The need for a European University Charter.

The assignment of responsibilities for science and R&D expenditures to different levels of government in federal systems

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Belgium plays an active role in the European Research Area, which is working to coordinate national research policies to achieve the European ambition of a knowledge-based economy.

Using the "new generation" theory of fiscal federalism, our paper will investigate the institutional structure of governance and finance in federal systems. Theoretical analysis will be compared with the empirical data to explain the inherent tension in the changing social contract for science. The Belgian context is an example of the more general problem of scientific governance in the European Union. The picture today of the EU Science and R&D policy involvement is clearly a multi-level structure of which the relevance is to be ascertained.

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All aspects of science are concerned. On this topic, economic precepts about the organization of public financing define fundamental research as a collective good with the largest externality, the financing of which is to be covered by the public bodies with the largest geographical spread of decision-making power. The EU is therefore the political authority that should cover this financing for our Continent. It is also known that a deficit in basic research handicaps the development of applied research, both to renew industry and also to meet the challenge of the globalized economy more effectively.

Recent studies highlighting the role of human capital in economic development emphasize the EU deficit in higher education. National and local authorities will have major financial difficulties in coping with the obstacles encountered by universities when setting up the Bologna European system of Bachelor-Master-Ph. D. diplomas.

In that context, one should consider the basis of a European University Charter which should define the role and mission of universities and guarantee their long-term financing. This funding could be identified in line with the tripartite mission pursued by universities: the carrying out of research, higher education and service to the community, including R&D activities and cooperation with enterprises. The links between national, local and European financing could be in function of the externality characters of these three missions.

Our article is divided into seven parts. The first two deal with Belgian and European R&D data in an international context. The third and fourth examine the difficulty of proper organization of the funding of basic research, leading to a consideration of this organization in a multi-level public structure. The fifth part is related to the changes in the way universities function which requires the drawing up of a Charter for European universities.

Parts six and seven then define the changes to be made regarding funding and governance of universities.

BELGIAN R&D IN AN INTERNATIONAL CONTEXT

Belgium is a federal state with a federal authority, three communities and three regions with institutional autonomy. Capron et al. (2000) discuss the very special Belgian institutional setting of science and technology policy. The Brussels-Capital, Flemish and

Walloon Regions have the primary authority for science and technology policies. The Flemish, French and German-speaking Communities have the primary authority for the higher education and fundamental research systems. The Flemish Region and the Dutch-speaking Community have merged together in an entity called the Flemish Community. It is worth noting that the Federal Government remains responsible for the research needed to support its own functions and the subject matter covered by international acts or relating to activities that transcend the interest of a community or region.

Koeune (2003) describes Belgium's economic situation in the context of the enlargement of the EU to fifteen Member States. Whilst Koeune finds that Belgium is lagging behind in the world rankings, he points out that the country still posts excellent figures for labour productivity. However, this latter result does not prevent the deterioration in Belgian competitiveness as regards the cost of labour. This handicap would appear to be 16% disregarding productivity and 9% if it is taken into account. Nevertheless, thanks to the capital accumulated by the previous generations, Belgium is rich. The financial assets of households represent 314% of GDP (the average for the euro zone as a whole comes to just under 200%). Among the Belgian handicaps, mention should be made of the high public debt (100% of GDP) and limited budgetary margins.

Among the special efforts which Belgium has to make, Koeune refers in particular to increasing the effectiveness of the education system and the promotion of R&D.

Table 1 below presents the Belgian indicators for science, technology and innovation taken from the work conducted by the Federal Ministry of Scientific Policy (BRISTI, 2001-2002)[1] in an international context, determined according to the main trading partnerships.

Table 2 summarizes the financing and scientific output figures, showing Belgium's ranking compared to that of the EU-15. This ranking was compiled on a scale of 1 to 8, with 1 as the highest value and 8 as the lowest.

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1. To ensure consistency in the text, we have not indicated the figures for 2001, although they are available.

TABLE 1.– International comparison in science, technology and innovation (most recent years available: 1997-2000)

