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Countries*

Stig Slipersaeter (NIFU STEP)

Benedetto Lepori (Università della Svizzera Italiana)

Michael Dinges (Joanneum Research)

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Stig Slipersaeter

NIFU STEP, Studies in Innovation, Research and Education,
Wergelandsveien 7, N-0167 Oslo, Norway
e-mail: stig.slipersaeter@nifustep.no
Tel: +47 / 22 59 51 20

Benedetto Lepori

Università della Svizzera Italiana, Via Lambertenghi
Ufficio: 108, Lugano, Switzerland
e-mail: blepori@unisi.ch
Tel: +41 58 666 4614

Michael Dinges

JOANNEUM RESEARCH, Institute of Technology and Regional Policy
Haus der Forschung, Sensengasse 1, A-1040 Vienna, Austria
e-mail: michael.dinges@joanneum.at
Tel: +43-1-581 75 20-2813

Abstract:

This paper investigates the developments of research councils in Austria, Norway and Switzerland, and tries to analyse the role of the councils and their responsiveness of councils to research policy. By use of various data sources and indicators, we find empirical evidence of councils being embedded in national structures of governance and policy. Our results suggest that councils in some cases might be likely to be more responsive to the beneficiaries' interests than to policy makers, while we also find evidence of councils being under stronger government control and thus more responsive to government policies.

Keywords: Public versus private R&D funding, Benchmarking

JEL Classification: O38

1 Introduction

Research councils have been the preferred way of institutionalising “the second stream” of research funding in most industrialised countries. There are evidence of research funding through grants and contracts is of increasing importance by research institutions (Geuna 2001; Geuna and Martin 2003). Council funding for research projects allocated through research grants, programmes and projects are perceived very important from the researchers’ point of view; instruments and criteria are co-decisive for the selection or research topics, for researchers’ adaptive strategies and their ability to perform high quality research (Laudel 2006), but also because general government appropriations often are tied up to the coverage of running costs and leaves the institutions with little freedom. Funding from intermediaries like research councils might thus be the only way to make possible new research initiatives and thereby scientific development.

Research councils are in many ways semi-independent agencies operating at an arm lengths distance from government and can often be closely linked to the research community. Their loyalty can thus be bi-directional, and the councils might have to balance between the interests of policy-makers and scientists. Our main concern is to analyse how research councils act as intermediaries influenced by national research policies on one hand and the research community on the other. By comparing research councils in Austria, Norway and Switzerland, we will shed light on the importance of the councils’ embeddedness in national contexts and history for how they play their roles.

We first introduce the research questions we are posing. In section 3 we discuss the theoretical framework underlying our understanding of research councils’ actions and responses to policy, before we lay out the analytical chosen model and methodology (section 4). Section 5 presents the councils, while section 6 gives empirical evidence on the developments along the selected variables. Section 7 discusses the findings.

2 Research questions

Research councils play a crucial role in the scientific development and in science policy in most industrial countries and are often assigned the task of allocating large parts of public budgets for science as well as implementing science policy. A council need however also to have some collaboration with scientists to fulfil its mission of implementing government policies and priorities. Since scientists not always readily accept the government policies, a council will have to balance the interests of government on the one hand, and the interests of scientists and their institutions on the other, being more or less responsive to both parts. From this double-sided relationship of the councils emerges our first question; are councils mainly responsive to government or scientists? In its essence this question concerns the driving forces of science (science policy or scientists), but we will here be more narrow in focus and concentrate on how responsive research councils are to science policy. Responsiveness is dependent upon several factors, among them the

councils' autonomy (dependent on the national traditions of governance), the mission or profile of a council and how science policy is coordinate horizontally internal in the council and between councils. Applying a set of variables to analyse responsiveness, we assume the eventual evidence for a council being highly responsive to policy initiatives actually indicates that policy makers have some steering capacities towards science. Second, we are interested in assessing national variations; i.e. to investigate the question whether research councils have developed along national trajectories or if there are homogenous developments across the compared countries. Homogenous developments will indicate some general trends in science policy, while disparate developments indicate science policy to be mainly a national enterprise.

3 Theoretical approaches for analysing the roles of research councils

To be able to study the development of research councils and their roles, we need a flexible approach accounting for the complex relations between a council and its surroundings. Research councils might maintain several roles, depending on the parts of the research system they address and the purpose of the actions they initiate. Towards the scientific community, a council's main role will normally be as a funding agency for research projects, but it might also serve as a developer of research policy through choice of instruments, priority areas and through its selection mechanisms. Towards policy makers, it will act as an agency implementing policies, but might also have its own agenda of increasing public budgets for research or the implementation of specific strategies and schemes for targeted fields of research, the construction of research facilities etc. It should be obvious that most councils maintain more roles than as an agent for the government, and consequently that a councils actions will be dependent upon its relations to more than one part and upon its ability to fulfil more than one type of task.

3.1. THE PRINCIPAL – AGENT APPROACH

Various aspects of science policy and the relations between institutions of science have over the last ten years often been analysed by use of principal – agent theories (Guston 1996; van der Meulen 1998; Braun 2003; Braun and Guston 2003; Caswill 2003; van der Meulen 2003; Gulbrandsen 2005). Principal – agent theory normally assumes an asymmetrical relationship between principal and agent; the principal is hiring the agent to contribute to the achievement of the principal's goals (Petersen 1993). This approach can be applied to science policy and the relations between institutions in the scientific system at several levels and in a hierarchy of relationships (Guston 1996), but in our context we use the model for explaining the relations between government and council on the one hand, and council and the institutions of science on the other.

