Changing patterns of public research funding in France

Jean Thèves, Benedetto Lepori and Philippe Larédo

In this paper, we critically assess the specificity of the French research system and of its funding mode, which is accepted in most of the literature on the subject. We show that this interpretation is largely a result of the use of categories for the analysis of public funding that are not really suited to the French case. We thus develop two new categories: joint laboratories as a distinct organisational structure between public research organisations and universities; and human resources funding as a description of the specific allocation mode of CNRS (Centre National de la Recherche Scientifique) to the joint laboratories, which we consider as more similar to project funding than to core funding. We then show that the French system has changed fundamentally in the last two decades, moving towards a system much nearer to other European countries than normally assumed, albeit following a distinct evolutionary trajectory based on the gradual restructuring of existing instruments. In methodological terms, this underlines the importance of adapting the categories for the analysis of funding systems to the specificities of each national context.

I N THE COMPARATIVE ANALYSIS, the French system of research funding has been mostly considered as a very specific case, which does not easily fit into international classifications (Senker *et al*, 1999; Senker, 2000). These specificities include: the centralistic decision-making structure concerning research (for example, through the

technological programmes: see Papon and Barré, 1993; Larédo and de Laat, 1998) and higher education, with limited autonomy and decision-making power of universities (Musselin, 2001); the importance of its public research organisations (PROs, with CNRS (the national scientific research centre) as the largest European research institution), with relatively weak universities and the very specific arrangement of the joint laboratories between PROs and universities; and the limited role played by project funding and its concentration on the support of industrial research, with the lack of an agency funding academic research (Gilpin, 1970; Chesnais, 1993; Papon, 1998; OECD, 2004).

Some studies have tried to highlight the recent evolutions (Larédo and Mustar, 2001; Millar and Senker, 2000) and the changes that might occur (FutuRIS, 2005). These analyses underline the limited amount of public money dedicated to project funding and channelled through agencies and lead us to consider the French research system as hybrid (OECD, 2003) or even idiosyncratic (Senker *et al*, 1999).

In this paper, we aim to discuss in more depth the extent of these specificities by using data on research funding, including the recent data on public project funding produced in the PRIME project on

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this subject (Lepori *et al*, 2007, this issue). Our hypothesis is that the perception of a specific French system and of its stability over time is largely driven by the continued application of traditional classification schemes for research and research funding, which no longer fit the specific French context. This is the case for the separation between the higher-education and public research sectors introduced by the *Frascati Manual* (OECD, 2002) and by the distinction between general funding and project funding adopted in most studies on funding systems (Millar and Senker, 2000; Lepori *et al*, 2008). What we show is that challenging this classification could be seminal to rethinking the perception of the so-called 'French specificities'.

With this aim, we will define categories that reflect the French situation better and, in particular, the diffusion of the organisational form of the joint laboratories between CNRS and universities on one side, and the specificities of allocation mechanisms to these laboratories on the other side; this will lead us to a different interpretation of the French case and, especially, show a much greater change over time than usually assumed.

In this analysis, we first envisage the traditional view of public research funding in France, including a more detailed discussion of project funding data. This analysis will enable us to grasp the specificity of the French system in terms of importance (with a lower share of public project funding than all other European countries analysed), beneficiaries (with the overwhelming role of the private sector as main recipient of project funding) and organisation with the quasi-absence of an intermediary layer (van der Meulen and Rip, 1998; Guston, 1996; Braun, 1993). Such an analysis is based on a clear cut delineation between public research organisations and higher education institutions as independent performers (OECD, 2002), while project-based allocation of resources is done only by the government or by specialised agencies.

Secondly, we introduce the main changes that have emerged during the last three decades, namely the generalisation of the joint laboratories as the main form of research organisation in France and the change in the allocation of resources by CNRS, which for many aspects has become more similar to what would be seen as a project-based allocation of resources than to 'regular' core funding. Both phenomena lead to a very different description of the French situation, which now displays features closer to other European countries (Thèves *et al*, 2006).

Finally, we discuss the very recent creation of a large intermediary agency (Agence Nationale pour la Recherche, ANR), which could lead in the next few years to the transition to an organisation form of public research funding more similar to other European countries. We finish with a short section providing some conclusions and methodological lessons.
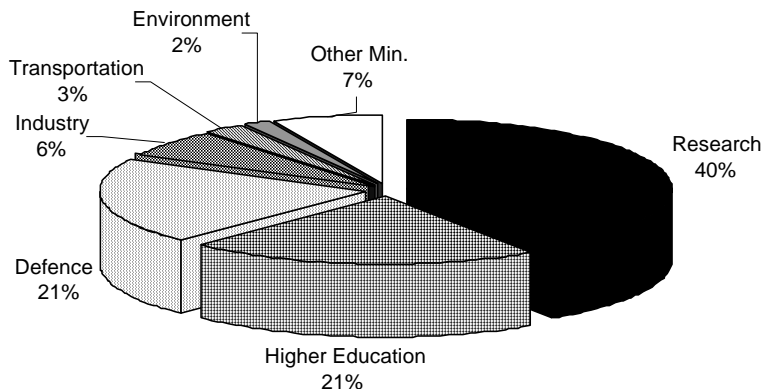
Public funding of research in France

Comparative work on European countries has shown that, despite national specificities, allocation mechanisms can be broadly divided into two main streams, namely, general allocations to research organisations (public research laboratories or higher-education institutions) and project funds attributed normally by external agencies, such as research councils, and ministries, to individual researchers for a limited period of time (Millar and Senker, 2000; Lepori, 2006). In this section, we adopt these categories to draw an overall picture of French research funding.