	BE	*DE*	*FR*	*IT*	*NL*	*UK*	*EU15*	*US*	*JP*
A. Input indicators of science and technology activities									
Public budget appropriations on R&D (1)	**0.58**	**0.80**	**0.99**	**0.58**	**0.79**	**0.67**	**0.74**	**0.77**	**0.66**
	78	*108*	*134*	*78*	*107*	*91*	*100*	*104*	*89*
Public budget appropriations on R&D – Civil R&D (1)	**0.58**	**0.73**	**0.74**	**0.56**	**0.77**	**0.44**	**0.63**	**0.39**	**0.63**
	92	*116*	*117*	*89*	*122*	*70*	*100*	*62*	*100*
Public budget appropriations on R&D (2)	**1.36**	**1.86**	**1.96**	**1.38**	**1.88**	**1.85**	**1.99**	**2.90**	**1.80**
	68	*93*	*98*	*69*	*94*	*93*	*100*	*146*	*90*
Gross domestic expenditure on R&D (1)	**1.98**	**2.46**	**2.17**	**1.04**	**1.94**	**1.87**	**1.85**	**2.62**	**2.91**
	107	*133*	*117*	*56*	*105*	*101*	*100*	*142*	*157*
Gross domestic expenditure on R&D by companies (1)	**1.41**	**1.63**	**1.35**	**0.56**	**1.06**	**1.20**	**1.15**	**2.01**	**2.17**
Total R&D staff (3)	**1.13**	**1.16**	**1.23**	**0.61**	**1.10**	**0.95**	**0.94**		**1.29**
Tertiary education in % of the 20 – 29 age bracket	**26.2**	**19.4**	**25.2**	**21.6**	**20.2**	**22.9**	**22.7**	**38.8**	**20.8**
Total number of researchers in companies (3)	**0.38**	**0.34**	**0.27**	**0.12**	**0.23**	**0.32**	**0.25**	**0.59**	**0.63**
B. Output indicators of science and technology activities									
Scientific publications (5)	**0.80**	**0.67**	**0.67**	**0.45**	**1.00**	**0.96**	**0.61**	**0.74**	**0.48**
	131	*110*	*110*	*74*	*164*	*157*	*100*	*121*	*79*
EPO patents – inventor's country (5)	**0.13**	**0.24**	**0.12**	**0.06**	**0.17**	**0.10**	**0.13**	**0.13**	**0.13**
	101	*195*	*94*	*49*	*136*	*76*	*100*	*104*	*101*
EPO patents – country of filing (5)	**0.10**	**0.22**	**0.10**	**0.05**	**0.24**	**0.07**	**0.11**	**0.09**	**0.12**
	91	*200*	*91*	*45*	*218*	*64*	*100*	*82*	*109*
USPTO patents – inventor's country (5)	**0.08**	**0.12**	**0.07**	**0.03**	**0.09**	**0.07**	**0.07**	**0.31**	**0.25**
	114	*171*	*100*	*43*	*129*	*100*	*100*	*443*	*357*

C. Innovation indicators								
Number of people who have started a business in the last three years (6)	**2.4**	**4.7**	**2.2**	**5.7**	**5.2**	**-**	**12.69**	**1.26**
Informal venture capital, number of people who invested in a start-up created in the last three years by a third party (6)	**1.15**	**3.94**	**1.91**	**2.14**	**3.07**	**-**	**6.97**	**1.37**
Formal venture capital (1)	**0.27**	**0.13**	**0.13**	**0.06**	**- 0.21**	**-**	**5.27**	**0.22**

Note: EPO (European Patent Office); GDP (Gross Domestic Product); USPTO (United States Patent Office); BE (Belgium); DE (Denmark); FR (France); IT (Italy); NL (Netherlands); UK (United Kingdom); EU15 (European Union 15); US (United States ; JP (Japan).
(1) in % of GDP; (2) in % of total government expenditure; (3) in % of the working population; (4) per 1000 inhabitants, (5) per 1000 adults, (6) per 100 adults

TABLE 2.– Ranking of Belgium according to scientific indicators

	Rank
A. Input indicators of science and technology activities	
Public budget appropriations on R&D In % of GDP	7
Public budget appropriations on R&D – Civil R&D In % of GDP	5
Public budget appropriations on R&D In % of total government expenditure	7
Gross domestic expenditure on R&D In % of GDP	5
B. Output indicators of science and technology activities	
Scientific publications Per 1000 inhabitants	3
EPO patents – inventor's country Per 1000 inhabitants	4
EPO patents – country of filing Per 1000 inhabitants	4
USPTO patents – inventor's country Per 1000 inhabitants	5

Note: EU15 = Index 100 – Countries compared: Belgium, Denmark, France, Italy, Netherlands, United Kingdom, United States, Japan.

The tables show that Belgium's ranking varies widely depending on the indicators used. Its best ranking is in terms of scientific publications. The ranking for patents puts the country in the middle of the results obtained for the international sample considered; conversely, in terms of public appropriations on R&D, Belgium holds the penultimate position. Table 1 shows that the gross domestic expenditures on R&D represent just under 2% of GDP, i.e. an amount slightly above the European average.

Capron and Duelz (2004) examine the possibility that Belgium can reasonably meet the objective of the European Summit of Barcelona, i.e. to attain 3% by 2010.

These authors emphasize various findings:

– the dynamics regarding the development of research potential are favourable in Belgium;

– Belgium's position is favourable in relation to the European average for R&D expenditure financed by enterprises;

– this country benefits from a contribution of funds from abroad to finance research equivalent as a percentage to that received by the EU;

– it is confirmed that Belgium lags behind mainly on account of the financing of research by the public sector.

