How German Professors Handled Increasing Scarcity of Resources for Their Research: A Three-Level Actor Constellation

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In Germany, as in many other countries, research coexists with teaching at universities.[1] Both tasks are, moreover, only situationally differentiated. There are only few roles or organizational subunits specializing in just one of these tasks. Professors in particular have to devote their attention to both tasks, which often leads to conflicting demands on their time budgets. In addition, most of the financial and personnel resources of German universities are shared by research and teaching as a common pool. Less than one fifth of the universities' resources are separately budgeted funds for research projects, while more than four fifths are general university funds from government which do not specify separate budgetary categories for each of the two tasks.[2] This *common pool of resources for teaching and research* establishes a zero-sum relationship between teaching and research. Since to the general public,

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This contribution sketches some main results from my extensive study of the resource problems of university research in West Germany since the mid-1970s; see Schimank (1993) for an extensive presentation. In addition to consulting other data sources, I conducted a survey of a representative sample of professors, asking them about some important aspects of their research conditions. The results, parts of which are used here, are described in Schimank (1992). I also carried out extensive unstructured interviews with about 30 professors from different academic fields who conducted more than the average amount of research, and with officials from the relevant government agencies and the organizations which politically represented the interests of universities. Findings from these interviews are also used here. To protect the anonymity of my interviewees, they are cited only by the number of the respective interview.

1 See Braun/ Schimank (1992) for a theoretical conceptualization of the following.

2 This rough calculation is based on data for the mid-1980s in Wissenschaftsrat (1988: 234). No significant changes have occurred since then.

especially students and their parents, to important interest groups like business associations and labor unions, and to politicians alike teaching usually is the much more important task of the universities, this zero-sum relationship implies structurally built-in resource trouble for research. When the amount of general university funds required for teaching increases faster than the funds themselves, the share allocated to research diminishes correspondingly.

Since the beginning of the last century when German universities adopted research as their second task besides teaching, this kind of trouble arose repeatedly in German university research. The last time it started was in the mid-1970s. I will focus here on the period from the mid-1970s until the end of the 1980s, although the trouble is still going on. From 1975 to 1989, the number of students at German universities increased by two thirds. Even if one allows for the fact that the demand for teaching did not grow to quite the same extent, the universities had to bear a huge increase in this demand, while the established posts for personnel and the institutional funding stagnated.[3] As a common pool of resources for teaching and research, these general university funds for personnel and finances were consumed more extensively by teaching, with shrinking leftovers for research.[4] This is corroborated by the professors' appraisal of their resource situation. About 40% of the professors estimated in 1990/91 that their general funds had worsened with regard to research during recent years (Schimank 1992: 23-26).

Compensating these losses by falling back on separately budgeted funds became more difficult, too. The total amount of separately budgeted funds to the universities grew from 1975 to 1986 by about one third.[5] In one of the German states, North Rhine-Westphalia, separately budgeted funds increased by nearly three quarters between 1982 and 1990.[6] Nevertheless, separately budgeted funds did not suffice. Thus, on the one hand professors depended increasingly upon separately budgeted funds. Actually, between 1988

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3 See the data in Wissenschaftsrat (1988: 234), BMBW (1990: 139, 260; 1991: 218). Financial increases during these years were only effects of inflation.

4 This was corroborated by my unstructured interviews with professors. Some of them even had to admit that they had to use practically all of the general funds allocated to them – the financial assignments for themselves and their assistants as well as their assistants' work capacity – for teaching (interviews 20, 21, 40).

5 My own calculations on the basis of deflated data from DFG (1975: 271); Wissenschaftsrat (1988: 234-239); BMFT (1990: 340-341).

6 My own calculations, based on deflated data from MWF (1992: 20).

and 1990, nine out of ten professors had to rely on some amount of separately budgeted funds (Schimank 1992: 26-27). On the other hand, these funds expanded much more slowly than the demand for them. This applies especially to the *Deutsche Forschungsgemeinschaft* (DFG), the most important funding agency for universities, which had been able to grant about two thirds of the total sum applied for in 1975 but could grant only half in 1988 (DFG 1975: 64, 195; 1989: 21).

On first sight, it seems plausible that an increasing demand for teaching not only consumes resources but also working time formerly available for research; if this reduces the amount of resources needed for research, the resource trouble for research might be significantly reduced. Indeed, most professors had to come to terms with a considerably higher teaching load. But, at first sight surprisingly, the common notion in political debates about German universities that professors could devote less and less time to research was not true. On the contrary, while research on average made up 23% of their working time budget in 1976/77, it increased to 28% in 1990/91 (Schimank 1992: 16-17). Evidently, the professors succeeded in neutralizing the time pressure of an increasing teaching load by reducing the quality of teaching, standardizing teaching, standardizing examinations and making them easier, informally delegating teaching duties to assistants, and sometimes coupling teaching and research activities more tightly.[7] Actually, on the average professors even gained a little more time for their research activities. If many professors had been prevented from doing as much research as before by their increased teaching load, the resource troubles for those who still had been able to do research would have been less because there would not have been that much demand for separately budgeted funds. Things being as they were, however, almost everybody continued to need resources for research.