Several analysis have used principal – agent theory for analysing research councils' double relationship towards government and scientists (e.g. Caswill 2003; van der Meulen 2003; Gulbrandsen 2005). These approaches analyses research councils as agents for government in the government's efforts to realise science policy goals. The relationship is asymmetrical as government is contracting the council and the

council is dependent upon government allocating the necessary resources and legal authority empowering the council to perform the actions deemed necessary to fulfil its part of the contract. The relationship is however not completely asymmetrical as government cannot terminate the contract without inflicting large costs and considerable political debate because there normally is no more than one council for each scientific domain in a country, often less. The asymmetry in the relationship will also be modified by the relationship between council and the scientific community, a relationship consisting of several elements. First, a council needs to evoke the necessary interest in scientists to apply for the support schemes it provides (Arnold 2004). This is usually no problem as scientists will be eager to apply for funding. Still the research council will have to rely heavily on contact with scientists to be sure their programmes and instruments are in accordance with actual and potential developments of science. Second, a council will also normally engage scientists in boards and committees at various levels deciding the use and design of instruments, in selection committees, as well as in the council board. Third, councils often recruit senior officials and leaders from scientific positions. In total, this makes strong connections and dependencies between council and the scientific community. In addition, councils often take the role as advocates for the interests of science; promoting arguments for increased science budgets, the need for new efforts in certain scientific fields or for infrastructures. The relationship can also be completely reversed, as government will be dependent upon scientists to develop its science policy (Braun 2003), and council can even have this role as part of their mandate (Skoie 2000). In some cases, a council can thus identify more closely with the interests of the scientists than those of government, and can act as a mediator of scientists' views or initiate processes of policy developments by itself.

In line with these examples and arguments, as well as other analysis (van der Meulen and Rip 1998; Caswill 2003) we will argue research councils have to be responsive to both government and scientists to be able to fulfil their mission. They can therefore be expected to develop their organisation, strategies and actions with the aim of satisfying policy makers, scientists or both, depending on the strengths and weaknesses of the combined relations to both of them. The actual position between government and science will obviously in most cases be somewhere in-between and be susceptible to change according to variations in government policies, composition and policies of the board, legal status and authority delegated, etc. In this way the a council will be intermediating between the interests of policymakers and the interests of the scientific community (Braun and Benninghoff 2003; van der Meulen 2003).

3.2. RESEARCH COUNCILS AS RESPONSIVE INSTITUTIONS

Research councils should also be treated as organisations with systems characteristics influencing their responses. A much used distinction of organisations is between rational, natural and open systems (Scott 1992; Thompson and McHugh 1995). Councils will probably display elements of them all, but we find the definition of the open system to fit research councils best. An open system is embedded and dependent upon its relations to its surroundings, have undefined boundaries and frequent interaction with other organisations. Internally open systems can be more loosely coupled, and its various parts and departments can be pursuing their own strategies independent of the overall strategy of the organisation. Loose coupling might lead to tensions internal to the council, between council and government or between council and scientists, as well as the possibility that the council maintains mixed relations or responses at the same time (van der Meulen 2003). An analysis of the Norwegian Research Council in the mid 1990s found for example strong tensions between the administration and the board (Statskonsult 1994), while there also

have been conflicts regarding the priorities between basic and mission oriented research (Skoie 2000). Tensions between council and government is found in the case of Austria where ministries found alternative agencies to fund research instead of trying to change the mission of the existing ones (Arnold 2004), and in the case of Norway where the councils role as policy advisor has been unclear (Arnold, Kuhlmann et al. 2001). Another study shows various relations in a council according to operative roles of council departments, for example can the scientific staff who manages peer review processes and monitors scientific progress have a stronger affinity with the interests of the scientists than the administrative staff who will orient themselves towards expectations from the government (Caswill 2003). We should however also be aware that councils sometimes might act as natural systems, - organisations where the participants share the common interest of surviving as a system -, in times of organisational restructuring, which there are examples of in the countries examined. In such situations, those identifying with the organisation are expected to contribute to its defence.

As open systems, the responses of councils will to a varying degree be dependent upon others. Among theories on institutional responses, the resource dependency approach put emphasis on the dependencies of an organisation and how it adapts to them (Scott 1992), as well as the possibilities of meeting incompatible requirements from various external actors and the choice of various strategies to adapt to these requirements (Oliver 1991). A research council is normally very dependent upon government for its resources, and the dependency will most likely make the council responsive to the requirements and policies of those providing the resources as dependency will increase with the amount of resources coming from the outside. If there is more than one provider of resources, we should expect greater freedom in the choice of responses as the council might be able to seek out alternative sources of funding and to juggle between various expectations and requirements.

The strategic contingency approach, on the other hand, stress the freedom of an agency to determine its own actions against the limitations of internal and external structures (Scott 1992). An organisation will always have several choices open for action, and the decision for which action to take will depend on a variable set of interests, goals and powers opting for a "functional fit" between external requirements and the internal organisational structures they require (Thompson and McHugh 1995). For a research council, this approach implies that there might be several options for response open, and that responses will be dependent on from whom and with what force the external pressures come, and how the internal organisation is prepared and coordinated to meet the pressures.

3.3. TYPES OF COUNCILS AND WAYS OF DELEGATION

The relationship between council and government can be understood as maintained through an explicit or implicit "contract", regulating the tasks and mandate of the council, i.e. its mission. Following Braun (1998), funding agencies can in general be divided into three categories according to their role in the realisation of science policy. Science-based agencies serve all disciplines, respond to problems raised by disciplinary communities and tend to propose disciplinary solutions, i.e. they will tend also to choose disciplinary oriented instruments for their funding. Strategic agencies serve the solution of particular problem areas (e.g. health, environment, public services etc), respond to problems raised by disciplinary communities, the scientific community also outside academic institutions and by external actors. Strategic

agencies will seek disciplinary and inter-disciplinary solutions to the problems posed. According to Braun, this is the largest group of intermediaries. Political agencies will respond to problems raised by external actors, and will tend to utilise multi-disciplinary schemes. These categories can be considered ideal types where the tasks and missions of the council change as policies and practices develop over time, and councils might change their roles and their position in the typology according to the development of policies.