TABLE 3.– The budget appropriations for R&D by public authorities. In million euro 1995 and as a percentage of the total

Total	*Federal authority*		*Flemish Community*		*French Community*		*Walloon Region*		*Brussels-Capital Region*	
1989	433	43.4	303	30.4	196	19.7	52	5.2	12	1.2
1990	424	43.8	292	30.1	190	19.6	45	4.6	17	1.7
1991	433	43.4	309	30.9	190	19.0	51	5.1	14	1.4
1992	432	44.1	285	29.1	184	18.8	61	6.2	15	1.5
1993	431	41.9	314	30.6	200	19.4	69	6.7	13	1.2
1994	429	41.7	321	31.2	195	18.7	73	7.1	12	1.2
1995	437	41.0	368	34.6	184	17.2	66	6.2	8	0.8
1996	434	38.5	425	37.6	197	17.4	67	5.9	5	0.4
1997	435	36.5	468	39.3	192	16.1	87	7.3	9	0.7
1998	441	35.4	497	40.0	195	15.6	100	8.0	10	0.8
1999	434	33.1	545	41.6	196	15.0	126	9.6	7	0.5
2000	445	33.4	557	41.8	197	14.8	124	9.3	7	0.5

Source: H. Capron, own calculations

In order to assess the scale of the decentralization of the organization of Belgian research, our article uses the data from Capron and Duelz which specify the trend in financing by the federated public institutions.

The Flemish Community's efforts to finance R&D are on the increase, with its share in the financing rising from 30% in 1989 to 42% in 2000. The financing profile of the French-speakers is less sustained, essentially on account of the French Community, as the Walloon Region is shown to have caught up with its financing to a considerable extent. The Brussels-Capital Region shows a decline in its R&D financing effort.

From the point of view of the sectors carrying out research, international comparison (see below) shows that a large part of the Belgian backlog is concentrated in higher education. Table 4 below, which relates only to Belgium, shows the disparity in expenditure incurred for Flemish and French-speaking students.

TABLE 4.– Expenditure per Belgian student in tertiary education in 2000 (in US dollars and PPP)

	Direct expenditure		
	Total direct expenditure	***Teaching and auxiliary services***	***R&D***
Belgium	10,771	7,098	3,673
French Community	9,602	6,484	3,118
Universities	16,259	8,430	7,829
Flemish Community	11,782	7,629	4,153
Universities	22,144	10,416	11,728

Source: H. Capron, 2004

Compared to the French Community, Capron finds that the Flemish Community invests 24% more per student in teaching services and 50% more in R&D. From 2001 to 2004, the budget appropriations for university education and scientific research increased by 13% in Flanders, compared to 6% in the French Community.

One of the major difficulties encountered in achieving the Lisbon and Barcelona objectives is the size of the supply of labour for research. Does it act as a real bottleneck for growth in the European research efforts?

Table 1 indicates that Belgium has a slightly better indicator in this respect than that of the EU-15. Capron (2004) confirms that Belgium has a larger pool of researchers than the European average, although with the exception of government research. This puts it in fifth position (out of a total of 17 countries) in terms of number of persons employed in research in relation to the employed labour force. However, Belgium is less well placed for R&D expenditure per person: the administrative and technical personnel per researcher there are well down compared to a majority of industrialized countries.

EUROPEAN R&D IN A WORLD CONTEXT

The EU is not a federal state and the draft Treaty establishing a Constitution for Europe (2003) stipulates, in Article 1, that the Union shall coordinate the policies by which the Member States aim to achieve objectives they have in common and shall exercise in the Community way the competences they confer on it. This fact having been recalled, the question arises of the competences which the EU should exercise. In the field of research, it is known that its financing essentially relates to non-basic research and that it is supplementary to national financing. The sixth Framework Programme will amount to over EUR 17 billion for the period 2002-2006 and will be the principal instrument for the creation of the European Research Area. Between the 1st and 5th Framework Programmes (1985-2002), the European R&D contribution increased by the equivalent of 2.5% of the government budget appropriations or outlays on R&D (GBAORD) to stabilize at about 5.5%.

Furthermore, the competences in the field of education are few in number and are normative. The Bologna process is steered by the national governments.

Busquin (2003) finds that while the EU investment in R&D grew at close to the same rate as in the United States (US) during the period 1997-2001 (4.5% per year in the EU versus 4.8% in the US), the proportion of its wealth devoted to R&D is still too low (just under 2% compared with 2.8% in the US). EU business R&D increased by

about 50% between 1995 and 2001, but growth was much more substantial in the US (130%).

The EU-15 still does well when compared to Japan. In current terms, the difference between them decreased in 1988-2003, but in real terms the gap in 2000 was a record PPS 61 bn in favour of the EU.

Furthermore, it is known that reaching a level of 3% in Europe is synonymous with a 50% increase in the current R&D expenditure in less than six years.