This small selection of indications of the resource troubles of German university research must suffice here. Each point could be described in more detail and documented with more empirical proof, especially with regard to differences between various academic fields; further empirical indicators could be added. But, essentially, the overall picture would not change. Thus, for more than fifteen years German professors had to cope with gradually increasing resource trouble affecting their research conditions. I will describe and

7 Findings from my unstructured interviews with professors illustrate all of these practices abundantly.

explain the unsatisfactory, but unchanging pattern of coping activities exhibited during that time as a *three-level actor constellation.* The three levels of action are: uncoordinated reactions of individual professors who each tried to make the best for themselves out of their own particular troublesome situation; collective decisions about the distribution of general university funds within universities, especially on the faculty level; and the interplay between government actors and certain corporate actors who represented the interests of the universities in the political arena. As I will show, action on the level of collective decisions within universities was decisive for what was possible on the political level; and both levels of action determined what happened on the level of individual reactions to trouble.

1 Nonredistributive Intrauniversity Allocation of General University Funds

It is certainly not entirely absurd to expect that, as resources for research from the general university funds declined, the yearly allocation of these resources within the university, especially on the faculty level, might have been affected. Several criteria for a redistribution of resources might have been considered. The professors with a high intrascientific reputation for outstanding research could have been especially favored, exempting them as much as possible from unavoidable sacrifices of resources. These sacrifices, instead, could have been demanded from those professors with a low research productivity. Or professors who did research in fields of high importance to extrascientific users of research results could have been spared from inordinate resource losses. Or older professors who had accumulated a rather large resource base over the years and, perhaps, were not doing that much research anymore, could have been forced to relinquish some of their resources. Younger professors, on the other hand, whose productivity was at its peak level but whose resource base was comparatively small could, for example, have been excluded from resource losses. These and other imaginable criteria for the preferential treatment of certain professors, of course, could have been combined if the need for a more complex appraisal became evident. The criteria also could have been softened so that the degree of redistribution could be determined according to what seemed to be reasonable.

As these brief remarks indicate, there are various potential good reasons to react to an increasing scarcity of resources for research with a redistribution of general university funds within the university. Moreover, redistribution very well could have been designed in a way which would not have brought about unbearable individual losses of resources and an intolerable increase of resource inequality among professors. But, in fact, almost nothing of this kind happened in German universities. The intrauniversity allocation of the general university funds did not redistribute resources according to any of the possible criteria mentioned. Instead, significant losses of resources as well as small intermediate or local gains were most often distributed proportionally according to the share of resources each professor had at the time of the respective decisions.

To understand this *status quo-oriented distributive logic*, we must look back for a moment at how general university funds were allocated to the German universities by the federal states before the university reforms began in the late 1960s. Until then, a bilateral funding relationship between each professor and the state's ministry of education existed. When a professor got an appointment for a chair at a particular university, and afterwards whenever he was offered a chair from some other university and had to decide whether to stay or to move, he could bargain with the ministry about the general university funds that were to be dedicated to him personally. The bargaining agreements were binding for the future. The ministry was unable to reduce what it had once granted to a professor. Thus, allocation of general university funds consisted in a multitude of bilateral binding commitments. It was, therefore, highly inflexible in the social as well as in the temporal dimension. A redistribution of the general university funds given to a university was only possible by allocating increases selectively.

In this traditional funding regime, within a university no collective decisions about the distribution of general university funds were taken. The university's organizational potential for self-governance remained untapped. For several reasons not to be dealt with here, government tried to increase the universities' self-governance by instituting the university reforms. Since then, general university funds have been given in a lump sum to the university, which has to allocate them internally in two stages. General university funds must first be divided among the departments, and then, within each department, among the professors. Thus, on the level of the university as a whole as well as on the department level, collective decisions regarding distribution

of funds are required. Universities have thus acquired the authority and the responsibility for the internal allocation of their most important resources. But, as explained above, this radical institutional change has had almost no redistributive effects. There were two reasons for this: the lack of resolve on government's part, and the widespread attitude among the professors that it was best to cooperate with one another.

Under the old funding regime of bilateral bargaining, the state's ministries of education had got into a ruinous cycle of outbidding each other in their competition for professors. Professors were able to exploit this competition and acquire very generous supplies of general university funds for themselves. At the end of the 1960s, the joint commission of the states' ministries of education (*Kultusministerkonferenz*, KMK) made a collective decision to restrict this ruinous competition by prohibiting the dedication of general university funds to individual professors. This evidently was integrated into the new funding regime established shortly thereafter according to which the universities themselves had to allocate general university funds internally. But the formal renunciation of personal resource dedications was not in tune with the ongoing competition for professors between the states. In this competition, such dedications have remained the most widely used weapons. Under the pressure of competition, a lack of resolve prevailed among the states' ministries of education (interview 52). As a consequence, government itself has acted contrary to its own intention, which had been to give universities a wide area of discretion for redistributive decisions about resources. At most universities, a significant amount of the general university funds – sometimes well over half – are still dedicated to individual professors and, hence, cannot be handled any more flexibly than under the old funding regime (interviews 16, 20, 39, 56).

