486	10.3
Non-nuclear actions of the Joint Research Centre		1817	2.5
TOTAL		72726	

Source: EC 2005: p.48

Note: This breakdown is based on the original Commission proposal. The new proposal for the 2007 – 2013 financial framework earmarks EUR 48081 million for the 7th FP.

3.3.1.1 The Framework Programme and the rationales for EU action: An assessment

The nine thematic priorities of the *cooperation* programme are all related to EU-wide or global public goods or directed towards issues with large potential external effects for the EU. Moreover, the multi-national collaborative nature of the research project under the heading cooperation ensures that the research projects are generally precompetitive, and that the windfall gains are limited. In fact, Luukkonen (2000) emphasises that the added value of European research does not necessarily lie in the funding of research which would not otherwise have been carried out – that is its simple 'additionality'. Instead, this added value may arise from its capacity to change the way in which research is carried out in Europe. However, there is substantial evidence that collaborative research projects in the FP have large additionality effects (e.g. see the references cited in European Commission 2005: Annex 1 Section 2). Coordination projects (e.g. ERA-NET) are justified by the policy coordination function among member states with the aim of fostering learning of best practice in RTI policy making on the national level.

The programme *ideas* are more controversial. At the beginning of the consultations on the 7th Framework Programme, some countries put forward serious reservations

regarding the European Research Council. These reservations have since been smoothed out, but at first sight the establishment of the European Research Council (ERC) does in fact appear to contradict the subsidiarity principle. The ERC (cf. also EC 2004) would set up a competitive fund for scientific research at the European level that is not connected to collaborative research and that moves beyond the thematic priorities of the cooperation programmes. The rationales provided by the European Commission in favour of the programme do not sound entirely convincing (cf. EC 2005: 36) in light of their own argumentation with respect to a purported "European Paradox".

The central point of the "paradox" is the claim that the EU's scientific performance is good when compared with its main competitors, and at the same time that Europe's weakness is the translation of research into innovation and competitive advantage. This argumentation is also visible in the EC's background report for the FP, where it is explicitly stated that the main problem of the European research landscape is a commercialisation gap in applied science (see EC 2005: p. Annex 1-13). That is, the high level of performance in a large number of fields does not translate into applied research and innovations. The creation of a Community patent would probably have a larger effect on closing the commercialization gap in some areas than the establishment of an ERC. However, Dosi et al. (2005) argue that the "paradox" itself is a myth. While it is true that Europe has overtaken the US in total number of published research papers in absolute numbers, the claimed "excellence" disappears when publications are scaled by population.

Table 8 presents publications and citations from these publications weighted by population and university researchers. The data clearly show that the US is well ahead of the EU with respect to both publications, citations and top 1% publications. The US leadership is based on the quality of research rather than the number of researchers.⁴ The common argument that there is substantially more business funded R&D in the US than in Europe is true for most EU countries except Sweden and Finland. However, government-financed R&D is also higher on average in the US than in the EU-15 countries, with the exception of Finland, Sweden, France and Germany (cf. Dosi et al. 2005). The fragmentation of European scientific research – also reflected in the comparatively lower productivity of European researchers – certainly plays an important role.

There is a role for the ERC in the FP.⁵ In the long term, any viable concept of ERA requires a European provider of competitive funding for frontier research. The ERC should mirror the American National Science Foundation (NSF) by relying on world-class peer review. In order to provide any benefits for the ERA, a country-specific allocation of funds must be avoided. The proposal of the ERC is a first step in this

⁴ The objection that EU-15 countries are heterogeneous is not critical. The US value is also an average over states with heterogeneous performance.

⁵ Science is essentially a global public good – especially when the scientific gift economy of scientific networks (cf. Lohmann 2006) that are closely related to the open system of science (Dasgupta and David 1994) are taken into account.

direction. A Europe-wide competitive mechanism would increase the competition between researchers and guarantee that the best scientific projects are selected at the European level. A close cooperation between national providers of competitive funds and the European Research Council is required in order to keep the duplication of efforts to a minimum. There must be a division of labour between the ERC and the national research funding institutions. For example, the specialisation of ERC on leading edge frontier science must be complemented by national funding agencies, which in turn focus on the enhancement of structural national or regional competencies. Another possibility would be to limit – only in the beginning – part of the ERC funding on multinational research projects. However, a partial overlap of activities between the ERC and national funding institutions is not likely to be harmful (cf. Edler and Kuhlmann 2005).⁶

The *people* programme rests on sound rationales. Fostering the internationalisation of European researchers decreases the fragmentation of European research and creates "European-value added" through increased possibilities for cross-national networking, competition and the diffusion of knowledge.

Table 8 Publications and Citations weighted by Population and University Researchers

Publications

	Publications per capita	= Publications per researcher	× Researcher per population
US	4.64	6.80	0.68
EU-15	3.6	4.30	0.84

Citations

	Citations per capita	= Citations per researcher	× Researcher per population
US	39.75	58.33	0.68
EU-15	23.03	27.52	0.84

Top 1% publications

	Top 1% publications per capita	= Top 1% publications per researcher	× Researcher per population
US	0.09	0.13	0.68
EU-15	0.04	0.04	0.84

Source: Dosi et al. (2005)

⁶ The ERC – if some of the funds are reserved for collaborative research - will most likely have a stronger impact on the creation of the ERA than the "Networks of Excellence" projects, which are conceived for fostering exchange and networking, but do not support research as such.