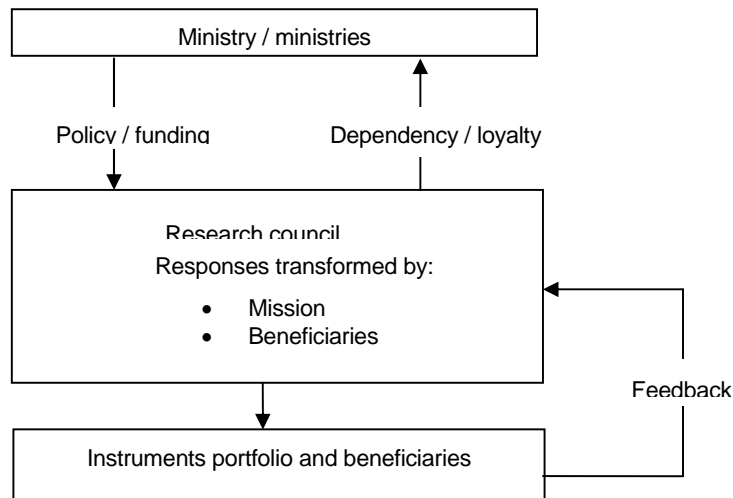
Braun also point to variations in use of instruments to help solving scientific problems by the various types of agencies (Braun 1998). A science-based agency will tend to select discipline-oriented solutions and a political agency will be oriented toward the solution of broader problems and will tend to select multi-disciplinary solutions. The way a council thus tries to accomplish its mission is a matter of the way it chooses to delegate the solving of scientific problems to scientists. Following Braun once more (2003)¹ we can typify how the forms of delegation have developed over time. From “blind delegation” being the typical form of delegation from the early days of science up to the 1960s, delegation developed through a transition period where curbed public spending results in “incentive” and “steady state” modes by the end of the 1970s, before the more formal “contract” mode and the “network” mode emerged during the 1990s. The modes of delegation will be reflected in the choice of selection mechanisms and instruments used by council, and we can assume that use of instruments will be dependent upon the type of council and type of delegation.

4 Analytical model and methodology

Following from the theoretical discussion, a council’s relationships to its surroundings is seldom characterised by a distinct or unambiguous relationship to a principal. Its responses to science policy will thus not depend solely on the relationship to the government, but depend also partly on the relationships between council and scientists, and partly on the internal organisation of the council, its dependencies and abilities to exert strategic actions. These elements are difficult to analyse, as they are constituted by a complex mix of history, legitimacy, use and balances of power, institutional perceptions etc. Our approach is to simplify these relationships into a model that as far as possible can be operationalised and compared across councils and countries, as well as taking into account the availability of relevant data (formalised in Figure 1).

¹ Braun analyses the development of delegations as a direct relationship between government and scientists, and without the use of intermediaries. We find the typology also useful for the understanding of how the relationship between research council and scientists have developed as the councils in this case can be understood as the extension of government.

Figure 1 Analytical model



We first assume that transferring funds to councils is the main way government has of implementing research policies, or, to use the principal – agent categories, to exert its role as principal towards the council. Since councils will be dependent upon government funding to be able to fulfil their mission and the expectations of scientists, according to the resource dependency approach these transfers create a dependency towards government, which is entailing loyalty and responsiveness towards government policy as well. More specifically, we assume a council being dependent upon one main source of funding (e.g. a ministry) will tend to be responsive to the wishes of this actor, while a council having several large sources of funding more freely can introduce its own strategies or make compromises between the priorities of the different partners. The number of funding sources and their relative strength in terms of funds transferred is thus the first proxy we introduce for our analysis, being aware that transfer of funds is not the only way of exerting research policy through councils. Direct instructions, legislation and statutes regulate the institutional freedom, the national traditions of political culture, style of government and distribution of power etc. will be of influence. We thus have to be aware of the general political context in which the transfers take place.

The responsiveness created through the combined dependency/loyalty towards a council's sources of funding will be transformed by several factors internally in the council. First, it will be affected by the type of council and its mission. A council is likely to 'translate' government policy into operative programmes that, from the council's point of view, contributes best to the fulfilment of its mission. We thus use the council's mission statements as a broad indication for the expected direction of a council response. We are aware that such statements can be formulated in a rhetoric or ideal language and should be treated carefully, but on the other hand, we are also aware that such statements often are regarded as so important that considerable debate is evoked when they are altered. In addition we can make a more robust account of whom the council actually serves by examining the real allocation of funds. We assume that a council having only one type of beneficiary institution (e.g. universities) or only one sector of society (e.g. agriculture research) will be dependent upon being recognized by these, and thus will be more inclined

towards transforming policies towards their needs. The mix of beneficiaries can thus influence a council's responses.

Second, responses to government policy will be transformed by the council board as it will be the decisional body for how to implement policies into practice. We find it likely that a council board with a majority of scientists will be more responsive to the needs of science, and thus tend to transform policies into actions deemed favourable from scientists' point of view. On the other hand, a council board composed with a majority from political circles or industry, will probably be more directly responsive to policy makers, industrial or societal needs. We use the composition of the board as another proxy for how a council is likely to respond to policies, being aware that the composition depends on who has the right to nominate the members, which again is part of the historical tradition and embeddedness of the council in national policy. We should also be aware that responses might be affected by the size and internal organisation of the council into divisions etc., but an analysis of institutional 'looseness' is beyond the possibilities of what we can do in this context.

For assessing the councils' responses to policy changes we use the categories of funding instruments as a proxy, implying new instruments used or changes in relative size of budgets might indicate responses to external influences. In general, this implies that a council responsive to government will respond to changes in policy by changing its own portfolio, i.e. bringing in new instruments to promote goals set by policy-makers or change the actual distribution of resources between the existing instruments. On the contrary, we can assume that a non-responsive council will keep to instruments well known and acclaimed by the beneficiaries. We are aware that this is a simplification as science policy does not (always) work in this one-dimensional way; and there will be feedback on the actions of a council. The council's response to policy can thus be welcomed by all parties and do not necessarily imply compliancy towards government.

By observations of these proxies we can of course not in any exact way establish criteria to assess how responsive a council is to policies, and observations should be evaluated on background of the specific national context. Our data on mission statements, composition of boards and councils and sources of funding has been collected from annual reports, government documents and prior evaluations and analysis. For contextual analysis, we rely on existing material, as well as our knowledge of the national science systems. Data on beneficiaries and instruments was made available through a study of project funding for the period 1970 – 2005 in several countries². The choice of comparing Austria, Norway and Switzerland, is partly because these countries resemble each other in research organisation and characteristics of the research funding system, and partly because these countries have one or more research council operating competitive-based funding instruments at an arm-lengths distance from the research performers. This in contrast to for example France where CNRS are a combined funding and research operating agency, or Italy where the former research council CNR was fundamentally changed (Potì and Reale 2005). The general methodology applied for funding data and comparisons are discussed extensively in other papers (Lepori 2006a; Lepori, Dinges et al. 2005; Lepori, Dinges et al. 2006; Lepori, Dinges et al. 2006a, Lepori

² The study is undertaken by The European Network of Indicator Producers (ENIP) 2004 funded by PRIME Network of Excellence. The study includes Austria, France, Italy, Netherlands, Norway, Portugal, Spain and Switzerland, see Lepori et al 2006, Lepori, Dinges et al 2006, Lepori 2006; Dinges 2006; Potì and Reale 2006.