But even the segment of the general university funds which was at the disposal of intrauniversity collective decision was only rarely redistributed. Instead, a mutual attitude of cooperativeness among the professors prevailed, causing them to refrain from challenging the status quo of resource distribution as it had emerged from the past. Losses of general university funds as well as rare increases were distributed proportionally. In effect, this resulted in an implicit mutual non-aggression pact among the professors (interviews 1, 2, 4, 6, 11, 12, 19, 23, 42, 43, 45). Undoubtedly, most of them suffered significantly from the scarcity of general university funds. Moreover, in any university everybody knows about certain departments or professors whose

research productivity is low but who nevertheless have considerable resources for research at their disposal. Still, these resources are not taken away from them by their colleagues who have a much more legitimate resource demand and who would be able to decide collectively on a redistribution of these inefficiently allocated resources.

There are several good reasons for professors to act in this way, as odd as it may seem at first sight:

1. The conflicts associated with challenging the established distribution of resources produce emotional stress, especially on the faculty level where one literally meets one's opponents every day.
2. Most professors are not experienced in organizational micropolitics. Socialization as a scientist does not include acquiring such skills, and often even breeds a certain contempt for the "dirty tricks" associated with them.
3. Conflicts arising from redistributive efforts destroy the collective influence of the department or university needed against enemies outside. In difficult times when the state ministry of education permanently threatens to reduce the general university funds and the universities have to fight for additional funds, internal conflicts are clearly out of place.
4. As risk-aversive actors, professors are well-advised to refrain from redistributive initiatives which might trigger future revenge. And even if no revenge is taken, establishing redistribution as a possibility of action always implies that one might be a victim of it oneself some time in the future.
5. All these reasons why a professor is better off not pressing for redistributive resource decisions even if they are to his present advantage have a strong basis as long as he sees good chances for himself to acquire the resources he needs as separately budgeted funds. By this, he substitutes a comparatively comfortable anonymous competition according to scientific criteria for the politicized face-to-face conflicts within the faculty or university.

These five reasons strongly overdetermine a professor's attitude of cooperativeness toward his colleagues. As long as most professors are motivated by at least one of these reasons, this is sufficient to bring about this implicit mutual nonaggression pact.

Government's lack of resolve, produced by the competition for professors among the state education ministries, together with the professors' mutual

attitude of cooperativeness toward each other arising from one or more of the five reasons mentioned above, jointly brought about the nonredistributive nature of intrauniversity allocation of general university funds. Thus, scarcity of the resources for research from these funds was usually divided evenly among professors. Collective decisions about resource allocation made everybody worse off. It was only under exceptional circumstances that a professor had the opportunity to cope with his resource troubles on this level of action. Coping, therefore, had to happen on other levels. I will now turn to the level of research policy, where government actors and advocates of the universities interacted.

2 Mutual Blockade between Government and Advocates of the Universities

From the beginning of this troublesome situation, there was a clash between government and the corporate actors representing the interests of the universities at the political level. The goals of both sides were mutually exclusive.

The main corporate actors functioning as advocates of the universities were the West German Rectors' Conference (*Westdeutsche Rektorenkonferenz,* WRK),[8] representing the universities, the DFG mentioned above, and the Association of University Professors (*Deutscher Hochschulverband,* DHV), a professional association of professors. In the early 1970s, these advocates began to criticize political indifference toward worsening research conditions at universities that had resulted from the increased teaching load. The resource trouble with all its implications was pointed out again and again. This criticism evolved into demands for far-reaching *compensation*. Essentially, the manifold and varied expressions of the advocates' opinions boiled down to a quite simple recipe. Increases were called for, primarily in the general university funds, secondarily in the separately budgeted funds (especially from the DFG), so that autonomous research would be possible on a satisfactory level for each professor. Obviously, this would have meant huge increases,

8 Its new name since 1990 is the University Rectors' Conference (*Hochschulrektorenkonferenz,* HRK).

as the advocates were well aware. To give just one recent example: In 1992 the HRK estimated that about 30,000 additional established posts for scientific personnel were needed to restore approximately the situation of the mid-1970s (HRK 1992: 14). While conceding readily that this could only be accomplished in a medium- and long-term perspective, the HRK left no room for doubts about how necessary such an increase was.

Such demands were the coping efforts on the corporate-actor level. The advocates of the universities had neither power nor resources of their own that could compensate for the worsening of the research conditions. They could only articulate the trouble and try to persuade the political actors to do something about it. For this purpose, they brought normative arguments to bear, pointing out that professors have not only the legal right to perform research, but, indeed, an obligation to do so. They also employed utilitarian arguments, emphasizing that a highly industrialized, export-dependent high-tech society like Germany cannot afford to do without university research on a large scale.