The rationales for the *capacities* programme are more differentiated. We need to consider the themes separately:

(i) The coordination of activities in the field of *research infrastructures* in Europe is necessary in order to use existing and new infrastructures in an efficient way. The intentions of this programme show clearly that the orientation is not towards redistributive goals but to the efficient use of scarce resources, the elimination of wasteful duplications of effort and the creation of infrastructures that have a EU-wide value added.

(ii) The rationales for *research for the benefits of SMEs* are less convincing within the setting of the FP. It touches the issue of subsidiarity quite substantially. Given the orientation towards EU-wide public goods and the internalisation of external effect on an EU-level of the FP, it is not entirely clear why redistribution towards SMEs should have specific priority beyond encouraging the participation of SMEs and SME associations through the general reduction of administrative burdens of participation in the Framework Programme. This programme should therefore be integrated with the CIP.

(iii) The rationales for the *regions of knowledge* programme are based largely on the systemic perspective of RTI policy and have a well-founded coordination function which is oriented towards the exchange of good practice and reduction of wasteful expenditure. Such coordination projects can also be thought of as a device with which to foster the effectivity of interjurisdictional competition for policy solutions. Such projects enhance policy learning processes, the articulation of initiatives and the possibility for comparison.

(iv) The *research potential* programme is motivated by redistributive arguments. This needs to be tied to participation in collaborative projects under the programme cooperation. If this is not the case, this instrument should be related to the CIP or even better to a competitive RTI fund in the Structural Funds.

(v) The *science in society* programme aims to stimulate research and initiatives on the broad issues on the interactions between science and technology and the European society as a whole. As these projects have a clear European focus and the answers to questions related to the interaction of scientific and technological development with political and social developments are of European interest, the coordinative and public goods orientation must be considered present.

(vi) The *activities of international cooperation* complement the international cooperation activities under the Cooperation and Peoples programme by supporting actions and measures that focus on different themes and supporting coordination of national programmes on international scientific cooperation. As long as global public goods are concerned, this focus is clearly in accordance with the rationales for an EU policy.

Overall, the assessment shows that the Framework Programme is in fact geared towards European public goods, the internalisation of negative externalities through coordination and the creation of positive externalities on a European scale. Thus the Framework Programme largely fulfils the criteria for policy at the EU level.

3.3.2 Competitiveness and Innovation Programme (CIP)

The Competitiveness and Innovation Programme (CIP) is a new Framework Programme that brings together several existing EU activities that support competitiveness and innovation. It ensure the continuity of programmes with a proven and successful track record. This Framework Programme consists of three distinct programmes:

- The Entrepreneurship and Innovation Programme

A first objective of this programme is to encourage entrepreneurship and improve conditions for entrepreneurs and SMEs. Actions are geared towards the improvement, encouragement and promotion of access to finance for the start-up and growth of SMEs and investment in innovation activities. Further goals include the creation of an environment favourable to SME cooperation, innovation in enterprises, entrepreneurship and innovation culture, and enterprise and innovation related economic and administrative reform including policy analyses, development and coordination with participating countries.

- The ICT Policy support Programme

This programme is oriented towards the creation of the Single European information space by strengthening the internal market for information products and services, the stimulation of innovation through a wider adoption of and investment in ICT.

- The Intelligent Energy – Europe Programme

The aim of this programme is to support sustainable development in the energy context by supporting energy efficiency and the rational use of energy resources, as well as promoting new and renewable energy sources and supporting energy diversification.

The indicative budgetary allocations for the specific programmes in the original Commission proposal was: EUR 2631 million for the Entrepreneurship and Innovation Programme, EUR 801.6 million for the ICT Policy Support Programme, and EUR 780 million for the pursuance of the Intelligent Energy – Europe Programme. But note, that the new financial framework reserves EUR 3284 million for the 2007 – 2013 CIP instead of EUR 4213 million.

3.3.2.1 The CIP and the rationales for EU action: An assessment

The CIP is geared towards innovation policy. It stretches the subsidiarity principle more than the FP, especially when it comes to the promotion of venture capital and entrepreneurship. In this field, a number of quite similar programmes are in place in the member states. However, although the subsidiarity principle is stretched, the CIP is generally consistent with the arguments in favour of a European RTI policy as outlined above. The argument in favour of the CIP is primarily related to the coordination principle. The aim of the CIP is to support competitiveness and innovation policy by supporting the coherence of innovation policy across member states. The main rationale for this Framework Programme is that there are complementarities in addressing market/systems failure with respect to specific innovation policy areas, namely SME, ICT and energy innovation policy. The actions within the CIP that emphasise the coordination of policy making and policy learning at the national and the regional level, and the actions which are oriented towards diffusion of knowledge and cross-border relations are in line with the outlined arguments for an EU RTI policy, as are the shared cost actions that are undertaken in areas where the European dimension is important. However, it is important to remember that the natural location of innovation policy is the region and national level.

The CIP is complementary to the FP, as it focuses more on innovation and SMEs than on science, research institutions and large scale projects with EU-wide external effects. This programme complements the efforts of the FP to bring the ERA one step further forward towards a European research and innovation area that complements the Single Market.