B., van den Besselaar P et al 2007)³. When analysing the institutional level contrary to the national level, we encounter more often breaks in time series and ways of classifying. We are also aware that even if concepts and terminology might seem homogenous, the underlying understanding of what it means might vary over time, between institutions and countries. When we present developments in research policy and organisation at macro level, at research councils' level, as well as developments of research funding, the reader should be aware that this could not be done on a very detailed level, and that some elements or developments have had to be omitted for the sake of simplicity.

5 Research councils in Austria, Norway and Switzerland

This section briefly introduces the research councils in the three countries and their historical developments in terms of years of establishment, reorganisations and mergers, with some references to the debates leading up to reorganisations.

Table 1 Research councils included in the analysis

Country	Abbr.	Full name	Established	Dissolved
Austria	FFF	Austrian Industrial Research Promotion Fund	1967	2004
	FWF	Austrian Science Fund	1967	
	FFG	The Austrian Research Promotion Agency	2004	
Norway	NTNF	Royal Norwegian Council for Scientific and Industrial Research	1946	1993
	NLVF	The Agricultural Research Council of Norway	1946	1993
	NAVF	The Norwegian Research Council for Science and the Humanities	1949	1993
	NFFR	The Norwegian Council for Fishery Research	1972	1993
	NORAS	The Norwegian Research Council for Applied Social Science	1987	1993
	NFR	The Research Council of Norway	1993	
Switzerland	SNF	The Swiss National Science Foundation	1952	

³ We are splitting project-funding instruments into three categories; academic, thematic and innovation instruments. This is far from simple since a classification can use different criteria based on funding objectives and allocation criteria, as well the different types of research activities and beneficiary groups funded. See the cited papers for a detailed discussion.

5.1. AUSTRIA

The Austrian Science Fund (FWF) and the Austrian Industrial Research Promotion Fund (FFF) were both created in 1967. Combined they have held the largest share of project funding in Austrian research, accounting for more than 54% of total project funding volume 2002 (Dinges 2006). By the reform act in 2004 the governance structures of FWF was somewhat changed, but its overall structure was not altered. From 1967 until 2004, FFF was the main funding agency for industrial research in all branches, but a noteworthy feature of the Austrian research funding system was the establishment of technology oriented support measures outside FFF from the end of 1970s. In 1987 the virtual Innovation and Technology Fund (ITF) was established, largely steered by a board dominated by ministries whereas its funding was administered jointly by FFF and the ERP⁴. The Technologie Impulse Gesellschaft (TIG) was created in 1998 and the Austrian Space Agency (ASA), established 1972, got involved into research and technology programme management as it operated ESA in Austria and started to prepare the Nanotechnology programme on behalf of the Ministry of Transport, Innovation and Technology (BMVIT) in 2000. There was thus some fragmentation in the organisational structure, which was ended when the Austrian Research Promotion Agency (FFG) was established in 2004 through a merger of FFF, TIG, ASA, and the Bureau for International Technology Co-operations (BIT). Upon the merger, FFF was dissolved and FFG was set up as a limited corporation on behalf of Ministry of Transport, Innovation and Technology (BMVIT) and the Ministry of Economy and Labour (BMWA).

5.2. NORWAY

Norway established three research councils during the late 1940s; one devoted to industrial needs and technological development (NTNF), one towards the needs of the agriculture (NLVF) and one academic (NAVF). Following a discussion in the 1960s of the needs in the fisheries, a council devoted to this industry was established 1972 (NFFR), while a fifth devoted to applied social sciences was established 1987 (NORAS)⁵. By the early 1990s, Norway thus had five councils with a mixed portfolio of academic, technological development and innovation goals. After a discussion focusing lack of coordination, excess resources used for administration, lack of integration between basic and applied research, problems of handling relations to external partners etc, the five councils were merged into NFR 1993 (Skoie 2000, Skoie 2005). The new council were divided into six non-disciplinary operative divisions, all integrating both basic research and innovation. After an evaluation of the council in 2001 (Arnold et al 2001), the council was reorganised into three divisions. By 2002, the council allocated 43% of the total project funding volume in Norway.

5.3. SWITZERLAND

The Swiss National Science Foundation (SNF) was established 1952, and is the single most important organization for project funding at the national level, accounting 2002 for slightly less of 50% of the total funding volume and for more than 60% when excluding international agencies (Lepori 2006). The

⁴ The ERP Fund was established under the Marshall Plan for European reconstruction and provided support for technology transfer and innovation projects close to market that require significant investments in form of loans and guarantees (see Jörg 2004).

⁵ NORAS is omitted in analysis due its short time of existence (1987 – 1992).

organization of the SNF has been stable throughout its fifty years of existence. Most changes have been pushed by the quantitative expansion, leading to the growth of the number of members of the National Research Council (NRC – the main body of the council) and of the secretariat and to its organization in divisions. Political intervention in the SNF internal organization and functioning has been practically absent, and Switzerland has thus had only one research council.

6 Empirical evidence

This section presents the empirical evidence along the proxies outlined in section 4. The findings will be discussed in section 7.

6.1. SOURCES OF FUNDING

The Austrian councils FFF and FWF were largely dependent on the annual federal budget (Table 2). In the case of FFF, the annual federal budget was the sole funding source until 1981, while from then on the Austrian National Bank (OeNB) started to contribute (22% of the total by 2000). From around 1990, FFF started to administer funds from the virtual Innovation and Technology Fund (ITF) as well as EU regional funds. Since 1997 special funds from the federal budget were added, but at cost of the regular budget. To provide a maximum of stability in its funding, FFF took money from the following year's budget, as well as utilised financial returns from loans and guarantees. In 1995 and 1999, the annual federal budget devoted to FFF was cut by more than 30%, leading to a severe financial crisis. Also for FWF, the National Bank provided some funding from 1982 onwards and state support was reduced during the mid-nineties. From 2004 onward, National Bank funding for both councils are allocated by the newly founded National Foundation. Also for FFG funding largely stems from the federal budget⁶.