Table 1 of this article placed Belgian R&D in its international context. By focusing the analysis on the place of the EU in its environment, various comments must be made to supplement the figures for the European countries.

The European Commission report on the key figures 2003-2004 stresses that:

– in 2001 R&D intensity of the EU 15 reached a record figure of 1.98%;

– there are extremely large disparities in R&D intensities both between the individual European countries and country groups. The majority of the Nordic economies are in the top quartile of the ranking. The highest R&D intensity within the EU was recorded for Sweden (4.3%). R&D intensity for Finland (3.5%) was the second highest and clearly distanced from the rest of the EU economies, led by Germany (2.5%), Denmark (2.4%), France (2.2%) and Belgium (2.2%). Sweden and Finland were followed by Japan and the US together with two EFTA countries Iceland and Switzerland. In the group of the acceding and candidate countries, Slovenia (1.6%) and the Czech Republic (1.3%) had the highest values. In general terms, with 0.3%-1.0%, the lowest levels were recorded by the rest of the acceding and candidate countries and in three EU economies, Greece, Portugal and Spain;

– as a proportion of GDP, in 2003, the US government (1.05%) allocated far more to research than the EU-15 (0.77%). This is the case despite the fact that the US government provides a lower share of total R&D funding than the government in the EU-15. When the 10 acceding countries are also taken into account, the figure for the EU-25 is 0.76%. Hence, the impact of acceding countries on the EU figure is very limited. In Japan, the figure was slightly below that of the EU-15, at 0.71%. In the EU-15 group, at 1.0%, France, Finland and Sweden were the countries with the highest relative volumes.

However, these countries have recently fallen behind the share of the US. In Germany and the Netherlands, government R&D budget in relation to GDP was around 0.8%;

– in the period 1997-2003, there were great disparities in the rate of growth in government R&D budgets between the major economic blocks and between individual countries. The highest rate of growth among the economic blocks was seen in the US (5.5% per year) followed at a close distance by Japan. Both the EU-15 and the EU-25 growth rate was just above 3%;

– in 2001, business expenditure on R&D accounted for most of total domestic R&D expenditure in Japan (73.7%), the US (72.9%), the EU-15 (65.6%) and the EU-25 (65.3%). But, even though some EU Member States are making substantial efforts, the EU-15 is far from catching up with the US, and in danger of being overtaken by Japan.

These trends show that the wish expressed by the recent five-year assessment of the EU research framework programmes (2005) is unlikely to be met. In fact, this assessment finds that the Commission's proposal to substantially increase the European research budget in the future is a welcome step in the right direction. This provides an opportunity to significantly strengthen, the European knowledge base and European competitiveness. However, it can only succeed if the increase is accompanied by increases in the RTD budgets of the Member States. The signals are clear: the European Union as a whole must invest more in RTD to respond appropriately to these challenges.

The authors of the assessment add that the coherence between national science and innovation policies and the Framework Programmes must increase.

Whilst this point of view has to be supported, it raises the question of whether it will suffice to make up the European research deficit.

To assess this question, reference can be made to the high-level group of independent experts, the Sapir Group, which was invited in 2002 to analyse the consequence of the strategic economic goals set by the EU. This group reviewed the entire system of the EU policies and proposed a strategy for delivering faster growth together with stability and cohesion in the enlarged Union.

The group's report shows that despite the considerable institutional achievement of the European Union, its economic

performance is mixed. While macroeconomic stability has improved and cohesion been preserved, the EU system has not delivered a satisfactory growth performance. Growth has been mediocre with Europe's performance deteriorating both absolutely and in comparison with the US. Europe's unsatisfactory growth performance during the last decades is a symptom of its failure to transform into an innovation-based economy. What is needed now is more opportunity for new entrance, greater mobility of employees within and across firms, more retraining, greater reliance on market financing and higher investment in both R&D and higher education.

Transforming the Union system of economic policy-making will require redesigning policies and revising their mode of delivery, as embodied in governance methods and the EU budget.

These general proposals from the Sapir report lie outside the scope of our article, which retains only the argument of relevance to our comments, i.e. that growth becomes driven by innovation at the frontier and fast adaptation to technical progress. As new growth theories suggest, innovations result from investments in R&D, which itself requires a good education and research subsidy system.

The Sapir report adds to what is known about the European financing deficit for research, whilst stressing that Europe is lagging behind in the constitution of human capital. It finds that as an economy gets closer to the educational frontier the greater the importance of higher education becomes. The basic requirement for an innovation-driven economy is higher education. Here too however, it has to be said that the United States has a larger share of population aged between 25 and 64 years old who have completed higher education than any EU Member State. The report recalls that the future share of graduates is driven by current enrolment and expenditure on higher education and finds that here the present situation is clearly inadequate to generate the future numbers of graduates that will be required in an innovation-driven economy.