3.3.3 Cohesion policy

European cohesion policy is motivated by entirely different rationales than the FP and the CIP. Due to the 2004 enlargement with the associated increase in income disparities across the European Union, the future of European cohesion policy is even more contested than the FP.

3.3.3.1 Rationales for an EU Cohesion policy

The central motive for a redistributive policy at the European level is the concern about regional inequalities – disparities in income, unemployment and standard of living among regions often belonging to the same country. The redistribution programmes at the EU level are closely tied to the belief that the geography of economic activity matters, and that agglomeration externalities benefit economic activity close to the centre (cf. Puga 2001, European Commission 2004D). The primary justification for redistribution is equity. A secondary justification is that redistribution is necessary in some cases to prevent costly unilateral actions. The European Commission emphasises that redistribution helps to create a more equal playing field for interjurisdictional competition by fostering the convergence of less favoured regions

and member states within the European Union. This is related to time-limited and geographically focused intervention in order to assist economic convergence or diversification. However, this argument is not entirely persuasive, as redistribution can stand in the way of needed regional adjustments that promote development in the less favoured regions by restricting the flow of resources (both in and out) in response to disparities. This suggests that the rationale for a European locational redistribution policy is stronger when there are substantial barriers to mobility (Casella 2005).

3.3.3.2 EU Cohesion policy

European cohesion policies can be grouped into two categories:

1. Convergence policy, which aims at promoting regional convergence by allocating development funding to member states and regions on a non-competitive basis. The convergence of countries is funded through the Cohesion fund. The regional aspect is addressed through the European Regional Development fund (ERDF). Its orientation is targeted on the one hand toward the structural support of so-called ‘convergence objective’ regions, that is, to regions that lag behind in economic development identified by per capita income criterion relative to the EU average. On the other hand, the ERDF targets regions with specific problems, as well as urban and regional development.
2. Social policy, that is the expenditures by the European Social Fund (ESF), which has been used to conduct active labour market policies.

The increasing emphasis within the EU on research, development and innovation is also present in the Structural Funds. In fact, the Commission proposal for a new cohesion policy aims to make EU structural actions targeted more toward the EU strategic priorities of the Lisbon and Gothenborg agenda. Due to the increased disparities associated with the 2004 enlargement - the Commission proposal aims at the same time at making redistribution more concentrated on the least favoured regions. A more decentralised and transparent implementation is promised. In comparison to the 2000 – 2006 cohesion policy the new proposal appears to be simpler - the number of objectives has been reduced from 9 to 3 and the number of instruments has been reduced from 6 to 3. Table 9 presents the budget breakdown of the Commissions proposal for the new cohesion policy.

The orientation towards convergence is clearly visible. 78.5 % of the Structural Funds have been reserved for this objective. The cohesion fund which has existed since 1993 accounts for 18.7 % of the funding and is the only fund that has a national focus. All other funds have a regional focus.

Table 9: Budget breakdown of the Commissions proposal for the new EU cohesion policy (2007-2013)(in EUR million)

Objective	Eligibility	Priorities	Minimum / maximum contribution of fund to public expenditure in per cent	Mio. Euro	Per cent
Convergence objective				264000	78.5
Cohesion Fund	member states with per capita GNI < 90 % of Community average	Transport Environment Renewable Energy	20 / 85	62990	18.7
National and regional programmes (ERDF, ESF)	Regions with per capita GDP < 75 % of EU average	Innovation Environment / Risk Prevention	20 / 75	177800	52.2
	'Statistical effect region' with per capita GDP < 75 % of EU-15 and > 75 % of EU-25	Accessibility Infrastructure Human Resources Administrative Capacity	20 / 75	22140	6.6
	Special programme for outermost regions		20 / 75	1100	0.3
Regional competitiveness and employment objective				57900	17.2
Regional programmes (ERDF)	The member states propose a list of regions (NUTS1 or NUTS2)	Innovation Environment / Risk Prevention	20 / 50	48310	14.4
and national programmes (ESF)	'Phasing in' regions covered by objective 1 between 2000 and 2006 and not covered by the convergence objective	Accessibility European Employment Strategy	20 / 50	9580	2.9
European territorial cooperation objective				13200	3.9
Cross-border and transnational programmes and networks (ERDF)	Cross-border cooperation in EU territory	Innovation Environment / Risk Prevention	20 / 75	4700	1.4
	External borders	Accessibility	20 / 75	1600	0.5
	Transnational cooperation	Culture Education	20 / 75	6300	1.9
	European cooperation and exchange networks		20 / 75	600	0.2

Source: European Commission (2004E) and associated proposals.

Note: This breakdown is based on the original Commission proposal, where the budget for cohesion policy was EUR 336100 million. The new proposal reserves EUR 308041 million for cohesion policy.

3.3.3.3 Regions or countries?

While there are good rationales for EU cohesion policy to focus on the regional level, there are also arguments for cohesion policy to focus on countries rather than on regions (e.g. Sapir et al. 2003, see also Bachtler and Wislade 2004, Richter 2005), because most regional redistribution is national, not EU-wide.