In Norway, the mission-oriented councils NTNF (technology), NLVF (agriculture) and NFFR (fisheries) were mainly funded by the ministries responsible for the equivalent sectors of society according to the 'sector principle' of governance (Skoie 2000). Typically, the NTNF got more than 70% of its funding from the Ministry of Industry. The academically oriented council NAVF had on the other hand a more diversified income, especially from the 1980s on. Except for the fisheries council in its early years, no council has been dependent upon one single source of funding as there for all councils were other public sources or industry contributing. A system that reserved parts of the incomes from the nationalised system of football betting for research purposes was established shortly after World War II for which government had no voice in the distribution, increasing councils independence from government (Skoie 2005). This mechanism contributed to as much as 80% of the funding of the NLVF and NTNF in 1970, while it later saw reductions and was abandoned altogether 2002. Since the establishment of NFR in 1993, no ministry contributes to as much as half of its funding. The Ministry of Education and Research is the largest source, but 15 other ministries allocated funding to the council in 2005, of which six contributed by more than five percent of the total.

⁶ The FFG annual reports do not clearly distinguish between various sources of funds, which make analysis of this case difficult.

In the Swiss case, the SNF has over the years received virtually all its funding from the central government through the Ministry of Internal Affairs. The framework decisions on financial allocations to SNF has been the most important possibility of influencing SNF and of setting specific objectives by the state, and all discussion concerning the SNF policy and role have taken place in this context.

Table 2 Main sources of funding for research councils. Percent of total annual budget.

Council	Sources of funding	1970	1980	1990	2000	2005
FFF (AU)	Federal government	100	100	82	20	
	Austrian National Bank			18	14	
	Loans, returns etc				14	
	Anticipation Budget 2001				46	
FWF (AU)	Federal government	100	100	87	58	57
	Austrian National Bank/National Fund			13	34	32
	Commissioned Federal programmes				8	11
FFG (AU)						NA
NTNF (NO)	Ministry of Industry	76	43	71		
	Ministry of Petroleum and Energy		21	12		
	Other ministries/public	7	20	4		
	Football pool funds	15	12	9		
NLVF (NO)	Ministry of Agriculture		5	54		
	Football pool funds	80	66	29		
	Industry	9	16	10		
NFFR (NO)	Ministry of Fisheries	100	73	82		
	Other ministries		2	12		
NAVF (NO)	Ministry of Education and Research		80	54		
	Other ministries/public		NA	26		
	Football pool funds	82		18		
NFR (NO)	Ministry of Industry				28	19
	Ministry of Education and Research				31	40
	Other ministries/public				39	37
SNF (CH)	Ministry of Home Affairs	100	100	100	100	100

6.2. MISSION AND BENEFICIARIES

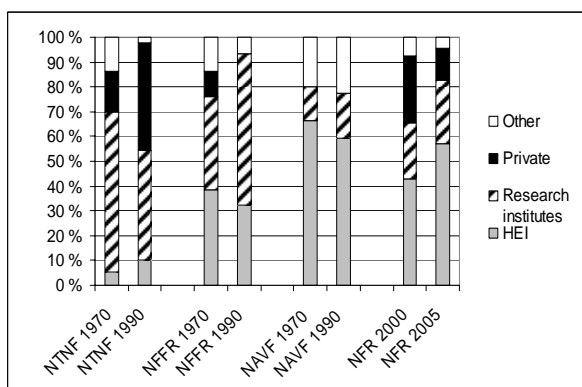
The Austrian council FFF was set up as a responsive mode agency for industrial R&D projects. According to the 2004 evaluation of the council, FFF has remained “remarkable true” to this mission (Arnold et al 2004). Still, the council deviated some from this mission in the last ten years of its existence as it in cooperation with ministries and other actors, managed also programmes of a top-down character (e.g. ITF-programmes) and programmes designed and steered by ministries, as well as defining specific programme-like schemes for the responsive mode calls. FFF beneficiaries were by large the business sector. In 2002

about 26% of FFF projects included science-industry collaborations, and at maximum an estimated 31% of FFF funds were for academia (Arnold et al. 2004). After the reorganisation into FFG in 2004, the mission is still predominantly towards support of strategic research to the benefits of the economy and business, but science-industry linkages are supposed to be higher than was the case of FFF. Ministries can assign programme management to promote technology development to FFG.

The FWF had a mission towards basic and academic research, and with the same responsive mode principle of operation as FFF. Noteworthy, the mission states FWF to have an equal commitment to all fields of sciences, which has consequences for virtually all programmes in the way that all measures are generic in terms of scientific disciplines and no a priori distribution of the funds over different disciplines exists (see Van der Meulen 2004). The mission has been realised by FWF funding mainly basic research almost exclusively in the higher education sector.

During the 1970s, the Norwegian councils' close links to the ministries affected their mission, which however had some noticeable variations (Skoie 2005). The technological oriented NTNF had a mission towards applied sciences and industrial relevance, and should promote technological and natural science and the use of scientific results for the benefit of industry. Responding to stagnating industrial developments and criticism of the abilities of the research system to contribute to the needs of industry, references to economic competitiveness and growth became more direct (Skoie 2005). For the beneficiaries, NTNF had until the mid 1980s its own research institutes for which a large part of its funding were allocated (Figure 2). After criticism of this arrangement in 1981, the institutes became independent units and a larger part of the portfolio was allocated to private and industrial research, and for some small part to universities (Arnold et al 2001). For the two specialised councils NLVF and NFFR, the mission statements had a commitment towards the agricultural and fisheries sectors and the needs of industry. NFFR allocated considerably funding to higher education institutions, with an increase to research institutes and a decrease to industry over the years.

Figure 2 Funding from Norwegian research councils by beneficiary.



Breakdown by beneficiaries not available for NLVF.