Overall volume and role of different departments

In 2002, public funding for research in France accounted for €15.5 billion, which represented 43 % of total research funding (OECD, 2005). This share has been slowly decreasing over the last 20 years because of the increase in private-sector research and the decrease in defence R&D.

Public funding comes mainly from three ministries (see Figure 1). The Ministry in charge of higher education[1] deals with most higher-education institutions. Its main contribution is the salaries of university staff and, in particular, academic staff, or *enseignants-chercheurs*, who are supposed by status

Figure 1. Main sources of public funding in France, 2002
Source: Thèves *et al* (2006)

to devote half of their working time to research. This amount is a convention since there are no recent surveys on the use of time by academic staff in France (OECD, 2000).

The Ministry in charge of research[2] has three main functions. First, it acts as the co-ordinator of all civil funding of research, negotiating with the Treasury the overall amount and allocation of civil public expenditure on R&D (Budget Civil de la Recherche et du Développement, BCRD) and thus presenting every year to Parliament a consolidated budget for civil R&D (the so-called yellow book for R&D). Its own budgetary allocation covers the core funding of PROs, and specific funds for supporting basic and technological research.

The third major source of funding comes from the Ministry of Defence, whose activities cover the whole spectrum with its own research facilities, dedicated PROs (for instance, ONERA for aeronautics research) and project-based R&D, mostly awarded to the private sector. One specific feature is that it also funds R&D in "dual" PRO, especially for nuclear (CEA) and space (CNES) research.

Moreover, several departments have developed both specific instruments for funding of dedicated bodies (such as industry with technical centres, and agriculture with its own higher-education institutions and support to agro-food technical centres) and for funding project-based research (health with clinical research, environment and so on). Of the total amount of public money for research in 2002, 58% was under the responsibility of the Ministry in charge of research and the rest was shared equally between higher education and defence.
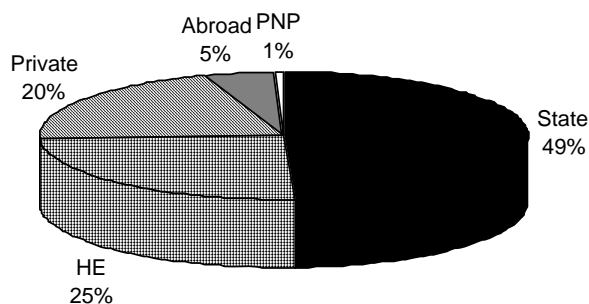
Main recipients

In most international studies (Gilpin, 1970; Chesnais, 1993), France is characterised by two main attributes concerning its public R&D expenditure: strong public transfer to industry associated with its long tradition of "large programmes" (Larédo and de Laat, 1998), and weak university research compensated for by the strong role of dedicated research institutions (see Figure 2).

Nearly one-fifth of the public funds for R&D went to the private sector in 2002. This represented 11% of total internal expenditure by the private sector: this figure was above 18% ten years before. Both the overall amount and its diminution over time is linked with military research, the Ministry of Defence representing over 75% of the total. The main civil sources are from the aeronautics and space programmes.

Figure 2 also confirms the low level of university research funding, standing at 25%. Furthermore, out of the €3.8 billion devoted to higher-education institutions, over 85% is for salaries. The same figure highlights the dominant role of the state sector. CNRS is the largest research institution in Europe, among the others INSERM for health and INRA for agriculture are the largest. The 1982 law on research, while granting them a special status (Etablissement Public à caractère Scientifique et Technique, EPST), has transformed their staff into civil servants.

This change did not apply to the pre-existing institutions that focused on development and had been granted the status of Etablissement Public à caractère Industriel et Commercial (EPIC), among them CEA for nuclear research (but also with important departments in microelectronics, materials and genomic research), IFREMER for ocean research and fisheries and ONERA for aeronautics research (Théry and Barré, 2001). The main difference is that private rules apply both for the management of human resources and for finance (including borrowing

Figure 2. Main recipients of public funding in France, 2002
Source: Thèves *et al* (2006)

Table 1. Main PRO staff in France, 2002

EPST	Staff	EPIC	Staff
CNRS	26,550	CEA	11,857
INRA	8,633	ONERA	1,725
INSERM	5,162	CIRAD	1853
IRD	1,654	IFREMER	1,375
INRIA	992	BRGM	920

Source: PLF (2002)

> **The traditional view of the French research system is that public research is strongly concentrated in public research organisations and essentially funded through core funding, while project funding is specialised towards support to the private sector**

and creation of subsidiaries). Table 1 compares the staff at the main PROs.

A limited change

By combining these data with those on public project funding presented in the next section, we can map the flows of public funding in France as in Figure 3. This figure supports quantitatively the traditional view of the French research system, where public research is strongly concentrated in PROs and essentially funded through core funding, while project funding is specialised towards support to the private sector.

Moreover, change in the last few decades has been rather moderated: thus, the share of project funding has nearly doubled from 11% in 1982 to 21% in 2002, but this is essentially a result of the increase of funds to private companies, and funding of international programmes. At the same time, the share of higher education in core public funding has increased from 15% to 32%, but this has not subverted the place of PROs, which still receive two-thirds of core funds.

Level of public project funding and its evolution

Public project funding is a reference to non-core funding allocated through specific instruments directly to individual researchers or research units. Two main criteria help to distinguish between institutional and project funding. First funding must be limited in scope, budget and time. Second, the beneficiary must not be institutionally attached to the granting institution. In most cases, this leads to the existence of dedicated institutions (agencies, academies or councils) external to the central administration, but this is not systematic as demonstrated by Italy.