Although much of structural funding is oriented towards regions, regions often do not play a decisive role in managing European programmes. In practice, national administrations often remain decisive because local administrations lack absorptive capacity. These in turn often do not perceive the geographical dynamics at work. Thus, the coordination between the national and territorial community authorities influences the efficiency of the funds. However, the scope of interjurisdictional competition for regional development initiatives would not necessarily be limited by a restriction of the focus of structural policy to countries. For example, coordination devices for cross-national policy learning regarding innovation policy have already been put forward in the proposals for the CIP or the 7th FP. This makes clear that while redistribution is an appropriate goal at the EU level, projects must be chosen and implemented at the national or regional level, regardless of whether the action is geared towards RTI or not. Given that there are serious doubts concerning the existence and extent of EU-wide externalities of regional RTI capacity building, any attempt to centralise network-oriented innovation policy beyond the regional and national level would not enhance efficiency.

3.3.3.4 RTI policy and Structural Funds

The RTI expenditures in convergence policy are important for the discussion on excellence and cohesion in the European RTI policy. This keeps the Framework Programme in perspective, as FP is not the only EU source of funds for RTI among cohesion countries.

The aim of Structural Funds is not only to redistribute financial resources but also to strengthen the factors determining regional development. In fact, for quite some time the European Commission has strongly urged beneficiary member states to pay special attention to implementing actions in favour of innovation (e.g. European Commission 1998). Table 10 shows that, on average RTI expenditures amount to 5.5 % of the total Structural Funds support from 2000 to 2006. The differences between countries and objectives are substantial. While Belgium, Finland, Sweden and Italy dedicated over 10 % of their objective 1 funds to RTI, Greece dedicated only 1.9 % of its objective 1 funding to RTI.

Regardless of whether the allocation of funds is made to regions or the nations, the regional aspect is relevant for the formulation of catch up policies. The literature on

innovation systems increasingly emphasises the regional level (e.g. Cooke 2001, Fornahl and Brenner 2003, Muller et al. 2005) as the level at which technical and non-technical innovation occurs through learning networks of innovators and local clusters of firms and research institutions. This shows that there is a motivation derived from the system failure argument for RTI policy for convergence policy to be oriented toward regions in order to facilitate the building of appropriate institutions and networks at the regional level.

Table 10: RTI initiatives within the EU's Structural Funds

	Objective 1		Non-objective 1		Total	
	RTI expenditures million Euro	as percent of Objective 1 expenditures	RTI expenditures million Euro	as percent of non-objective 1 expenditures	RTI expenditures million Euro	As percent of total expenditures
BEL	96	15.4	73	5.2	169	8.3
DNK	-	-	35	4.3	35	4.3
DEU	1524	7.6	467	4.7	1991	6.7
GRC	410	1.9	11	1.3	421	1.9
ESP	1940	5.1	832	11.8	2772	6.1
FRA	87	2.3	511	4.3	598	3.8
IRL	252	8.2	6	3.8	258	7.9
ITA	2501	11.3	104	1.4	2605	8.8
NLD	6	4.9	21	0.7	27	0.8
AUT	19	7.3	132	8.3	151	8.2
PRT	678	3.6	15	2.05	693	3.5
FIN	119	13.0	103	8.5	222	10.5
SWE	94	13.0	56	3.7	150	6.7
GBR	412	6.6	219	2.1	631	3.8
EU-15	8128	6.0	2594	4.5	10722	5.5

Source: EC 2004D

Evaluations of RTI expenditures in Structural Funds for the period between 1994 and 1999 have shown that some initiatives have been successful, but the majority have not (ADE et al. 1999, Circa et al. 1999). According to the evaluators, this was primarily related to a strategic incoherence of the RTI investment and regional development strategies. Too often, the RTI investment was guided by a 'technology push' conception of technological change. The primary beneficiary was the public research capacity while critical capabilities of technology transfer and business research activities were not considered in an appropriate way. A thematic evaluation of the Structural Fund's contribution to the Lisbon strategy emphasised that no complete alignment of cohesion policy to the Lisbon strategy should be attempted. Investment priorities are likely to differ too much across the convergence regions to warrant a general alignment of the cohesion funds with the Lisbon investment strategies (Danish Technological Institute 2005). There is evidence that a strong orientation towards R&D-intensive industries does not have an impact in less favoured regions (cf. Midelfart-Knarvik and Overman

2002). The changes in endowments brought about by Structural Funds do not feed through to changes in the production structure. This suggests that a concentration on structural policies that favour R&D intensive industries may be misplaced. Structural policies should focus on activities that reflect and reinforce the comparative advantages of regions and countries.

The orientation towards RTI capacities and infrastructure in the Structural Funds is justified on the basis of the evidence that in the last 10 to 20 years innovation has become a crucial part of economic catch-up and development strategies. Innovation is no longer exclusively associated with the world technology frontier, and differences in technology, human capital and structural change are becoming more and more important in explaining growth differences (e.g. Aiginger 2004). However, for the orientation of aid in this respect the evaluations of past cohesion fund initiatives emphasise that research and development is only a part of the overall process of innovation. The available evidence with regard to innovation policy suggests that the reaction of cohesion regions and countries will crucially depend on the ability of their innovation systems to develop innovative networks and formal and informal institutions that support growth. The challenge of RTI policy in the cohesion and Structural Funds will be to assist adapting local policies and institutions in order to aid the enhancement and realignment of workable local and national innovation systems. In this respect it must be emphasised that policies that aim towards a general 'technology push' are likely to fail. There is a need, especially in the former socialist countries, to link the EU RTI policy in the Structural Funds to programmes designed to foster learning capabilities and innovation clusters in sectors that mirror the underlying comparative advantage and existing institutions of regions. The available evidence (e.g. Mueller et al 2005) suggests that the decentralisation of RTI competencies is limited in the new cohesion countries. The interaction and strategic fit of European money with national and regional development policies is of central importance to the success of projects. RTI policies that aim to foster firm innovation activities must be coordinated with a wide range of other policies, e.g. infrastructure provision and educational policies, in order to prevent contradictory effects and to ensure an efficient allocation of scarce resources.