The figures are striking: 23.8% of the population aged 25 years old have achieved a tertiary educational attainment in EU-15, compared to 37.3% for the US. Belgium has a slightly higher score than the average of EU-15, i.e. 27.1%. The US spends, from public and private funds, more than double the EU average on higher education: 3% of GDP compared to 1.4%. Furthermore this US figure of 3% is higher than that of any Member State!

It should be noted that the Belgian contribution, i.e. the public share (the private share is not communicated), only represents 1.5% of GDP.

What should be retained from the findings of the Sapir report?

Three basic aspects must be retained for our purposes, i.e.:

– the transformation of the conditions of economic growth in the highly developed countries;

– the excessively low figure for the share of research in economic activity as a whole;

– the urgency in correcting this figure and refinancing higher education, in conjunction with a search for excellence.

Education plays a part in the economic transformation. In an economy which is catching up, primary and secondary education are vital. But the closer a country comes to the technological frontier, the more it is higher education which is the driving force for growth. The challenge today is to promote the " supérieur du supérieur " (Ph. Aghion, E. Cohen, 2004), which is where the battle of the knowledge-based society will be played out, as shown by the European countries which stand out for innovation and the importance attributed to education: Sweden and Finland, with expenditures on tertiary education which represent 2.4% and 2.2% of GDP respectively.

Consequently, among other economic policy proposals, the Sapir report stresses the need for a good system for subsidising research and education and supports the target of 3% of GDP to be devoted to R&D. This text also concerns the changes in governance to be introduced to select excellence in the field of research, but does not directly concern the institutional organization of the financing of research.

WHY IS IT SO DIFFICULT TO OBTAIN PROPER FINANCING OF RESEARCH?

Analysis of the reply to be given to this question comprises two stages of reasoning. This point 3 recalls that the economic nature of research, whether private or public, must be determined for its funding by the private and/or public sectors to be organized correctly. The concept of externality then specifies the level of the public authority

which must take charge of this research depending on whether it is basic or not.

This brings us to the second stage, explained in point 4, which analyses the devolutions granted according to the institutional architecture of the geographical areas considered.

From a contemporary point of view, Stiglitz and Walsh (2002) consider that from society's viewpoint, a particularly valuable kind of R&D is basic research. Basic research is the kind of fundamental inquiry that produces a wide range of applications. Indeed, the externalities flowing from basic research are so extreme that it can be considered to be a public good. Public goods are defined by two properties. First, it is difficult to exclude anyone from the benefits of a public good. Basic research involves the discovery of underlying scientific principles or facts of a nature which cannot be patented. Second, the marginal cost of an additional individual enjoying a public good is zero. An additional person being informed of a basic discovery does not detract from the knowledge that the original discoverer has, though it may reduce the profits the original discoverer can make out of the discovery. Indeed, sharing the fruits of basic research as soon as they are available can yield enormous benefits – as other researchers use this knowledge in their quest for innovations.

Fundamentally, it is known that as public goods, private markets yield an undersupply of basic research. There is increasing concern among economists that expenditures on basic research are inadequate.

While there is widespread agreement that government should encourage innovative activity through the protection of intellectual rights and through support of basic R&D, other ways by which the government promotes R&D have been more controversial. A discussion of this subject can be found in van Pottelsberghe de la Potterie (2004).

Kindlerberger (1986) shows that the tendency for public goods to be underproduced is serious within a nation bound by a social contract with the power to impose and collect taxes. It is a more serious problem for the delivering of international public goods where there is no international government. Kindlerberger's analysis concerns the supply of research in more than one capacity, since it raises the questions of mobility of the factors (notably the brain-drain) and the leadership role, with the United States accusing the rest of the world of being free riders.

A note of caution should be sounded as it is in fact known that the traditional frontier between basic research funded almost exclusively by the public sector and applied research funded by business has become increasingly blurred. This awareness is certainly essential to show that basic research is not as far as usually believed from the economic activity. However, it would be a great error if it were to distance those responsible in the public sector from their specific funding mission.

HOW SHOULD RESEARCH BE ORGANIZED IN A MULTI-LEVEL PUBLIC STRUCTURE?

The question of the best political level for financing public goods can be tackled through the literature on fiscal federalism. The traditional literature [Tiebout (1956), Oates (1972), Musgrave (1959)] is currently being re-examined under the name of « Second Generation Theory of Fiscal Federalism » (Oates, 1999, 2004; Wildasin, 2004).

According to Oates (1999), the economic use of the term federalism does not cover the political science usage where it refers to a political system with a constitution that guarantees some range of autonomy and power to different levels of government. For an economist, nearly all public sectors are more or less federal in a sense of having different levels of government that provide public services and have some scope for de facto decision-making authority irrespective of the formal constitution.

Briefly and still quoting Oates (1999), it can be said that at the most general level, the traditional theory contends that the central government should have the basic responsibility for macroeconomic growth and for income redistribution and must provide certain public goods that provide services to the entire population.