To apply the methodology developed by Lepori *et al* (2006), a detailed analysis of all funding channels described by the official budgetary documents (the so-called *jaunes* for research and higher education) was undertaken for 2002 and then retrospectively over a period of 20 years. We note that these data do not include funding from regions, which we believe has become much more important since the beginning of the decentralisation process (1984), because there are currently no aggregated data available. Moreover, we need to be careful in the discussion regarding the year 1982 since the large technological programmes were still active and were not considered among project funding.

The aggregation reached €3.11 billion spent in 2002 on project funding, representing 21% of total public funding as compared with 29% for Austria, 32% in Switzerland, 24% in Italy and 46% in Norway (Lepori *et al*, 2008). Although this level is lower than other countries, the difference is less significant than we anticipated. Moreover, we witnessed a doubling of this share between 1982 and 2002: the level of project funding has risen from
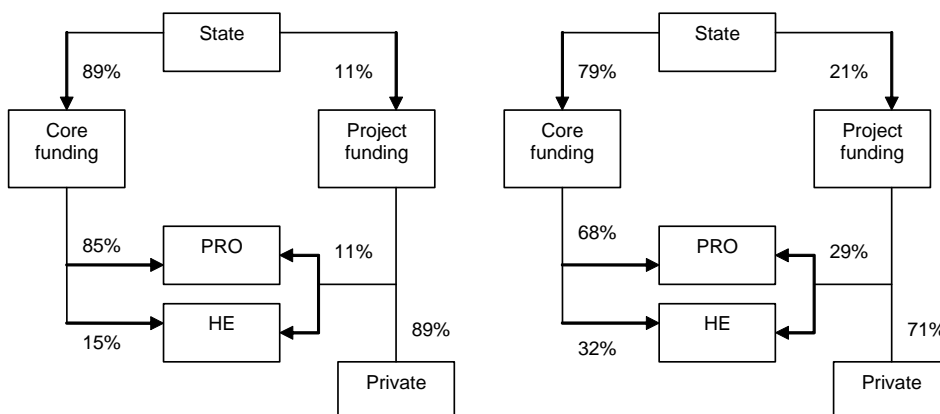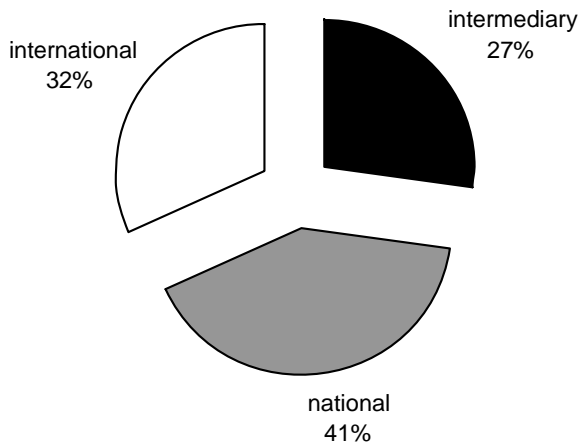

Figure 3. Structure of public funding, 1982 and 2002

Figure 4. Project funding in France, 2002: aggregation by levels of management

Notes: International brings together ESA and FP
Intermediary institutions combines CNES (national programmes), ANVAR (project development, personnel grants and other grants), ANRT (CIFRE), ANRS and ADEME
National level consists of the Ministry of Defence (so called "*amont*" studies), the Ministry of Industry (with FSH, Eureka, key technologies, microelectronics, information technologies and ATOUT), the Ministry of Research (with FNS-ACI, FNS-Regions, FNS-young researchers, FRT-RRIT, FRT-Regions, FRT-Innovation, doctoral grants and post-doctoral grants) and other smaller ministries (health with PHRC for clinical research, transportation, housing, employment)

0.13% of gross domestic product (GDP) in 1982 to 0.18% in 1990 and to 0.20% in 2002 while, over the same period, total gross expenditure on R&D (GERD) has decreased from 1.07% of GDP in 1982 to 0.85% of GDP in 2002 (OECD, 2005).

The results (see Figure 4) highlight the importance of non-French public sources of funding: the European Union (EU) Framework Programme (FP) and European Space Agency (ESA) account for nearly one-third of total project funding (32%). This

was only 13% in 1982, and the core of the change took place in the 1980s, since, by 1990, this share had reached 29%.

Moreover, the figures underline a low level of intermediation, since only 27% of total public funding goes through French intermediary agencies, with the agency in the space sector, CNES, and its national programmes accounting for 15% (see Figure 5). The other significant agency is ANVAR focusing on innovation in small and medium-sized enterprises (SMEs) accounting for 8%. The other agencies (ADEME for energy and environment technologies, ANRS for AIDS research, ANRT for CIFRE, a mechanism for PhD thesis jointly funded with industry) account for 4%.

Finally, most mechanisms in place in 2002 were directly managed by ministries, which represented 41% of total project funding. Three ministries plaid a central role: Research and Defence with 17% and 14% respectively and Industry with 8%. The share of Industry and Research Ministries nearly doubled over a 20-year period, while Defence, has witnessed a continuous decrease, first rather slow (from 35% in 1982 to 30% in 1990), then accelerating to reach 14% in 2000. Although the decrease is general in European countries, France is unique among large defence spenders for the significance of the reduction.