3.4 A step toward a more coherent European RTI policy?

As the discussion of the main instruments of EU RTI policy has shown, the main goal of the three instruments discussed is to promote competitiveness, growth and new jobs in the EU. However, their rationales, goals, instruments and orientations differ. Overall the Commission proposals can be considered a step towards a more coherent European RTI policy. The CIP and the RTI oriented parts of EU cohesion policy help to put the Framework Programme into perspective. For a number of countries the Convergence Funds will be more important than the FP as a source for both funds and inspiration for their regional and national development strategies.

Table 11 presents an overview of the three main instruments with substantial budgetary impact of European RTI policy at the EU level. The three programmes are clearly differentiated from each other with respect to aims, rationales, spatial dimensions, targeted groups and criteria for project selection.

Table 11: A comparison of the three large programmes of EU RTI policy.

	Framework Programme	CIP	Cohesion Policy
Ultimate aim	creation of the European research area	fostering innovation within the EU	fostering convergence within the EU
Rationale	market and system failure in RTI policy, provision of EU-wide public goods	market and system failure in RTI policy	redistribution
primary spatial dimension	European	European	National and regional
criteria of project selection	bottom-up research excellence (innovative potential)	impact potential	relative national and regional backwardness (country specific financial allocation)
	except in some aspects of the capacities programme	coordination projects	evaluation of impact potential on regional (national) economy
targeted group	enterprises, researcher and research institutes as well as national and regional decision-makers in RTI policy	national and regional decision makers in RTI policy, innovative SMEs, technology transfer institutions	nation states, regions
Funding dimension 2007-2013 (Trialogue proposal)	48081 Mio. EUR	3284 Mio. EUR	308041 Mio. EUR (total) 18482 Mio. EUR (RTI)

Source: WIFO. Notes: For the funding dimension for RTI in the Structural Funds we assumed that 6 % of the Structural funds is directed towards RTI.

The FP is oriented towards the creation of a European Research Area. The main focus is on pooling and leveraging resources for the provision of EU-wide and global public goods, fostering excellence in research through mobility of researchers and setting up the ERC. At the same time the FP addresses pan-European challenges and aims at coordinating national and regional policies on RTI. The FP follows a supply-oriented conception of RTI policy and focuses on the science and research aspect of RTI. If the FP were the only RTI oriented programmes in Europe, this would clearly be counterproductive, given the fact that innovation is a knowledge-intensive process that takes place within networks of firms and organisation and has a strong regional location. It is clearly not the goal of the FP to provide tangible infrastructures in order to increase RTI capacities at a national level. The rationales of the FP are the provision of EU-wide public goods and the internalisation of externalities at the European level.

The CIP focuses on SMEs, ICT and sustainable Energy innovation. The CIP is much more innovation oriented and a large part of its funding is oriented towards SMEs. Because national and regional policies do exist in this area, it can be argued that the

CIP stretches the subsidiarity principle. However, as a number of its initiatives are oriented towards policy learning across Europe, the CIP complements the efforts of the FP to bring ERA one step further forward towards a European research and innovation area.

The RTI oriented initiatives of the proposed cohesion policy constitute an important third element for a coherent RTI policy at the European level. However, the rationales for such a policy are quite different from the rationales of EU RTI policy. Cohesion policy is not oriented towards creating EU-wide or global public goods, and neither tied to scale effects nor to the necessity of policy coordination between regions. The main argument in favour of RTI cohesion policy is related to the reallocation of resources that increase overall welfare in the Union and to the prevention of costly unilateral actions. The focus of these programmes is to foster the catch up of the least favoured regions and countries within the EU. The main rationale behind these initiatives is redistribution and capacity building. Accordingly, there is a country- and region-specific allocation of funds for these programmes based on the relative lag of national and regional economic development to the EU average.

The division of labour between the programmes is advantageous. If all EU RTI policy were squeezed into the FP, it would become overloaded. When too many ambitions are compressed into a single policy instrument, evaluation becomes impossible. Moreover, using several instruments to achieve several objectives creates confusion and inefficiency. At the same time this division of labour mirrors the needs of countries and regions at a different level of economic development for different policies and even different institutions (Aghion et al. 2002, Aghion and Howitt 2005). While the FP has the goal to foster science and research at the world frontier, the cohesion countries need a complementary RTI policy that emphasises capacity building. The FP is more oriented toward a 'technology push' conception of fostering economic and scientific progress than to the fostering of and building up of learning capabilities. The Capacities programme of the FP is oriented towards the provision of research infrastructure with an EU-wide value added. This shows that the RTI initiatives of EU cohesion policy complement the FFP and the CIP by providing an instrument for the provision of tangible and intangible RTI infrastructure.