The 1970 mission statement of the academic oriented NAVF was to promote scientific research in all scientific fields. A debate during the 1970s concerning a government proposal to establish a new research

council for funding research for societal planning resulted in the establishment of a new division within the NAVF, and the mission statement came to include "...research for society's planning needs" (Skoie 2005). After a separate council for applied social science was established in 1987, the mission statement again refers only to the promotion of the scientific disciplines. Around 60% of the NAVF funding went 1990 to academic institutions, 18% to research institutes, and 22% to individuals and national priority programmes outside the regular institutional structure. After the former councils were merged into NFR 1993, the mission statement gives this council much wider responsibility as the council should increase the knowledge base and meet society's demand for basic and applied knowledge, as well as for innovation. The amalgamation into one council with broader objectives and services seem to have caused a vague and general mission statement without favouring any sector, type of research or discipline. The broad mission is reflected in the composition of beneficiaries (Figure 2), but a slight turn towards the benefit of higher education institutions is observable in the 2000-2005 period, while private beneficiaries have had a reduction from 27 to 13% of the total.

The mission of the Swiss SNF is described in its statutes and in the research act of 1983. The main aims are to support independent (investigator-driven) research in universities and research institutes, while interdisciplinary and problem-oriented program research comes second and training of young researchers also play a part. SNF can also be charged to execute national research programs on subjects decided by the Swiss government and to fund national competence networks in research. The option of funding directly laboratories was discarded already at the creation of the SNF and SNF deals directly with the principal investigators with very little involvement of their university. HEI receive about 90% of the total funds and this share has not changed significantly in the last years. The rest is divided between some public research institutes, individuals and some consultancy companies. Direct funding to private companies is almost non-existent and SNF cannot by statute fund research of direct commercial interest.

6.3. COMPOSITION OF BOARD AND ITS NOMINATION

FWF and FFF were from their establishment given a strongly autonomous status as governance structures were dominated by beneficiaries rather than by ministries (see Arnold et al. 2004) and until 2004 their governance structures remained unchanged (Table 3). FFF was governed by a Presidium that consisted of 18 members, where the 11 voting members were a subset of the Board, which again consisted of 31 members appointed entirely by the Social Partners⁷ except for 3 non-voting members appointed by ministries. The governance structures of FFG is entirely different as FFG is a limited corporation on behalf of BMVIT and BMWA, who appoint the two managing directors via tendering procedure approved by the supervisory board dominated by ministries. FWF on the other hand, was largely governed by the scientific community. The Assembly of Delegates the Executive Board and the Kuratorium, which takes the research funding decisions, had all a majority from higher education. Whereas internal regulations were optimised and not altered dramatically by the 2004 reform, a supervisory board was also introduced for FWF⁸, deciding upon FWF long-term work plans and appointing and recalling the management. Hence, the strategic competencies of the supervisory board are extensive and policy makers now actively participates

⁷ The Austrian Federal Economic Chamber WKÖ (15 members), the Austrian Federal Chamber of Labour AK (3 members), the Austrian Federal Chamber of Agriculture (3 members), and the Austrian Trade Union Federation ÖGB (3 members).

⁸ FTFG 2006 §5.a.

in the decision making process as three out of seven supervisory board members are appointed by ministries. Of the rest, three are appointed by the Assembly of Delegates (dominated by universities).

Table 3 *Composition of Steering Boards of Research Councils*

Austria Prior 2004		Austria After 2004		Norway 1980		Norway 2004	Switz- erland
FWF	FFF	FWF	FFG	NTNF	NAVF	NFR	SNF
Assembly	Board	Supervisory Board	Supervisory Board	Board	Board	Board	Council
Policy	5 (n.v)	4 (n.v)	3	7	1	4	
Higher Education	52	3 (n.v)	3*		1	4	3
Non University Sector	4				1	1	2
Trade/Labour/Ind- ustry Associations	6	24		3	5	1	2
Others	5 (n.v) ***		1**			2	1
Total Voting Members	62	24	7	10	8	12	8
							100

n.v. = non-voting members.

*Appointed by Assembly of Delegates, which is still dominated by Academia.

** Appointed by the 6 other members of the Supervisory Board, if no decision on 7th member occurs the Council for Research and Technology elaborates a three person shortlist of which ministries have to select a member.

*** Members of FWF board.

The three strategic Norwegian councils had a considerable representation from industry; as much as two third of the NTNF members coming from industry in 1990. The nomination and the appointment of the board were in the early period by the council assembly, while in 1990 the appointment had been transferred to the Ministry of Industry. Also in the agricultural council (NLVF) the board was until the 1980s appointed by the council, while this right later was transferred to the government while the institutions represented had kept their right to nominate the members. For the fisheries council (NFFR), members of the board were nominated by the Ministry of Fisheries and appointed by the government. The board of the NAVF was dominated by scientists and had no industrial representation. In the early period, the Ministry of Education and Research nominated four of the board members and four others were nominated by the assembly, while later the government appointed the majority of the representatives. Since the establishment of NFR the government has kept more of an arms length distance, as it has not appointed any government official except in cases were they have come from government research institutions at a relative long distance from central government.

The internal organization of SNF is based on a national research council (NRC) composed of 100 researchers (mostly university professors) spread on scientific disciplines. NRC is more a collection of representatives of the scientific disciplines than a corporate body. In the past, $\frac{3}{4}$ of the members have been

chosen by the SNF itself, while the rest was nominated by the government; in practice co-opted by the NRC. Since 2000, all members are elected by the committee of the SNF foundation council through an open call procedure. The whole organization of the SNF emphasizes the role of the individual members of the NRC, who are responsible for the choice of the reviewers of project proposals, and to submit the propositions of decisions to the NRC. In addition, there is a foundation council linking SNF and the stakeholders composed of representatives of the universities, the central state and the cantons, scientific societies and the world of culture. Most of the strategic documents and decisions are taken by NRC together with the secretariat.