We can thus conclude that, when applying the project funding methodology, France has a lower rate of project funding than other European countries. However, its share has almost doubled over 20 years despite the reduction in defence funding. This is mainly because of the growing Europeanisation of French research, European sources being multiplied by 2.3 over the same period of time and now accounting for one-third of total project funding. Second, compared to other countries, project funding is overwhelmingly directed towards industry: 70% goes to the private sector, a figure
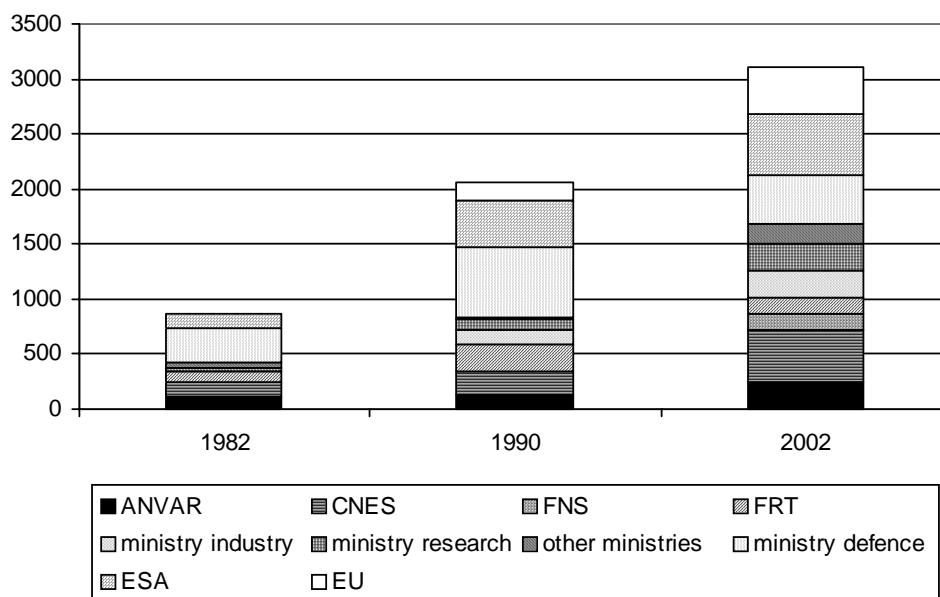
Figure 5. Project funding in France: main trends, 1982, 1990, 2002

unique in Europe for public project funding when considering Italy (55%), Switzerland (19%), Austria (42%) or Norway (7%).

When only considering the instruments clearly dedicated to academic research, we arrive at the very low amount of 14%, with half of it for PhD grants, and only 4% for disciplinary-based calls, thus highlighting a missing dimension, namely funding of academic research through intermediary agencies, which in all the other countries considered except Italy represents a major component of public project funding.

Joint laboratories and the new role of CNRS

Can we be satisfied with this description and simply conclude that France does it its own way and that little has changed during the last few decades?

We believe that this conclusion overlooks the important changes that occurred in the last three decades in the organisation and funding of public research through the generalisation of the joint laboratories between PROs and universities and the introduction of the labelling process as a way to access to resources. We propose that these mechanisms are largely similar to project-based processes: a periodic open call, a strong selection process, and support limited in time and scope. Through it, CNRS allocates different resources: funds, access to large facilities and, primarily, human resources. This latter dimension has driven us to speak of an agency for "project-based" allocation of human resources.

In doing so, we translate into figures a lasting on-going debate both within the academic sphere (Larédo and Mustar, 2001; d'Iribarne, 1999) and within research-management circles (see, for instance, Mégie and Larrouturou, 2004). Its importance for French research policy is obvious, given the size and the importance of the CNRS in the system.

While this section focuses on CNRS, the reader should be aware that this approach is not unique, since INSERM for medical research has also generalised it, and other research institutions such as INRA and IFREMER have also been active in this respect.

We proceed as follows. First, we briefly explain the organisation of joint laboratories, the labelling mechanism and its implications for the allocation of resources. Further, we discuss the differences and similarities in project funding and, finally, we propose a new description of public research funding in France that better takes into account the specificities of this allocation mechanisms.

Mixed research units

A mixed research unit (the official terminology since 1982) a joint laboratory involving more than one institution, typically a university and CNRS. This organisation model was introduced in the 1970s to support university research and promote partnerships in the research system. Typically the laboratory comprises personnel funded by both organisations, has two budgets and two different affiliations. As we explain below, recognition of joint labs by CNRS is ruled by a specific labelling process managed by the CNRS scientific directorate. This is a competitive process with important entry and exit processes.

The balance over time between university and CNRS staff has changed drastically, if only because the 1990s witnessed the creation of 12 new university positions for each new position in PROs. In 1998, the average joint lab had 49 staff, of which 13 were university *enseignants-chercheurs,* nine were CNRS researchers, the other staff were doctoral and post-doctoral students and support staff (Larédo and Mustar, 2001). Furthermore, 50% of the mixed research units were managed by teacher–researchers from the university in 2002 (CNRS, 2002). This situation enhances the mixed nature of the laboratories since the management responsibility of the units is shared between CNRS researchers and university researchers. It is then the granted labels that create the perimeter of the CNRS, and the result is a moving border for the organisation.

This situation means that CNRS should not be compared to research institutions like the Max Planck Gesellschaft, which has only its own labs with its own staff. Thus, including CNRS joint laboratories under the PRO category can lead to misleading comparisons across countries. Joint laboratories do not fit into the distinction between higher education and PROs and should be considered as distinct organisational forms across these two sectors.

The need to revise the categories for the analysis of public funding is shown by the relevance of this organisational arrangement in the French case, which makes it impossible to consider it as an exception. Today, more than 90% of CNRS researchers and around 80% of its technical staff work in joint and other associated labs on university campuses, while the 1,000 joint research units constitute nearly 30% of all research units in universities (and almost all the most reputed ones; own calculations on CRNS, 2002).

The question now arises as to how their funding from CNRS should be interpreted. To this end, we

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examine in the next section the labelling process and its implications for the allocation of resources.

Labelling process of joint research units

Joint research units between CNRS and higher-education institutions are the result of an overall labelling process of university research.