This indeed suggests that the implementation of these programmes is a right step towards a coherent EU RTI policy that emphasises the provision of EU-wide public goods, and the coordination of national and regional innovation policies, without limiting the competition principle, which states that multi-layer decentralised systems strengthen political and organisational innovation via a competition by experimentation between regions and countries.

4. Excellence vs. Cohesion in EU RTI policy: An assessment

In section 2.1 we argued that there are three lines of conflict regarding excellence and cohesion in the European RTI policy. Possible conflicts between excellence and cohesion primarily emerge in the almost exclusive orientation towards excellence in the FP and the relative importance of the FP and cohesion policy in the European Budget.

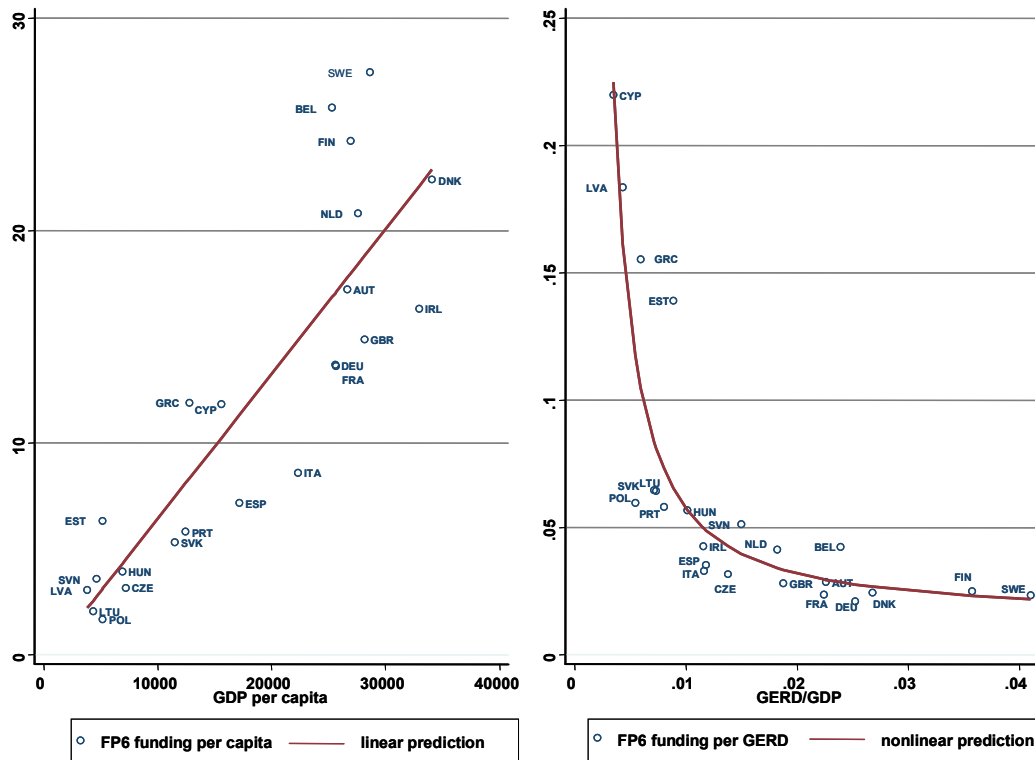
4.1 Excellence and cohesion as project selection criteria in the FP

From the assessment of the rationales, goals and instruments of the FP it follows that cohesion or redistribution should play no role in the selection of research projects. The only criteria should be research excellence and the innovative and impact potential evaluated on the EU level. If the selection procedures lead to the impression that poor proposals went through, then it is the review process that needs to be tightened and made more transparent, but this has nothing to do with cohesion (Sharp 1998). Cohesion may affect the membership of RTD consortia. It is well known that the Commission looks favourably on the inclusion of project participants from Cohesion Countries. The response to this influence was to include members from Cohesion Countries. The involvement of 'weaker' partners in research consortia is a wholly different issue from the quality criterion on the research projects as such (Sharp 1998). In fact, the New Instruments are often criticised by small countries because new instruments favour large scale projects and large countries therefore stand to benefit more. Here, the policy of the Commission to favour the inclusion of 'weaker' partners works against a structuring of the ERA by exclusion.

Figure 4 illustrates two different aspects of the distribution of funds in the Framework Programme. The first panel in figure 4 relates funding for the first third of FP 6 funding per capita to GDP per capita.⁷ As expected from the orientation of the FP, the relationship is positive, with richer countries receiving a larger share of funding from the FP than poorer countries. This is often criticised. However, when capacities are taken into account, a slightly different picture emerges. In the second panel, where the contribution of the FP to the national gross expenditure on research and development is related to the share of gross expenditure on R&D in GDP, we clearly see that the relationship is negative. That is, the FP is more important for R&D expenditures in countries that have a low capacity for R&D as measured by the ratio of gross R&D expenditures to GDP. This leads to the implication that, when measured against their own R&D efforts, some of the cohesion countries in fact do very well. In absolute terms the richer countries receive more funding, but when the R&D capacities are taken into account this is not true for all cohesion countries. In fact, as the second panel in figure 4 illustrates, the contribution of funding contracted via the FP to national GERD is larger for all cohesion countries than for the 'richer' countries - with the exception of the Czech Republic which ranks below Italy and Belgium.

⁷ Only data relating to the first third of FP funding is available. The data relating to the first sixth of FP6 funding were also available, and here, the picture was essentially the same. See also Albercht and Klusacek (2005).