The Federal Ministry for Research and Technology (*Bundesministerium für Forschung und Technologie,* BMFT) – which is an important funding agency – and the state education ministries had plans for the universities which differed considerably. As early as 1972, it was stated in the *Bundesbericht Forschung IV*, a research policy report issued every four years by the federal government, that there were "... still very unclear ideas ... within the universities ..." (BMBW 1972: 15, 63-64, translation by the author) about their role within a research system planned and guided by government according to its new emphasis on "demand-oriented research."[9] One of the two important goals of government was to eliminate this lack of clarity. University research programs were expected to be oriented more closely than in the past toward the types of new knowledge required by firms and institutions in government and the private sector. The other important goal was to raise the quality of university research. This goal was first expressed by the Science Council (*Wissenschaftsrat*), an advisory board made up of representatives from the states and the federal government, and from the universities and the research institutes outside the universities. Especially in its proposals made in 1979 concerning the research conditions in the universities the Science

9 An expression coined at that time by the federal minister of research and technology, Horst Ehmke (translation by the author).

Council denied that the university funding was inadequate, stating instead that there was a significant lack of quality in university research (Wissenschaftsrat 1979: 17-19). This view was adopted by government.

Both goals, in conjunction with the fiscal restrictions, implied that government was not only unwilling, but also unable to fulfill the demands of the advocates of universities. Instead of providing a comprehensive compensation for the loss of resources which university research had incurred, government favored a *redistribution* of the reduced resources to those professors whose work was either of high interest to the government or private sector, or of high quality or, preferably, both. Thus, government wanted to make a virtue out of necessity: By increasing the competition for scarcer research resources among professors, research that was useful for the government or the private sector or was of high quality would benefit, while useless and mediocre research would be eliminated. In time, this would bring about an overall transformation of university research, the highly controversial consequence of which would be that many professors would cease conducting research altogether for want of resources. This would amount to the factual elimination of the traditional German "unity of teaching and research." One of the reasons government tacitly accepted such consequences was because, as a useful side-effect, they would make available the additional personnel required for teaching.[10] The great majority of professors had to resist these prospects, of course, because most of them were highly interested in maintaining their research opportunities and only a few could be sure that they might not lose them if such measures were taken.

This incompatibility of viewpoints was defused somewhat during the second half of the 1980s, but not enough on both sides to allow for effective compromises. Government actors came to accept the universities' claim that the resources for research were far too inadequate altogether. As a result, some special programs were initiated to alleviate this lack of resources, in-

10 In 1983, Eberhard Böning of the Federal Ministry of Education and Science (*Bundesministerium für Bildung und Wissenschaft*, BMBW) openly criticized: "... [W]e are trying to translate the idea of the unity of research and teaching too perfectionistically from the Humboldtian university to today's university." He concluded that it would be best to "... say farewell to the idea that each professor" can be expected to conduct research with consistent intensity throughout his career (Böning 1983: 55-56, translation by the author).

cluding several programs to enable the universities to offer young talented researchers at least temporary positions, and 5% annual increases of the DFG's budget for five years. When the states' ministries of education together with their ministries of finance did finally admit in the early 1990s that the universities' demands for strongly increased general funds were basically justified, they did not hesitate at the same time to make it quite clear that the states' financial capacities were overtaxed and that the federal government would have to step in and take action. But the federal government's finances were also very limited because it had to pay the biggest share of the huge costs of German reunification. Only Baden-Württemberg, a relatively prosperous state, was able to implement a special program for an improvement of its universities' general funds (*Stuttgarter Zeitung*, 21 November 1991). Financial scarcity, thus, severely restricted the government's ability to compensate.

Turning to the other side, we find that some advocates of the universities also cautiously began to adopt government's concerns about the performance deficits of university research. As early as 1977, for instance, Werner Knopp, the president of the WRK, had proclaimed that in future only qualified university research could and should be preserved. He came to the conclusion that traditional claims for resources had "... to be reflected critically – even self-critically ...": "What is necessary here is the courage to differentiate according to the criterion of quality" (Knopp 1978: 39-40, translation by the author). In the debates about the necessity to intensify competition for resources between universities and between professors which started in the early 1980s, there were also some voices from the universities signalling partial approval of government's point of view. For example, the new president of the WRK, Theodor Berchem, declared in 1983: "We will have to ask how to distinguish good research from bad, and how to react adequately to this distinction" (WRK 1983: 56). But these had to remain lip-services paid to government by the advocates of the universities or by individual professors. The universities were unable to live up to such promises because, as shown above, collective decisions within the universities about the allocation of general university funds refrained from the redistributions which would have been necessary to promote research of high quality and of high economical or political usefulness.

Therefore, the constellation of government actors and advocates of the universities resulted in a mutual blockade. For fulfillment of their demands,

the advocates of the universities depended on government actors. But these actors were unwilling and unable to provide comprehensive compensation for the resource losses to university research caused by the increasing consumption of general university funds by teaching. In order to realize their goals of improving the quality and societal usefulness of university research, however, government actors also depended on the universities. In order to serve as implementation agents for these goals of research policy, and to redistribute resources internally, the universities would have had to have a capacity for self-governance they in fact lacked: they therefore blocked government's efforts. Thus, on the political level of action, both sides increasingly frustrated each other.