Since 1988, universities have entered into a four-year contract with the Ministry in charge of higher education, covering both their teaching and research activities. For university, this periodic contracting has turned into a major strategic event, since it delivers the accreditations for teaching curricula, defines an envelope for investment and new positions, and allocates research money to recognised labs. Until 2006, labelling activities and resource allocations were undertaken by the same ministry service. The new law voted in 2006 has established a separation between evaluation/accreditation and allocation of funds, but it remains to be seen what actual changes this will lead to.

Previously, research units already 'associated' with CNRS and those that were candidates for a new 'association' were evaluated by the PRO process, the Ministry taking into account the results arrived at, and, from time to time, complementing the means allocated by the PRO. The open nature of this process had the result of strongly increasing the number of associated labs, since many university labs applied for association to access CNRS resources.

The 1,000 CNRS joint research units and new candidate units, thus follow the labelling process of CNRS. To explain it requires entering into organisational aspects of CNRS. CNRS is organised in seven scientific directorates, which cover broad fields of research (physics, chemistry, life sciences, engineering, social sciences and humanities, universe sciences, mathematics). They are responsible for the labelling of units and the allocation of human and financial resources.

For the evaluation, they have the support of the Comité National de la Recherche Scientifique (which also uses the CNRS acronym) that is made up of 40 disciplinary sections composed of both elected and nominated members, complemented by a few *ad hoc* inter-disciplinary sections. The Comité National is in charge of the recruitment and career of researchers. The choices made in its sections are largely followed by the Scientific and the General Directorates.

The situation is not so clear-cut for research units. In most directorates, the evaluation is based on a visiting committee in charge of reviewing both past activities and the four-year project proposed by the unit. Its members are nominated by the scientific directorate, while the sections of the Comité National concerned with the unit nominate one member to the panel. They are the guarantors that quality issues and research excellence are well addressed. The sections also review the reports prepared by visiting committees adding their own advice about proposed directions.

Decisions about labelling, renewal, closure and transformation are made by the scientific directorates. Decisions translate into the nomination of a director with a letter of mission. They are accompanied by the allocation of resources: human, technical (new equipment or access to large facilities) and, to a lesser extent, financial. CNRS considers that the label granted gives a privileged access to other external resources and that it is the responsibility of units to find the majority of additional funds needed.

There has been no extensive account of the level of renewal and transformation of research units. D'Iribarne (1999) suggested a 10% turnover over a four-year period. This is below the level presented by Larédo (1997) for INSERM, which has a somewhat similar mechanism. In any case, analysts converge on two points. First, at least one-third of units disappear or change drastically over one decade, a period considered as corresponding to the life cycle of an approach in most fields, and at least another third have significant internal changes with new team structures, new themes and/or changing balance of themes. Second, there is a strong push for merging units so as to build critical size units.

Towards a new approach to resource allocation

How can we evaluate the impact of such a mechanism? Once more, analytical review of practice leads to a complex view of its effects.

First, the process of staff allocation is both direct and indirect. Direct since the label is allocated on the basis of staff already in the lab (or ready to move on a voluntary basis). Indirect because it is seldom the case that new positions (both for researchers and technicians) are attached to the label granted. Yet we can suppose that allocations that are the remit of the Scientific Directorates take the recognised needs into account.

Another important dimension lies in staff mobility. The staff can move within CNRS and, in particular, between CNRS research units. Theoretically at least, labs have thus to devise strategies to become attractive for other CNRS researchers to increase their own research capability. Thus, the label gives access to an important internal market of researchers, since it signals labs open for CNRS researchers.

Second, the label gives access to shared resources, and especially to large facilities, both CNRS ones and others through the collaborations and alliances that CNRS has developed. These resources can be area specific (such as large telescopes or synchrotrons) or generic (such as computing capacity or access to large databases).

Third, along with the label come direct financial allocations, which amount to €300 million annually (CNRS, 2002). This is complemented with other
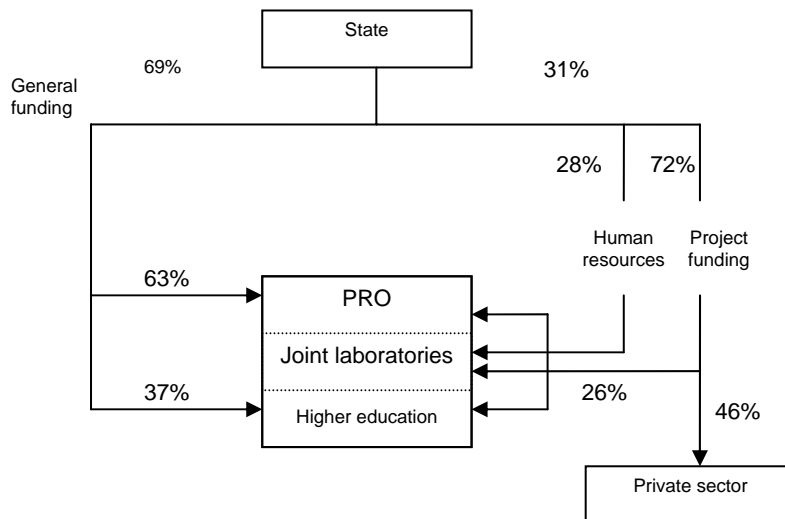
Figure 6. Public funding in France revised, 2002

targeted procedures (for young teams within research units, for given themes) that are only accessible to CNRS units.

Thus, we can assume that, at the macro level, there is a strong correlation between the labelling and the resources that the joint research units mobilise from CNRS. Moreover, labelling is in principle an open and competitive process, which new laboratories can also try to access and for which resources are granted only for a limited period of time. Finally, as explained previously, joint laboratories are at least partially external to CNRS. As a consequence, we propose to design a different allocation structure of public funding in France in which we introduce a "human resources allocation" of CNRS to joint laboratories as in Figure 6; its positioning to the right side of the picture shows our interpretation that this mechanism is more similar to project funding than to core funding.