Figure 4 Contributed FP6 funding per member State: per capita vs. per capacity



Source: The data on contracted contributions are based on European Commission, Data base of the SP1 Programme Committee, and were made available by Vladimir Albrecht (Technology Centre Academy of Sciences of the Czech Republic). The data on GERD and population is from the AMECO Database, Eurostat. Notes: Panel (a) reports the distribution of funding in the FP per capita vs. GDP per capita. Panel (b) reports the distribution of funding in the FP per GERD expenditures vs. GERD as a fraction of GDP.

4.2 Excellence and cohesion as goals of the Framework Programme

Neither the history of the FP nor the current Commission proposal reflect that the FPs aim to provide tangible RTI infrastructures other than RTI infrastructures with an EU-wide value added. The provision of tangible infrastructures is the responsibility of member states. For cohesion countries there is the possibility to use Structural Funds to build up infrastructures.

There are two interrelated arguments against the provision of RTI infrastructures for national and regional capacity building and, more generally, against the introduction of cohesion goals into the FP:

1. The FP are the expression of a supranational European RTI policy that is oriented towards the provision of EU-wide public goods and the coordination of

RTI efforts in the member states to reduce coordination failure at the European level. Cohesion in the form of RTI capacity building does not fit into this picture. Goal congestion would reduce the effectiveness of the FP.

2. The second argument is the very existence of a European cohesion policy that is implemented with Structural Funds. The rationales for cohesion policy and the rationales for a European RTI policy are quite different, and the use of different programmes and policies is therefore appropriate.

Table 10 shows that the RTI component in the Community Structural Funds amounted to quite some funding for RTI infrastructure for Cohesion countries. In fact, the Structural Funds are (or have the potential to be) the more important source of RTI for Cohesion countries than the FP.⁸ An advantage of using Structural Funds for building up national and regional capacities for RTI is that they are administered by national and regional administrations, which are expected to provide own funds and to have a more detailed knowledge of the particular needs for RTI infrastructure. To base a national or regional strategy in cohesion countries on high-tech sectors is most likely not the best idea. The evaluation of the Structural Funds suggests that science parks and technopolies that are not connected to existing networks and competitive strengths are not functional and become 'cathedrals in the desert' (von Tunzelmann and Nassehi, 2004: 482). Moreover, the contribution to GDP of so called high-tech industries is modest. A more viable strategy would be to foster the diffusion of high technology to a wide range of productive activities including the service industries, and to base development strategies on comparative advantage. The Irish example is often cited as an example of the success of the Single Market and Structural Funds (see Box 5). While it is difficult to imagine that copying the Irish example and fostering growth via high FDI inflows is a feasible strategy for the EU-10 countries, the Irish example illustrates how a national government can effectively use Structural Funds to complement its own initiatives.

Box 5: Ireland, growth and Structural Funds

Between 1991 and 2000, Ireland grew by about 8 percent on average per year, resulting in a movement of per capita GDP from 77% to 116% of the EU average. This impressive catch-up process is often linked to Structural Funds. In reality, most observers link it to the capacity to attract foreign direct investment. Here, the Irish strategy to invest in education and life-long learning is, in addition to the creation of a business-friendly investment climate, a primary factor for the success in attracting FDI. The direct effect of the Structural Funds on the Irish growth rate was estimated to have

⁸ If one considers table 4 and compares the share of RTI-related allocation of expenditures with 6 % of the share of the structural actions for Cohesion Countries this becomes immediately evident. For example, for Spain the 2004 expenditures under the heading of RTI amounted to 1.13 % of the overall allocation, while a 6 % RTI share of structural expenditures would amount to 3.5 % of the overall allocation.

added at best approximately 0.5% to the GDP growth rate over the 1990s. This is a relatively modest number when compared to the scale of the Irish growth of 8% during this time (Barry et al. 2001). However, indirect effects are not accounted for in those estimates. The indirect effects of the Structural Funds are related (i) to the fact the Structural Funds allowed the implementation of infrastructure projects that would not have been implemented otherwise due to fiscal constraints, and (ii) it aided investment in education and life-long learning. The indirect effects are related to the fact that good administrative capacities permitted the channelling of Structural Funds into projects that were consistent with national and regional growth strategies.

4.3 Excellence and cohesion at the level of the distribution of funds in the EU budget

The previous two arguments have led to the conclusion that a conflict between excellence and cohesion does not exist at the level of European RTI policy. 'Excellence' is associated with the provision of EU-wide public goods and 'cohesion' is the redistribution of funds to ensure convergence and to implement catch-up strategies. Each has its own policy instruments that follow a distinct rationale as well as distinct project selection criteria.

At the level of funding there is always a conflict between expenditure targets. The smaller the amount to distribute, the larger is the conflict potential. In its extreme, this conflict boils down to either eliminating EU RTI policy or eliminating EU cohesion policy. Our discussion has emphasised that good rationales exist for both. Taking the subsidiarity principle seriously would require member states to perceive the EU budget differently than focusing on net payment positions. Guided by subsidiarity, member states would allocate resources toward achieving European objectives. The benefits of these objectives would not be visible in the funds flowing back to the member states, but rather in the greater prosperity of the EU as a whole and in the solidarity with poorer member states, i.e. redistribution (Gelauf et al. 2005). The focus on subsidiarity would change the existing EU budget and redirect expenditures, e.g. towards the support of Europe's knowledge economy as proposed by Sapir et al. (2003). In particular when the RTI part of cohesion policy is considered a central element of overall EU RTI policy, then the real conflict is not between excellence and cohesion but between policies that foster competitiveness and policies that reduce overall welfare.