The outcome of these coping efforts on the political level shaped the situations of individual professors. Since their advocates failed to obtain a far-reaching compensation for their worsening research conditions, the professors had to rely on individualistic coping efforts. Each one of them was forced to try to take care of himself.

3 Competition among Individual Professors for Separately Budgeted Funds

For a large majority of professors, general university funds were not sufficient as resources for their research activities. 83% of all professors declared in 1990/91 that they needed separately budgeted funds for their research. Only 17% stated that the availability of separately budgeted funds was not an important prerequisite for their research work (Schimank 1992: 28-29). This small group consisted of three subgroups of professors: those whose general funds were sufficient for their research activities, those whose inability to cope with an increasing teaching load forced them to give up research altogether, and those who were indifferent to research.

The first of these subgroups deserves a closer look here. It was composed mainly of professors in academic fields where research requires relatively small financial resources. Typical fields for such "armchair research" which usually needed nothing but a good library were mathematics (interview 1), philosophy (interview 15), the legal sciences (interview 47), and even some parts of the engineering sciences (interview 2). These professors sometimes

asked private foundations or firms for donations to compensate for the declining general university funds for their library or for travel costs. This was all they needed in addition to their general funds. Even in these academic fields, however, changes in the way research was conducted often made research more resource-demanding. In mathematics, for example, additional resources became necessary, though still on a comparatively low level, for computer facilities which opened up new ways to solve theoretical problems (interview 1). In many academic fields, as the expenditures for equipment and personnel required for empirical research grew hand in hand with progress made in developing new theories, the niches for inexpensive research became increasingly rare.

In some academic fields, however, professors could at least alternate between doing resource-intensive research or less expensive research. In archeology, for example (interview 4), one branch of research is philologically oriented, while another involves costly excavations. Professors with such an alternative had an escape route when resources became scarce. But all in all, only very few professors were in such lucky circumstances. This reflects the path-dependency of individual research careers which, as scientific specialization increases, sharply narrows down the options remaining open for researchers. A researcher who is on a certain track of research has usually invested so much time and effort in mastering this track's difficulties that he will think twice before switching tracks and starting anew.

The need for separately budgeted funds in addition to the general university funds varied also with a professor's bargaining position when he was appointed to his professorship or, later, when he got an offer from another university (interviews 1, 46, 47). Professors endowed with plentiful resources, either by good luck or because they were excellent researchers who could demand such a resource base, were less pressed by resource trouble than others. On the other hand, in many academic fields a professor's proven ability to acquire separately budgeted funds had gradually become an important criterion for the respective faculty's recommendation to appoint him to the professorship in the first place (interview 24). This points to the fact described above that for most of the professors separately budgeted funds had become absolutely necessary for their research. The general university funds were especially scarce with regard to capital expenditures so that professors had to pay the costs for new research facilities or for necessary repairs from separately budgeted funds. This sometimes even resulted in alibi projects

whose only covert purpose was to get certain types of equipment (interviews 20, 23, 40).

The sources of separately budgeted funds had diversified since the mid-1970s (Schimank 1992: 27-28). Private foundations, newly established pools for separately budgeted funds on the state level, and the European Community (EC) became increasingly important. Still, the DFG remained the most important distributor of these funds in all academic fields. There is no other funding agency without any restrictions for the subjects of proposals. Thus, the DFG is the only source of separately budgeted funds for those professors whose research topics do not fit into the programs of any of the other funding agencies. Quantitatively, second to the DFG was the BMFT, whose research promotion is concentrated in the natural sciences, engineering, and medicine. Unfortunately, these two "big spenders" experienced the highest scarcity of funds. The DFG not only had to suffer, as already mentioned, a dramatic decline of the proportion of grants applications it was able to fund. Additionally, in certain years even money already granted to professors had to be cut back. The BMFT, which was often criticized for concentrating its research promotion too much on a few technological fields like nuclear energy and space technology while neglecting many other promising fields (interview 20), had to cut back spending, especially in these other fields, because it had to fulfill huge long-term commitments in nuclear and space research.

The professors who needed separately budgeted funds individually tried to cope with this situation in four ways. Firstly, professors still applied for funds at the DFG and BMFT, but increased their efforts, either by writing more than one research proposal at a time instead of just one, hoping that at least one would be granted (interviews 18, 19, 20, 22, 40, 43), or by writing more carefully argued and extensive proposals, hoping that these would be more persuasive (interview 16). Both practices were time-consuming, and became even more so because the periods for which funds were granted were reduced by DFG and BMFT as a reaction to their scarcity of resources. This meant that, as one professor put it, he now wrote four grants proposals a year while some years ago he had written one every two years (interview 21).