The second-generation theory of fiscal federalism draws on several strands of literature, mainly that on industrial organizations: principal-agents, the economics of information, the new theory of the firm, organization theory, and the theory of contracts and research in the field of public choice. There are important open research questions in each of these areas.

This article uses the concepts derived from this literature to characterize the nature of research, and in particular basic research, to

find that it should be financed principally by the public bodies with the largest geographical spread of decision-making power. Our analysis consequently considers the case of the EU before commenting on that of Belgium.

The concepts of the second-generation theory will be introduced in our proposal for the introduction of a European University Charter.

Alesina and Spolaore (2003) consider that European institutions should centralize prerogatives for which economies of scale and externalities are important and for which heterogeneity of preferences among European citizens and member countries is low.

They comment that in general, in specific policies, how to evaluate this trade-off is not a priori indisputable. For the field analysed in our article, they consider that the areas of education and research should show very high levels of heterogeneity of preferences and limited economies of scale. They therefore advocate the shared devolution of these competences at the Member State level and consider that it is not clear why the Union should have a presence at all.

This point of view is far from being expressed unanimously. For instance, von Hagen and Pisani-Ferry (2003) ponder the question of why Europe does not resemble what economists would like. They define the theoretical framework of fiscal federalism to study European integration and to deal with the distribution of competences between political entities.

In this way, a balancing act has to be carried out between the concept of economy of scale and externality, on the one hand, and adaptation to the heterogeneity of preferences, on the other. These authors recall the basis of the principle of subsidiarity, according to which European policies must be bottom-up except where centralization is justified by economies of scale or significant externalities. Their point of view is summed up in table 5 below.

TABLE 5.– Theoretical and actual allocation of responsibilities in the EU

	Externality and economy of scale	Heterogeneity of preferences	Allocation	
			Theoretical	Actual
research	strong	weak	EU	Member State

The question of heterogeneity of European preferences is different for education and research. The former is to be resolved to a

large extent by the Bologna process, which aims at increased mobility of European students. The latter heterogeneity would appear to have been decreased considerably by the success of the European policy in favour of mobility of researchers. For example, the Marie Curie grants programme, which aims at permitting this mobility, has been substantially oversubscribed.

Furthermore, the precepts of fiscal federalism presuppose considerable responsibility of the centralized power in macroeconomic growth policies. This responsibility should cover education and training, since they are the main channels of knowledge transmission and are the main components of the innovation system not only as input to the R&D process but also as means to convert technological change into economic growth and job creation.

Belgium

Capron et al. (2000) have shown that as the new Belgian institutional system is still in a transitional phase, it is difficult to predict in which direction it will evolve. The large degree of autonomy of the regions with regard to the science and technology policy makes any institutional analysis of the Belgian Innovation System very complex. Each region has implemented S&T instruments that are supposedly adapted to their own socio-economic environment. The regional dimension today is therefore a major aspect of the Belgian Innovation System.

The question is: does Belgium still need a federal science and R&D policy?

Yes, theoretically, this should be the case, since economically the question does in fact arise as to whether the limited competences of the Belgian federal authority should not be reviewed and increased. The consensus which emerges that it is difficult to distinguish between basic and applied research is an argument in favour of increasing the funding of basic research which, as scientific truths, transcend the linguistic frontiers inside the country.

Institutionally, this will obviously be quite difficult. The discussion of the following section should help to clarify the debate.

WHY IS IT NECESSARY TO DRAW UP A EUROPEAN UNIVERSITY CHARTER?

It is known (OECD, 1999) that R&D is conducted in most countries within and from universities. This is particularly the case in Belgium (Capron and Duelz, 2004). Although this is not the case in France, the analysis by Aghion and Cohen (2004) indicates that the knowledge-based economy will impose it. They therefore stress that research at the frontier requires profound, sustained interaction between basic research and applied research, especially in so far as high-tech discoveries often lead not only to improving productivity in existing fields or industrial sectors, but also in creating new paradigms, new sectors and new product lines. This increased complementarity between applied research, basic research and doctoral education in turn suggests a reorganization of these three activities within a common organization: the university.

Thys-Clément (2001a, 2001b, 2002, 2004) describes the new conditions of researchers and the changes in the relations between universities and their stakeholders. Cabiaux and Thys-Clément (2005) illustrate the particular case of the Université Libre de Bruxelles.

These changes in the balance of power between universities and their environments give rise to the question of the transformation of the management, governance and status of the universities. They destabilize the organization of higher education institutions which are subject to a twofold process: they are more answerable than previously to the public funding authorities, whilst being subject to the constraints of negotiating market shares and keener competition for the enrolment and training of students and for the funding and organization of their scientific and applied research activities.

European countries are transforming their university systems. For instance, the United Kingdom is reforming the system of participation by students in financing their studies, the implications of which are summarized aptly by The Economist in the title of its editorial: «Pay or Decay». Germany is establishing universities of excellence comparable to the great US universities and France, finally, is tabling the transformation of the universities desired by the Conférence des Présidents d'Universités so that they are more autonomous.