In order to bring the budget into perspective, it must be pointed out that the EU budget accounts for approximately 1 % of EU GDP and 2.5 % of Europe's public spending. Therefore, and because both RTI policy and cohesion (redistribution) policy are multi-level policy areas, EU initiatives can only complement and supplement national efforts. EU RTI policy can never replace national RTI policy. Nevertheless, it is important to assess trade-offs between cohesion and excellence in the European budget in more detail. There are in fact possibilities to give more weight to redistribution, as well as

give more weight to competitiveness, as the discussion of the two radical scenarios in box 1 shows. Let us now consider the implications for overall EU economic development and growth.

1. Giving redistribution more weight could be associated with a more demand-oriented growth regime for the European Union as a whole. It can be argued that redistribution would create trade-related effects that would also lead to spillovers to other countries by fostering the catch-up of less favoured regions and countries. Due to a connection between demand expansion and technological change, EU competitiveness would increase. However, there are a number of flaws in this reasoning. First, it is well known that redistribution via grants need not lead to a more level playing field between regions and countries. In fact, redistribution can stand in the way of needed adjustments that would promote development and have a structure-preserving instead of a structure-changing effect. Second, as the German experience shows, trade related effects are not necessarily enough to foster growth in the industrially advanced countries. Last but not least, a near-exclusive orientation on redistribution would send the wrong signals to policy makers by providing the wrong incentives for the implementation of growth-enhancing policies across Europe.
2. Giving excellence (R&D) much more weight in the budget at the cost of cohesion goals would most probably lead to the increased polarisation of economic development across European regions and countries. A reduced budget for convergence would reduce efforts to build up administrative capacities in the regions and countries for RTI policy. It is well known that there is no automatic advantage of backwardness. Technology spillovers are not costless, domestic RTI and education investments are crucial (Keller 2004). Increased polarisation could lead to variable geometries in RTI policy with a negative effect for overall EU growth and the EU as a provider of public goods. A strong focus on a “technology-push” will most likely not benefit less favoured regions and countries. While some countries would gain, others would fall further behind. This would increase the calls for a strong redistribution policy in the future.

This suggests that there is in fact a trade-off between cohesion and excellence. On the one hand the RTI is a central driver of economic development and there are efficiency (welfare) arguments for an EU RTI policy. On the other hand the reduction of income disparities among member states is a political and economic priority in the enlarged Union. Even if the EU budgets for RTI and redistribution are quite small (if not insignificant) in comparison to RTI and redistribution budgets at the national level, the signalling effect of the EU budget and efforts are quite important. With regard to convergence within Europe, it is important to keep in mind that there are other channels of convergence than technological catch-up. Capital deepening, gains from trade and structural transformation are also essential ingredients for any development strategy. Research by Caselli and Tenreyro (2005) suggest that the catch-up of the new cohesion countries requires both the sectoral reallocation of labour from agriculture to industry and services, as well as within-industry capital deepening and

technological catch-up. With regard to trade effects, Badinger (2005) estimated that per capita income in the EU-15 countries would be about 20 % lower without economic integration (but Badinger includes GATT and WTO reforms, so that the intra-EU effect is certainly smaller than 20 %).

The discussion shows that there are good arguments for an excellence-oriented RTI policy at the EU level, which must be complemented by the efforts of member states and regions. European RTI policy is oriented towards fostering economic growth and social cohesion in the EU. Both aspects must be taken into account, but different instruments should be used. The FP should be used to move Europe (or even parts of Europe) closer to the technological frontier, and the RTI initiatives in the Structural Funds can help to build up absorptive capacities for technological spillovers, which are needed for innovative action.

5. Conclusions

European enlargement has created new challenges for European RTI policy making. As the Sapir report (Sapir et al. 2003) and other contributions made clear, in an enlarged Union variable geometry is likely to become a natural response to differences of situation or preference. However, the European Research Area cannot be oriented towards variable geometry. Thus, the coordination of EU, national and regional RTI policies is important, and even more important when the disparities with regard to RTI are increasing among member countries. Coherent policy making is necessary to generate desirable outcomes at the European level. A coherent European RTI policy must be oriented towards the creation of a European Research Area which is inclusive for researchers, businesses and research institutions from less-favoured regions, and at the same time competitive so that the best projects, best researchers and research institutions are selected.

This implies that there is no conflict between excellence and cohesion at the level of European RTI policy. The FP is oriented towards EU-wide public goods while structural and cohesion funds are oriented towards capacity building. Structural & Cohesion funds need to become an integral part of European RTI policy, although the rationales and goals of cohesion policy are inherently different from the rationales and goals of the FP. European RTI policy needs to be broader than the FP, and the 'technology push' orientation must be complemented by a more innovation-oriented approach to RTI policy at the national and regional level. Only by reducing regional disparities will it be possible to obtain a full EU RTI competence comparable to that of the US and Japan. Excellence and cohesion are required inputs to make Europe more sustainable in economic, political and technological terms.

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