To diversify one's sources of separately budgeted funds beyond the DFG and the BMFT was a second way of coping with scarcer resources from these two most important funding agencies. The private foundations, which were especially important for the social sciences and humanities and for the medical sciences, were one source which could partially make up for the decrease

in separately budgeted funds from DFG and BMFT. Another source were the pools for separately budgeted funds at the ministries for research which were founded in several states during the 1980s. Since the end of the 1980s, the BMFT in particular pointed to the EC as a source of separately budgeted funds to which German universities had paid too little attention, compared to universities from other EC member countries (Wissenschaftsrat 1988: 46-52). The main reason for this, however, was that German professors did not need the EC as an additional funding agency as long as the funds from other funding agencies sufficed. When this was no longer the case, they were referred to the EC, but without adequate information about programs of research promotion and application procedures; standing outside the informal circles of EC clients, German professors found this to be a very hard road (interviews 17, 20, 25, 39, 43). Moreover, the realization that the EC would only be able to grant less than one fifth of the total money applied for along with the very complicated application procedures discouraged German professors from submitting applications. The frequent partitioning of projects into many short segments, each requiring a new application, was also a deterrent, as was the belief that scientific quality as a criterion in grants decisions was often superseded by regional considerations in favor of South European countries.

Another attractive source of additional separately budgeted funds was contract research for firms or government agencies. Ranging from small studies to large-scale projects, contract research had a long tradition in many fields of science. The fields of engineering, agricultural sciences and medicine were most likely to be engaged in this type of research. Due to the scarcity of resources available for research from the general university funds and the increasing difficulties encountered in trying to acquire separately budgeted funds from other sources, many professors in these fields were forced to intensify contract research; others who had shunned this type of research altogether up to this point had no choice but to begin conducting it (interviews 1, 3, 19, 20, 22, 23, 25, 40).

A third way to partially cope with the decline of separately budgeted funds from DFG and BMFT was to intensify research cooperation with certain government-financed research institutes outside of the universities, especially with institutes of the Max Planck Society (*Max-Planck-Gesellschaft,* MPG) and big science centers. This cooperation was called for frequently by the WRK. As early as 1977, a resolution was formulated by WRK and MPG concerning the desirability of a further increase of research cooperation. Simi-

lar joint proposals were made by the WRK and the association of big science centers. Quite recently, in 1991, the Science Council documented the present state of the cooperation between universities and big science centers and recommended a number of improvements (Wissenschaftsrat 1991). Such cooperation was especially interesting for professors because these research institutes outside of the universities usually had much better research facilities. Thus, research cooperation frequently meant nothing more than being allowed to participate in the use of these facilities (interviews 20, 23). The genuinely cooperative research activities that did occur tended to date back to a time when professors were not being nudged toward cooperation by resource trouble (interview 12).

A fourth way of coping with resource trouble was to increase the use of students as an extension of a professor's research staff. In many fields of the natural, engineering, and agricultural sciences, it had become quite common for students writing their final thesis to select their topic from lists compiled by the professors, reflecting the latter's research interests (interviews 1, 12, 16, 38).[11] Often research consists mainly of extensive experimental work within the framework of a theory which is finished in general and has to be worked out in detail; advanced students are competent to do this routinized research and to deliver useful contributions to a professor's research program. These are frequently very time-consuming research activities requiring neither the theoretical creativity nor the extensive knowledge of the field which only an experienced researcher possesses. The students' tasks consist mainly of developing experimental designs and, later, observing and measuring the processes. This is perhaps best exemplified by chemistry, where a particular research problem is often attacked simultaneously from different approaches, each assigned to one researcher within a professor's group; some of these researchers will be advanced students working on their thesis. In contrast, many research problems in theoretical physics are too difficult or too complex to be distributed among advanced students, so that in this field such a coupling of research and teaching was not possible (interview 43).

Of these four ways of coping with the resource trouble, the third was available only to very few professors, and the fourth could only yield marginal improvements. Thus, the first two ways were by far the most important.

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11 See the extensive empirical study analyzing this situation at the beginning of the 1970s by Wilhelm (1978).

Both of them resulted in an increased competition among professors which forced them to intensify their efforts to acquire separately budgeted funds. These efforts consisted not only of writing grant proposals, but also of manifold activities of social networking with influential colleagues or officials from the funding agencies. The success of these efforts, however, became less likely because the demand for separately budgeted funds increased stronger than the supply; and even if a professor was successful, he was usually granted a smaller amount of resources for a shorter period of time. In other words, an increase of invested efforts corresponded with a decreasing return on the investment. In addition, no professor knew how much effort others were investing. This mutual ignorance between competitors motivated each one to redouble his efforts. For a risk-aversive actor, this is a rational way of acting under such circumstances. Applying for separately budgeted funds was like bidding at an auction where one does not know how much one's competitors are bidding. If one is desperately in need of separately budgeted funds, investing as much effort as possible maximizes one's chances for success. But such individually rational action results in collectively undesirable, ruinous competition. The mutual pressure between professors brought about increased standards for successful applications, which was against everybody's interest because it required even more effort. Thus, if the professors could have committed themselves to not to try to beat each other by perfecting grant applications and cultivating good connections, this would have been helpful to everybody. Everybody then would have had more time to actually conduct research, instead of having to spend time acquiring resources for research.