The Bologna process (1999) has brought on disruptions in European higher education. The aim is to introduce a European area of

higher education by 2010 in which students will be able to move round and have their qualifications recognized in institutions other than those in which they first enrolled. This reform, launched by the rectors and ministers of 33 countries, has not been the subject of any serious opposition as it gives rise to so much utopia. However, Carlier and Hachez (2002) are more critical, putting forward that in this case, no directive and no discussion were necessary for those in charge of university institutions, usually more jealous of their secular independence: of their own accord and in record time, they set themselves a common framework based on a new requirement of general mobility.

It is the awareness of a global environment which underpins this will to create a European Education Area, whether it is defined according to its research component or education and training component. The Bologna Declaration expresses a growing awareness in the political and academic world and in public opinion of the need to establish a more complete and far-reaching Europe, in particular building upon and strengthening its intellectual, cultural, social, scientific and technological dimensions. For the Association of European Universities, participation in the construction of a twofold European area of higher education and research is the lynchpin for all its activities.

The Conference of European Education Ministers in Berlin specifies the terms and conditions for organization and stresses the need to harmonize the criteria and the methods to guarantee quality.

Several analyses indicate that although the process is desired, the university crisis, which reveals the inconsistencies and contradictions in the social demands made of the higher education system, imposes major reforms. These reforms should be the subject of a pact for a new university (Le Cercle des Economistes, 2004) or a European University Charter (Thys-Clément, 2004) for rethinking the rationales for funding and governance (Geuna et al., 2003 ; Dewatripont et al., 2001, 2002).

WHAT TYPE OF FUNDING FOR UNIVERSITIES?

Three agents are primarily concerned in the construction of proper funding of research and education as regards the sharing of the

financial burden between the public and private sectors : enterprises, students and their families.

We have seen that the economic precepts of fiscal federalism can assist in untangling the responsibilities of the public authorities, even in complex political systems with architectures at several institutional levels. The concepts of public goods and macroeconomic management of economic growth are essential in dictating the devolutions.

The respective responsibilities of the European Union and its constituent States and regions should be reorganized. It is well known that basic research currently comes mainly under the States, whereas the precepts of fiscal federalism allocate it to the most centralized public authority and therefore to the EU, so as to organize as effectively as possible the externalities produced by the knowledge and to support progress in research closer to the economic field.

The European Commission is aware of what is at stake in funding research and education. In fact, the European policy landscape has changed significantly as a result of the Lisbon and Barcelona objectives and the establishment of the European Research Area. More specifically, the Commission has organized a large number of actions to promote the mobility of researchers. It is also more concerned than previously by responsibilities regarding basic research and universities. A summary of the points of view expressed by the stakeholders is to be found in the Liège Conference (web site in the bibliography), as well as the arguments put forward in favour of setting up a European Research Council to make a difference to the European science base.

The sharing of public competences between the EU and the countries concerned for funding more applied research and lifelong training can be maintained. However, two aspects must be distinguished for the introduction of more applied research: that of risk and that of the more local consequences. The first aspect should come under European funding as a continuation of economic development close to the frontier of production.

In this respect, mention can be made of the point of view of the European Round Table of Industrialists (2003), which approves the target of 3% of GDP for R&D, but which considers that it is only feasible if the authorities invest in centres of excellence and improve the status of the supply by researchers, if they increase public R&D expenditure which is complementary to private R&D and if they

improve the protection of intellectual property and reduce the administrative obstacles to innovation.

Improving the status of the researchers boils down to raising the key question of increased, more direct European support to universities. It is known that the latter are significant partners in the execution of the research framework programmes financed by the European Commission. On the other hand, the introduction of university reforms prompted by the Bologna process is based on financing by the national or regional authorities. It is of interest in this respect to examine the differences between the reforms conducted by the Belgian Commmunities (Thys-Clément and Bouton, 2004).

However, more generally, due to an incorrect assessment of the financial and political efforts to be made, there is a significant risk that the challenges, cultural, linguistic and support to the competitiveness and growth processes, will not be met (Kalaora, 2005).

The last five-year assessment of the EU Research Framework Programmes (2004) makes a clear diagnosis, considering that European universities and research institutions have traditionally been able to develop and maintain the European knowledge base. In many fields this is still the case. However, only a few European universities are recognized as global leaders. This is, at least in part, a result of insufficient resources combined with the fragmented nature of the European R & D landscape. European universities and institutes are yet to fully respond to global competition for knowledge and talent.

Several texts call for increased cooperation between the enterprise and the university (see in particular the Business and Industry Advisory Committee to the OECD, 2003). It is of interest to note that the recent analyses of the historians of the university (Bertram, 2004) show that since its creation, it has been supported and even sponsored by enterprises.