6.4. INSTRUMENTS AND FUNDING ALLOCATION

The Austrian FFF operated for a long time bottom-up R&D project funding for all branches as its sole funding instrument. Except some technology-specific initiatives, FFF virtually did not extend its instrument portfolio, and programmes geared towards science-industry collaborations, networks and thematic oriented programmes passed FFF largely by (Arnold et al. 2004). Only in the beginning of the nineties, FFF got partially involved in thematic oriented, top down programme implementation through the programme management of a series of technology programmes designed and launched by BMVIT⁹. The tradition of bottom-up research funding did not vanish with the creation of FFG as the funding scheme was converted into FFG General Programmes, still by far the largest direct research funding instrument for industry. Funding of individual research projects has also been the single most important instrument of FWF. Until 1990, the portfolio of instruments consisted mainly of individual research projects and thematic priority programmes, while since then the programme portfolio has increased dramatically. Today it consists of about 15 programmes, some of which are mandated by BMBWK and BMVIT. In 2005, mandated programmes accounted for 12% and individual research projects for 50% of total funding.

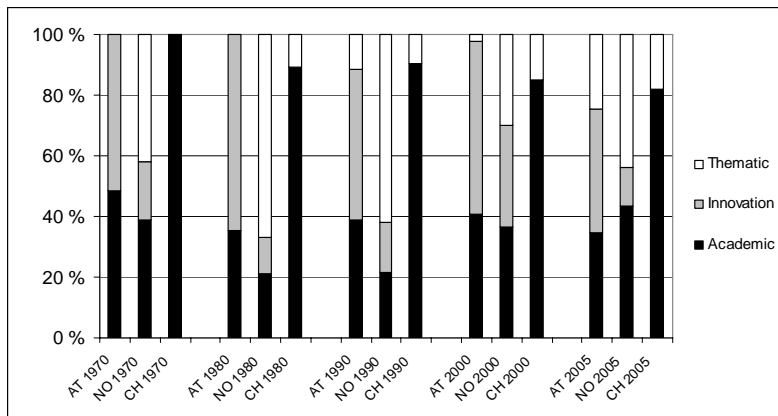
Until the mid-1980s the Norwegian NTNf largely used instruments dedicated towards its own research institutes; mostly through thematic instruments. When most institutes became independent units, a larger part of the portfolio was allocated to private and industrial research (Arnold et al 2001). Even if NTNf allocated some resources to universities as PhD and travel grants, its instruments were almost solely designed to promote innovation or thematic programmes. The fisheries council (NFFR) utilised almost solely thematic instruments operated in response-mode in the earlier period and as larger programmes in the later years (94% of total in 1990).

In the 1970s, NAVF used academic instruments allocated as individual grants and free projects in responsive mode. These developed partly into programmes during the 1980s. In the late 1980s, national priority areas were introduced and defined by government, and administered by the council. By 1992 more than 60% of the council's funding were organised through programmes and national priorities. For the amalgamated council NFR, about 40% of the funding has been allocated through academic instruments, while instruments for innovation have decreased and thematic instruments gained. The number of instruments has proliferated, especially instruments with a thematic content like targeted programmes,

⁹ E.g. in 2002, when FFF was asked to administer th BMVIT "Impulse Programmes"

centres of excellence, and programmes for basic research etc. By 2005, less than 20% of the total was allocated to the 'classical' academic instruments grants and free projects, and by 2006 the council stopped giving individual grants. More than 80% of funding for centres of excellence and basic research programmes were allocated to higher education institutions.

Figure 3 Instruments by main categories.



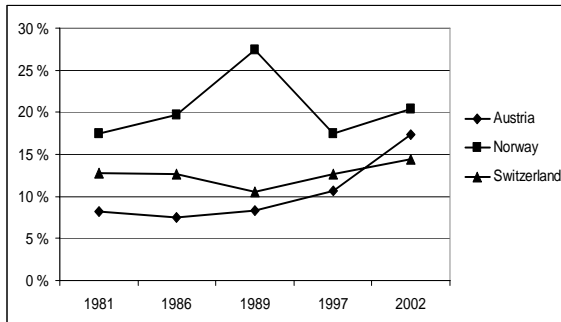
Swiss SNF has dominantly allocated funding by responsive mode instruments. In 2005, about 80% of the budget was attributed this way, either as research projects (60%) or as individual grants (20%). Thematic programs to answer to urgent social and political needs were introduced in the 1970s (national research programs), while SNF managed also a set of technological programs in the 1990s (priority programs). The latter have been replaced since 2000 by an instrument to finance national competence networks in research (NCCR), with a stronger orientation towards basic research. Overall, thematic instruments appeared in the mid-1970s and reached about ¼ of the total SNF budget by the mid-1990s, but then decreased to about 5% in 2005. This orientation towards responsive mode funding has been confirmed by the new plan for the years 2008-2011.

7 National trajectories

Before we discuss our findings, we would like to point out the fact that in terms of the total amount of R&D funding, research councils in all three countries have succeeded in increasing their share of total government allocations for R&D (Figure 4). Comparing also research council project funding by Purchasing Power Parities confirms the findings as purchasing power in the three countries was at about the same level around 1980, while during the 1980s funding from the Norwegian councils was considerably more powerful before coming back to the level of the other two countries by the mid 1990s. Over the last years, funding by the Austrian councils has gained in relative power. We conclude from this

that over time the governments in the three countries to a varying degree have been willing to invest in their research councils, indicating some variations in the relationship between governments and councils¹⁰.

Figure 4 Share of project funding by research councils by GERD GOV



7.1. AUSTRIA

In the Austrian case, we find in our opinion evidence for FFF and FWF being highly dependent upon government for their funding, but the internal governing structures and relationships to the beneficiaries made them largely unresponsive to government policies. In the end, this provoked a total reorganising of councils by government, introducing a much stronger and direct government influence on councils from 2004 onwards. This development is of course open to several interpretations and possible explanations, but we point to some evidence to support our interpretation.

Governmental influence on budgets was prominent as they during the 1970s and 80s came almost 100% directly from government; thus a dependency is to be expected. Even when budgets later became to be spread on more sources, they to some extent came indirectly from government and government direct allocations were reduced accordingly. Despite the dependency, the councils stuck to their original mission until the 1990s, and the dedication to the FFF mission is demonstrated by the fact that when government budgets were reduced, the FFF shifted budgets forward to be able to meet its obligations towards the beneficiaries. The legal mandate and mission of FFF provided an excellent basis for getting wide responsibilities for innovation policy, but it restricted itself mainly to a narrow concept of bottom-up research project funding by use of a traditional and well-established set of instruments acclaimed by the beneficiaries. (Arnold et al 2004). The lack of response first made government initiate new agencies and instruments outside FFF, and later government reorganised the council system and introducing legislation allowing for direct influence on the programme portfolio by ministries and a strong ministerial representation on the boards (3 of 7 representative), and stronger links to the national strategies developed by RFT. The FWF seems to have developed much in parallel; playing the role of a science-based council funding disciplinary projects in a responsive mode selected by quality criteria. The basic funding principles and internal organisation of FWF have however not altered dramatically with the reorganisation, and bottom-up research funding still account for the largest share of research project funding. This might be a sign of unresponsiveness continuing.