The situation was a *Prisoner's Dilemma* (Colman 1982: 101-104, 113-136) where no professor could be sure that all others would refrain from trying to get a competitive advantage. But if one must anticipate that some, at least, will defect from a collective self-restraint, it is better to be one of the defectors. With everyone taking this into account, the escalation of competition which harms everyone begins to take its inevitable course. This dynamic was accelerated by two differences between the professors:[12] Those in greatest need of separately budgeted funds were more likely to start the race than others, as were those who – rightly or wrongly – felt they had good chances of winning such a race. As a consequence, professors became "professional

12 These differences are "threshold levels" in Mark Granovetter's sense (Granovetter 1978).

application writers," as one of them concisely expressed it (interview 18), finding correspondingly less time for genuine research work.

Thus, individual coping efforts resulted in increasing collective frustration. A growing number of professors were unable to keep pace with the intellectual and social efforts necessary to apply successfully for separately budgeted funds, and those who did keep pace found themselves devoting more and more energy to an intrinsically unsatisfactory activity.

4 An Incremental Way Out of a Self-Replicating – and Unsatisfactory – Coping Pattern

As my analysis up to this point shows, the pattern of coping activities on the three levels of action was a stable equilibrium. It reproduced itself again and again because none of the actors involved was able to improve his situation unilaterally. More precisely, the equilibrium of the constellations of actors on the level of intrauniversity allocation of general university funds strongly determined the equilibria on the other two levels. Because an implicit nonaggression pact between the professors on the middle level prevented redistributions of general university funds, a mutual blockade between state ministries and advocates of the universities ensued on the political level. This, in turn, increased the demand for separately budgeted funds on the level of individual professors, which in turn brought about an intensified competition between professors.

This three-level equilibrium was unsatisfactory for almost all of the actors involved. Government actors, on the one hand, did not succeed at increasing the universities' research performance either with respect to intrascientific quality or with respect to extrascientific utility. A majority of professors, on the other hand, suffered from resource trouble because their individual coping efforts could at best reduce, but not totally compensate for, their losses. In addition, professors had to make the efforts necessary for coping. Thus, professors were worse off than before the trouble started; and government actors could not achieve the strongly desired improvements. But whereas professors had no chance to get out of this unsatisfactory equilibrium, government actors did have an option for at least a small, slow way out. They began to take advantage of this opportunity in the mid-1980s.

Government's option amounted in effect to bypassing the obstruction of redistribution that prevailed in the intrauniversity allocation of general university funds. Whenever resources became available, government actors were able to distribute them according to their own discretion. Although the total amount of resources did not grow during the period under consideration and no additional resources therefore became available for redistribution, resources which had been dedicated to a professor did become available on a small scale whenever that professor left his post, either to retire or to take on a new job. While taking away a vacant professorship from a department or a university, including the finances and the established posts attached to that professorship, does cause conflicts, it is relatively easy. First of all, there is no one occupying the chair who can claim any specific rights to it. Secondly, although a department or a university usually tries to preserve its resource base, if it is forced to give up some of it, it will tend to choose resources which do not belong to anyone at the moment.

Since professorships became vacant from time to time, the states' ministries of education were able to collect up these unclaimed resources and redistribute them. This occurred sporadically until the mid-1980s, when ministries of education in several states, seeing an opportunity to further their research-policy goals, started systematically redistributing resources by building up special discretionary pools of general funds (Wissenschaftsrat 1988: 43-46).[13] Baden-Württemberg was the forerunner (*Stuttgarter Zeitung*, 22 July 1987), with others like North Rhine-Westphalia soon following suit (interviews 52, 54). Resources from these pools were mostly used to reward high-quality research and to make new high-quality research possible. For example, when a group of professors acquired a special research area (*Sonderforschungsbereich*) from the DFG, it meant they had proven the quality of their research activities. Hence, they could get additional general funds from the special discretionary pool of the state's ministry of education. An additional criterion for the assignment of these resources was the promotion of research considered to be economically or politically useful. Informatics profited especially from this redistribution (interviews 43, 45, 52) as did fields such as

13 A little earlier, in 1979, the Science Council had advised the states to instruct the universities to build up central pools of general funds *within* each university (Wissenschaftsrat 1979: 20-29). The states' ministries of education seldom followed this advice, assuming – correctly – that the universities would be unable to significantly redistribute these resources (Wissenschaftsrat 1988: 46).

biotechnology or material sciences, while the humanities and many fields of the social sciences suffered.