For enterprises, the university is a supplier of competences from which they require both immediate returns and a long-term capacity to adapt on the part of the graduates. They expect the university to put a lot of effort into basic research, whilst expressing their wishes for the efficient interfaces necessary for the transition and implementation of the results for the purposes of research and development.

The current practice of private financing often at the level of the marginal cost of research forces universities to co-finance part of the applied research from their general operating budget intended for student supervision. Here too, the financial participation in this

activity should be reviewed, as well, for that matter, as that for lifelong training.

Consequently, the question of the financing of universities comes under a social discussion involving awareness to obtain a fair distribution of its cost. The structure of this cost must be re-examined so that public funding, which is poorly distributed over the population as a whole on account of the lack of progressiveness of tax, is readapted to take account of the substantial private effects derived by the beneficiaries of education and applied research. As far as the students are concerned, it is certainly necessary to maintain general public funding for basic higher education, which is no longer really admissible when one considers the highly professional connotations of certain higher education and lifelong training courses.

WHAT CHANGES IN GOVERNANCE FOR THE UNIVERSITY?

These changes in the balance of power in the university environment give rise to the question of the transformation of the management, the governance and the status of universities. Abundant literature exists on the subject, but it is rarely shored up by rigorous scientific analysis of the envisaged changes (Thys-Clément, 2001a).

Without entering into detail of the current discussions, we retain the analysis of Mas-Collel (2003), a scientific economist and politician responsible for education. Mas-Collel pointed out that the USA is a good reference point but cannot be imitated mechanically, given the more segmented reality of Europe. He recalls that the university, from the point of view of the social interest, has a double mission: it must train the future generations (helping transform the young into free and thinking persons) and it must contribute to the advance of knowledge. Mas-Collel asks what the characteristics will be of a good public policy oriented to an efficient provision of an adequate mix of education and innovation or teaching and research.

This researcher considers that achieving an aim of excellence will depend on three factors :

– (i) the structure of the inter-relationship among universities, the "market", has to be efficiency-promoting;

– (ii) the objectives and aims of the management structure of individual universities have to be aligned with the social interests and the goal of efficiency;

– (iii) the human factor is essential to the effective functioning of a university: organization matters. But it will not accomplish much if the people in the organization, the academic personnel, are unresponsive. It happens sometimes in Europe that we prefer to celebrate the institution, the centre or the research group over the particular teacher and researcher. Mas-Collel believes this is a mistake. The individual academic is key and needs to be well motivated and committed. Incentives are, therefore, very important as we shall see later.

It is important to stress that the first characteristic does not mean for Mas-Collel that the education «market» is a market in the economic sense of the term. Hence he raises the question of what «competition» means in the education sector.

Europe is experiencing a critical moment in its history of education with the introduction of the Bologna process. The desired mobility of our students opens up a choice and therefore possibilities which go beyond the local territory. Competition should signify the attraction of the best institutions and not those which are less demanding.

Mas-Collel's other two points refer to the governance of the institutions. Hence, an appropriate trade-off between autonomy and the overall efficiency of the organization or the political control is delicate. The extent to which the principal-agent theory can work is a matter that deserves careful theoretical attention and more research work is needed, as Oates (2004) has called for in the field of the second generation of fiscal federalism. For the third point, the procedures of choice or selection of the teaching staff-researchers are vital. One precept is that given the asymmetries of information, the difficulties in establishing «the talents», the institutions should concentrate on the quality of research where it is a matter of recruiting its personnel, whilst implementing institutional mechanisms to guarantee that they supply high quality education.

Dewatripont et al. (2001) showed that the theory of incentives would allow several factors to be taken into account for recognition of the work of the researchers-teaching staff. It is hence necessary to take account of incentives, not only internal (salaries, promotions) but also external, via scientific reputation. In an environment in which the

synergies between research and education would advise against individuals being too specialized, it is nevertheless necessary to ensure to offer them incentives to fulfil these two tasks in a balanced manner.

CONCLUSION

It is agreed to recognize the need to increase the resources for research and development in Belgium and the European Union.

The diagnosis is detailed in particular in the Sapir report, which stresses the need to increase the resources for research and higher education.

In the political organizations with multiple institutional levels, i.e. in so-called federal structures, the question arises of the level of the authority which is to finance basic research, i.e. primary research.

Although the distinction between basic research and applied research is fortunately more permeable than hitherto, this distinction underlines the difficulty in funding research for which no immediate application is envisaged in the short term.

The traditional literature on budgetary federalism would allocate the funding of this research, on account of its maximum externality, to the political authority with the widest geographical spread.

The new literature on fiscal federalism may assist in steering the university, the main actor in research and higher education, more effectively.

To finance the "supérieur du supérieur" more effectively presupposes the introduction of a European University Charter which guarantees it stable funding in the medium term to allow it to complete its missions. This charter should also allow universities to clarify their governance methods.

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