French 'specificity' revised

To assess the impact of the proposed change, we propose a conservative measure, including only the CNRS (and not resources allocated by other PROs following in some cases the same process), and within CNRS only state resources directly targeted to joint research units. We thus consider the total amount of support granted to joint units in 2002 (€307 million), plus the share of CNRS staff in joint research units, thus another €1316 million (CNRS, 2002). This amount increases the total project-based allocation by 52%, bringing it to €4.7 billion and 31% of the total public spending, a share similar to Switzerland, and well above Austria (26%). This demonstrates that the point lies not only in the specificities of the instrument, but also in its quantitative importance in the French context.

A second major change deals with the roles of recipients. Public research becomes the main beneficiary of project funding with 54% (compared to 29% in the previous description), while this allocation is

nearly equally shared between usual financial support (including CNRS support to joint research units) and the human resource allocation process.

The third change deals with the share of academically focused support. With this new definition of project-based support, the share of resources channelled through mechanisms focusing on academic research is tripled and represents 43% of the total. This is more in line with the other countries considered in the study.

Thus, the three conclusions put forward in the previous analysis no longer hold. First, intermediating structures are now the major source of funding with 52% of total project-based funding (see Figure 7). In relative terms, with over one-third of total project-based resource allocation, CNRS compares favourably with most grant-allocating agencies or councils. Central state sources dwindle to a standard quarter of total project-based funding, while European sources stand at one-fifth.
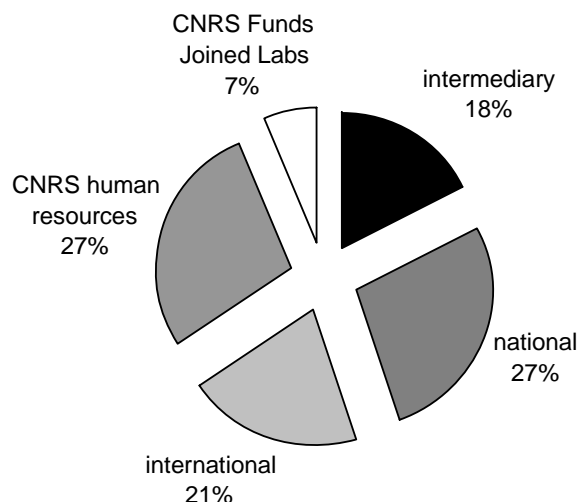

Figure 7. Managing agencies for public project funding including CNRS human resources, 2002
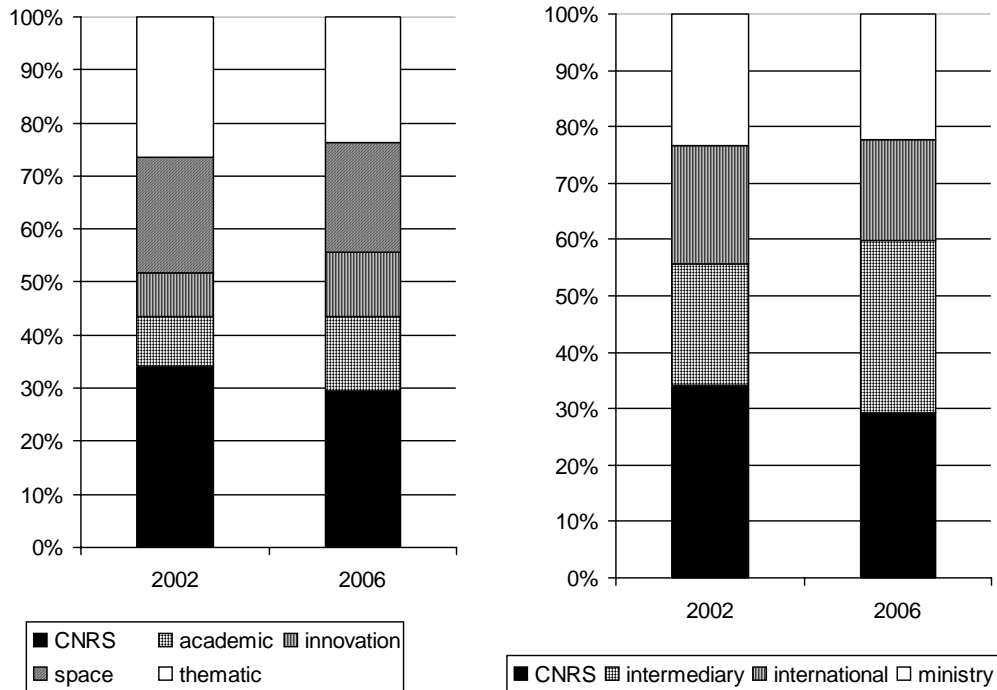*Source*: Thèves *et al* (2006)

Figure 8. Composition of project funding, 2002 and 2006

A step towards the continental European model?

A further significant change, both for its practical and symbolic implications, has been the creation in 2005 of the Agence Nationale de la Recherche (ANR), as a specialised project funding agency mostly devoted to funding public laboratories and academic research. Structurally, the creation of the ANR has been the combining of the former FNS (Fonds National de la Science) and FRT (Fonds pour la Recherche Technologique). However, this aggregation has reinforced the new agency, whose budget has been strongly increased in the last two years: with €800 million, the ANR budget for 2006 was about half the CNRS allocation to joint laboratories.

As Figure 8 shows, despite the creation of the ANR, public labs still largely depend on CNRS resources, but the shift in the composition of project funding between 2002 and 2006 has been significant. Additional resources are now engaged preferentially in the new agency and this might lead in the long run to a fundamental change in the system if this policy orientation lasts for some years. In fact, the 2010 objective of the ANR is to finance research projects in academic labs at the level reached by all the EPST together (Audier, 2006).