¹⁰ Factors as the overall economic development, reallocations between sectors etc can also influence this.

The interesting question is how unresponsiveness to government could prevail over such a long time since the councils actually were totally dependent upon government. Internally the councils were dominated by beneficiaries as the Austrian model of governance delegates considerable power to organised societal interests, making it possible for the beneficiaries to remain in control of the councils. Outside, responsibilities for research within government was fragmented. The considerable change in government policies and control of the councils after the 2004 evaluation might be considered as an example of a reorientation of the Austrian arrangements in direction of a principal – agent model including a greater government steering capacity as well as an increased will to allocate public resources (cf figure 4).

7.2. NORWAY

In the Norwegian case we find an example of councils being responsive to government, but were the sector-based organisation of the science system and funding from several sources had fragmentation of the horizontal coordination as well as rather unstable or fluctuating constellations as consequences. Quite close cooperation between councils, ministries and beneficiaries created a situation where these partners created ‘collaborative responsiveness’ within each sector. Councils were thus mostly able to balance the wishes of policy-makers and beneficiaries by using thematic instruments, but largely within a limited context of an economic sector. Overall, we find it difficult to pinpoint definite patterns of development as both government policies and council responses seem to have varied rather much. Not unlikely, the lack of coordination and unclear role of councils probably were part of the rationale behind the fundamental reorganisation (Skoie 2000). The reorganisation did probably not come about because councils were not responding to science policy, rather, as the evidence below points to, because the way the system was organised and steered asked for better coordination.

The mission-oriented councils had funding from several sources, but usually with one ministry as the main source (with some variations over time). Norwegian ministries funded also projects outside the councils and by this action somewhat de-coupling councils from government. During the 1980s, this practice were to some extent tried reversed, but ministries partly opposed regulation and continued to initiate and fund projects of their own in addition to allocating funding to councils. The science-based NAVF had most of its funding from the football pool funds and was virtually independent of direct government funding. In total, these variations in funding might open for constellations of a more unstable kind with unclear dependencies. The composition of the boards also shifted over time; ministries took greater control of councils during the 1980s by increasing their representation and then decreasing again since the establishment of NFR. These shifts in governmental influence are probably reflecting some ambiguity in the ministries regarding the usefulness of the councils and the needs for direct influence.

Also the mission and allocation to beneficiaries varied between councils, as well as there were considerable variations over time. The agriculture (NLVF) and fisheries (NFFR) had a very restricted mission, and had to some extent roles of political agencies as they partly responded to priorities set outside the scientific realm due problems caused by industrial restructuring. NTNf addressed broader industrial and technological development, but for a long time favoured its own research institutes. NAVF exemplifies a different case as it operated basically as a science-based council with responsive-mode disciplinary funding

schemes, though not only allocating funds to HEI. The mission and beneficiaries of the NFR covers all sectors and types of research, including the management of programmes initiated by policy makers. Again, we interpret these variations as expressing some uncertainty within government on the role of councils.

7.3. SWITZERLAND

The development of SNF exemplify a case where the combination of a relatively weak state and an autonomous council tightly integrated with and responsive to a strong academic community have been able to defend this community's interests and by this also defending its own existence and strategies. By successfully maneuvering its responses to the satisfaction of both policy-makers and beneficiaries, it has succeeded in keeping its organization and mode of action virtually unchanged. The examination of SNFs share of funding above might indicate that the defence of a traditional role might have come at the price of its share of public resources.

The council has essentially been funded from one single government source, potentially causing some dependence towards this source. SNF accepted thus in a period some change in direction of being a strategic agency by including in its portfolio the national research programmes and national competence networks in research (NCCR's), where the Federal Government participates in the decision on research themes. We believe that this model responds to two rationales: firstly, the wish of the public administration to get some influence on project funding through the SNF; secondly, this joint management reduces the potential goal conflicts between these programs and the general mission of the SNF, since the SNF is charged only of the evaluation of the scientific quality of the proposals, but not of the choice of the research themes. This arrangement might indicate that the stability and autonomy presupposes a relatively close cooperation with government in line with the Swiss consensus model of governance. On the other hand, the mission is definitely one of a science-based council operating mainly in a discipline-oriented manner and allocating funds to universities, and in line with this it has been governed by a board of academics selected from the disciplines of higher education institutions. After inclusion of thematic or mission-oriented programmes, the council has succeeded in transforming these into the standard portfolio of instruments, thus keeping to its mission and avoiding further governmental interference.

8 Conclusions

Our first research question concerned the responsiveness of the councils. From our material it is evident that research councils might be equally responsive to scientists and their institutions as to policy-makers, and by this reducing the possibilities to implement science policy. In our study the Austrian case is the clearest example of councils de facto controlled by the beneficiaries, but also in the Norwegian and Swiss cases the councils have negotiated their responses to government and managed to find solutions keeping their mission towards the beneficiaries relatively unchanged despite policies towards the opposite. On the other hand, in the Austrian case since 2004 we find evidence of councils being controlled directly by government. In both the Austrian and Norwegian cases we find examples of periods in time when

ministries actually to some extent tried to avoid the use of councils, deliberately reducing the councils' possibilities to play a role in science policy. From a theoretical point of view, our findings illustrate the need for multidimensional concepts for how research councils function.

Our second question concerned the possible parallel or homogenous development of councils and their relation to government in the three countries. We find some homogeneity in the way that in all countries there has been a development of policies towards greater use of thematic and innovative funding instruments. On the other hand, the case studies have demonstrated research councils to play distinctly different roles in the countries we have examined, their roles have developed and changed in disparate ways over the years, as well as government to a varying degree exercising control over the councils. Overall, this is an indication of research councils basically being strongly embedded in national policies and national research systems.

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