While in organisational terms the creation of the ANR represents a fundamental innovation, in terms of the funding schemes (and of the related rationales) it has been largely the continuation of a long-term trajectory. The creation of the joint labs and of the labelling mechanism already introduced into the French context the concept and the model of the competitive allocation of resources, and the related practices of fund-seeking at the lab level.

However, the role of CNRS and the articulation between the PRO function and the funding agency function were highly debated, while a recent proposal for reform pointed to strengthening the core of its own labs as the central mission of the organisation (Mégie and Larrouturou, 2004). Once the main ideas of the new funding rationale were introduced in the political discussion, the path to creating a separate funding agency in the face of the CNRS resistance to change was open, but this did not require the existing organisation to be disrupted (with the intention, however, that the new agency could become dominant in a few years).

Discussion and conclusions

Besides its interest as the presentation of a specific case of national funding model for research, this analysis leads to some relevant conclusions concerning the study of public funding and the use of quantitative indicators for it, as well as on the changes in research funding and research systems.

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unavoidable question of the choice of the underlying categories in the production of indicators. Specifically, comparative analysis over long periods of time requires the adoption of stable categories: in this respect, the simple categorisation of funding between core and project funding and of public research systems between PROs, higher-education institutions and private companies has proved extremely powerful (Lepori *et al*, 2007, this issue). The success of the project funding exercise rests largely on these simplifications and on the demonstration that borderline cases were sufficiently limited not to alter the results fundamentally.

However, the French case demonstrates that these categories should never be used blindly in a new case without critically questioning their applicability; both joint laboratories and labelling did not quite fit into the original classification scheme and thus we resorted to introducing new categories specific to France.

Moreover, it appears clear from our discussion that the definition of the categories and the decision as to where to classify individual items is essentially a matter of interpretation and thus is basically questionable. The whole discussion on human resources funding displays clearly how these classifications can be subject to debate.

Finally, this case displays the whole problem of using categories to analyse the evolution over time, where changes are in many cases gradual. Thus it can be very difficult to decide when to reclassify an instrument or an organisation and mixed forms can arise in some periods of time; this entails the risks that changes over time are hidden by the use of old instruments to analyse reality.

To what extent does this methodological exercise lead to a different interpretation of the French case and of its specificity? Not surprisingly, the answer is ambiguous and open to debate. First, it is clear that the stylised view of a public research system dominated by PROs directly funded by the state no longer holds and that the system has been profoundly modified by the reforms of the last three decades. At the same time, the differences with most European countries, where public research is based on the universities and funded by a mix of core and project funding, are still quite evident.

We face as proposed by OECD (2003) a hybrid model, where a new type of agency and intermediation has emerged and transformed traditional research institutions into 'human resource' granting agencies serving a system now overwhelmingly made up of university-based research. More precisely, this allocation system should be considered hybrid in two respects: because joint laboratories are halfway between CNRS's own laboratories and university laboratories; and because the labelling mechanism contains competitive elements characteristic of project funding, but the results of the competition are only indirectly translated in allocation of resources and, also, these resources are in the form

of scientific personnel in a pool controlled by the CNRS, rather than as a free monetary allowance. We must not forget that, since CNRS researchers have civil servant status, they have considerable freedom of choice as to which laboratory to work in and whether to move or not; thus allocation of resources is linked to the willingness of personnel to move.

This hybrid nature has been widely acknowledged in the public debate and has raised highly discussed issues about the mission and organisation of the CNRS itself, which seems to have lost its identity as a PRO without finding a new position in the French system. Thus, a document prepared by a former CNRS directorate calls for a clearer distinction between the PRO function, with a strong reduction of the number of the laboratories, and the funding agency function, which should be open to all public laboratories (Mégie and Larrouturou, 2004).

The whole discussion should also be considered in the framework of the emergence of the French universities as central actors in research policy and thus the fact that the joint laboratories are now embedded in an institutional context where their hosting universities increasingly attempt to develop their own research strategies. This represents a dramatic change with respect to the anomic universities of the 1970s and 1980s (Musselin, 2001) and tends to modify the position of the joint laboratories and the relative strength of both parties.

However, what is not clear now is whether this hybrid model represents a stable and specific configuration to France, or whether it should be considered as an evolutionary step towards the European standard model, as the recent creation of a large funding agency might indicate.

For the analysis of the evolution of research policies, and of institutional change in general, this study also engenders a number of remarks. A first lesson concerns the possibility of profoundly changing a system without disrupting it, while in organisational studies the model of stable institutional configurations alternated with periods of profound institutional change is considered more relevant. This gradual evolution depended critically on the possibility of incoherencies in the institutional setting, the whole ambiguity over the mission of the CNRS being a case in point.

Moreover, this process entailed a good deal of clever political design to avoid being stuck in blocking situations; a good example has been introducing competition among labs for resources, while at the same time granting job security to CNRS researchers through the civil servant status. Introducing major institutional changes as additions to the existing systems and then using the selecting attribution of resources across time to let them grow was also a strategy followed in many cases.

A second lesson is the strength of the organisation model based on higher-education institutions and a mix of core and project funding: this international model functioned throughout the whole period as a

conceptual reference for policy-makers, emphasising the French specificity as a weakness, and thus granted some stability to the reform. This strength is crucially linked to the flexibility, which allowed the translation of the model to organisational forms suited to the French context (considering the CNRS as a funding agency involved a considerable reinterpretation of the original concept).

Finally, the French case appears as an interesting case of path dependency (Lepori *et al*, 2007, this issue). It is composed of a number of successive events, whose sequential dependencies are retrospectively evident: for example, the introduction of the labelling process led to the transition towards a project-funding model only because it took place after the generalisation of the joint labs; otherwise, it would have meant just introducing a competitive means of steering CNRS internal labs. This path was not designed from the beginning and depended critically on other events, such as the emergence of universities as relevant actors in the French system. We could speak of the inevitability of the European model, but at least we can say, from a careful analysis of historical events, that this process has been far from simple and determined in advance and other outcomes would have been possible.

Notes

1. In 2002, it was called Ministère de l'Éducation Nationale, de l'Enseignement Supérieur et de la Recherche. The reader is reminded that terminologies of departments change quite often in France, even if the corresponding administrations remain untouched.
2. In 2002, it was no longer a full ministry but a subordinate one to the Ministry of Education, covering higher education and research. However, it still had a delegated Minister in charge of it.

References

Audier, H 2006. Vous n'imaginez pas tout ce que l'ANR peut faire pour vous. Contribution for Sauvons la Recherche website forum, Paris.

Braun, D 1993. Who governs intermediary agencies? Principal–agent relations in research policy-making. *Journal of Public Policy*, **13**(2), 135–162.

Chesnais, F 1993. The French national system of innovation. In *National Systems of Innovation*, ed. R Nelson, pp. 192–229. Oxford: Oxford University Press.

CNRS, Centre National de la Recherche Scientifique 2002. *Annual Report*. Paris: CNRS.

d'Iribarne, A 1999. Le CNRS, propositions d'analyse pour une réforme. *Gérer et Comprendre*. Paris: Annales des Mines.

FutuRIS 2004. *Synthesis Report for a National Debate*. Paris: Operation FutuRIS – ANRT.

FutuRIS 2005. *Le Système Français de Recherche et d'innovation: Propositions pour une Réforme*. Paris : Opération FutuRIS – ANRT.

Gilpin, R 1970. *La Science et l'Etat en France*. Paris: Gallimard.

Guston, D 1996. Principal–agent theory and the structure of science policy. *Science and Public Policy*, **23**(4), August, 229–240.

Larédo, P 1997. Evaluation in France: a decade of experience. In *OECD Proceedings, Conference on Policy Evaluation in Innovation and Technology*, pp. 419–441. Paris: OECD publications.

Larédo, P and P Mustar 2000. Laboratory activity profiles: an exploratory approach. *Scientometrics*, **47**(3), 515–539.

Larédo, P and P Mustar 2001. *Research and Innovation Policies in the new Global Economy: an International Comparative Analysis*. Cheltenam: Edward Elgar.

Larédo, P and B de Laat 1998. *Changing Structure, Organisation and Nature of PSR Systems*. TSER project. Paris: CSI.

Lepori, B 2006. Methodology for the analysis of research funding and expenditure: from input to positioning indicators. *Research Evaluation*, **15**(2), 133–143.

Lepori, B, P van den Besselaar, M Dinges, B van der Meulen, B

Potì, E Reale, S Slipersaeter and J Thèves 2007. Comparing the evolution of national research policies: what patterns of change? *Science and Public Policy*, **34**(6), July, 372–388.

Lepori, B, P van den Besselaar, M Dinges, B van der Meulen, B Potì, E Reale, S Slipersaeter and J Thèves 2008. Indicators for comparative analysis of public project funding. concepts, implementation and evaluation. *Research Evaluation*, **17**(1), March, forthcoming.

Mégie, G and B Larrouturou 2004. *Notre Projet pour le CNRS*. Paris: CNRS.

Millar, J and J Senker 2000. *International Approaches to Research Policy and Funding: University Research Policy in Different National Contexts*. Brighton: SPRU.

Musselin, C 2001. *La Longue Marche des Universités*. Paris: PUF.

OECD, Organisation for Economic Co-operation and Development 2000a. *Measuring R&D in the Higher Education Sector, Methods used in the OECD EU Member Countries (revised with 2000 data)*. DSTI/EAS/STP/NESTI(97)2. Paris: OECD.

OECD, Organisation for Economic Co-operation and Development 2002. *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*. Paris: OECD.

OECD, Organisation for Economic Co-operation and Development 2003. *Governance of Public Research, Towards Better Practice*. Paris: OECD.

OECD, Organisation for Economic Co-operation and Development 2004. *S&T Policies Outlook: France*. Paris: OECD.

OECD, Organisation for Economic Co-operation and Development 2005. Science, technology and industry scoreboard 2005. Paris: OECD.

Papon, P 1998. Research institutions in France: between the Republic of Science and the national-state building. *Research Policy*, **27**, 771–780.

Papon, P and R Barré 1993. *Economie et Politique de la Science et de la Technologie*. Paris: Hachette.

PLF, Projet de Loi de Finances 2002. *Etat de la Recherche et du Développement Technologique*. Paris : Ministry of Research.

Senker, J ed. 2000. Introduction to a special issue on changing organisational structure of European public-sector research systems. *Science and Public Policy*, **27**(6), December, 394–396.

Senker, J *et al* 1999. *European Comparison of Public Sector Research Systems*. Brighton: SPRU.

Théry, J-F and R Barré 2001. *La Loi sur la Recherche de 1982. Origines, Bilan et Perspectives du 'Modèle Français*. INRA Editions: Paris.

Thèves, J, G Filliatreau and B Lepori 2006. *Project Funding. France. Country Report*. Paris: European Network of Indicators Producers.

van der Meulen, B and A Rip 1998. Mediation in the Dutch science system. *Research Policy*, **27**, 757–769.

Ziman, J 1994. *Prometheus Bound, Science in a Dynamic Steady State*. Cambridge: Cambridge University Press.