Obviously, this very slow, piecemeal approach to gathering resources for redistribution could seldom keep pace with the amount of resources required for accomplishing far-reaching political goals at any given moment.[14] At the beginning of the 1990s, the total amount of separately budgeted funds acquired by the universities in North Rhine-Westphalia, for example, was about twenty times higher than these discretionary funds from the ministry; using the special pools for established posts, the ministry could redistribute no more than 40 to 60 posts annually, and only one third of these could actually be redistributed according to priorities of research policy (interview 52). Thus, these resources from the special pools could at best reinforce certain developments whose impetus came from somewhere else, or sometimes catalyze such developments. But this was the only escape route government could take from the blockade described above. At least government was able to redistribute about 15% of the universities' established posts for personnel between 1975 and 1990 – an average of 1% annually. While this may seem to be a very small amount, it is three times the amount the universities themselves were able to redistribute.[15]

It seems safe to predict that other states will try to take this route on an extended scope during the coming years. As of the mid-1990s, the political room to maneuver in this respect will expand considerably for several years because many professors will retire. Some observers, like the HRK, even expect that government will use this opportunity to eliminate permanent per-

14 A lucky coincidence could be exploited politically in Baden-Württemberg (*Stuttgarter Zeitung*, 23 November 1991). According to general orders from the state's ministry of finance, all ministries were called upon to reduce their budgets for several years as of the end of the 1980s, in 1990 and 1991 by 5% each year. For the universities this meant a proportional reduction of the general university funds from the ministry of education. It so happened that this ministry initiated special programs for the universities during this same period. The funds it mobilized to do this were part of the very money it had been forced to cut. Now, the education ministry was able to distribute these resources according to its own priorities. Thus, the ministry of finance unintentionally did for the ministry of education what the latter would hardly have been able to accomplish on its own.

15 These data are from an internal survey of the HRK (see also *Deutsche Universitätszeitung* 1991(4): 7).

sonal dedications of general university funds and, instead, establish dedications which last for a specified number of years and can be renewed only after a successful passing of a personal evaluation of one's research performance (interview 55). If this really happens, government will have considerably more discretionary power in distributing general university funds, and its political guidance capacity with respect to university research will increase significantly. Thus, a slow, incremental shift of the still predominant equilibrium into a direction more favorable to government's research-policy goals has already begun and will probably pick up speed in the near future.

This change will surely be accompanied by growing conflicts with faculties and universities. But not all professors were and will be against this government policy. Professors with a high intra- or extrascientific reputation for their research performance will be at an advantage. Over time, government might establish a tacit coalition of interests with them. The redistributive measures of government will probably exacerbate the resource trouble faced by the rest of the professors while providing good opportunities for the professors with outstanding performance records.

5 Effects on University Research

Turning back again from speculations about the future to the existing resource trouble and the pattern of coping reactions, I will now briefly sketch some of the effects these developments had on university research.

To begin with the most general finding, 32% of all professors claimed in 1990/91 that their chances of acquiring separately budgeted funds had decreased during the preceding years; 35% said their chances of acquiring such funds had remained the same, while 16% said their chances had even improved.[16] This is, clearly, a mixed picture. About one third of all professors suffered from resource troubles without being able to cope with them successfully. The other two thirds either coped successfully with this kind of trouble or had no need to cope because they were undisturbed by it. This indicates that the damage done to university research by the shrinking of general uni-

16 For the remaining 17%, separately budgeted funds were not an important determinant of their research activities.

versity funds remained limited – partly because individual coping activities were sometimes reinforced by research policy.

Lacking appropriate data, one cannot say anything definitive about whether the overall volume of university research has declined. But it may very well be that in this respect nothing significant has happened yet. And even if the universities' quantitative research capacity has been reduced to some extent, this may in effect turn out to be a blessing in disguise. As long as mediocre or even bad research is being weeded out, the resource trouble can be said to have spawned a prudent consolidation of the research system.

Effects of the resource trouble which can more clearly be categorized as harmful relate to certain qualitative dimensions of university research. At least four possibly harmful effects on research quality can be distinguished. The first concerns the implications arising from the fact that the increasing efforts necessary to acquire separately budgeted funds kept professors from doing research work themselves and left them with less time to supervise their assistants' research work. As mentioned above, professors were forced to spend more and more time writing grant applications and had to pass the research work on to their assistants,[17] who were often comparatively inexperienced. As a consequence, the assistants' work may not have been as efficient as the professors' would have been, and may sometimes have lacked the ingenuity which could have been contributed by extremely innovative professors.

A second harmful effect resulted from the shorter terms of the research projects and the diminishing chances of getting follow-up projects, which meant that many professors had significant problems maintaining their research staff (interviews 20, 22, 23). Often, research assistants had to be dismissed just when they had finally gathered some research experience. Thus, professors repeatedly had to make fresh starts with new, inexperienced staff. The increased turnover of research assistants was not only detrimental to the continuity of research work, but also demotivated the assistants themselves and lowered the quality of their performance. Moreover, as the time allotted to the research projects was reduced, many investigations were left incomplete because the scientists had to start completely new projects when they applied for new grants (interviews 19, 20, 23).

Thirdly, the professors who coped with their resource trouble by doing more contract research often suffered harsh consequences in the form of a

17 See also Kaddatz (1987), who interprets this as a general tendency.

significant loss of their research autonomy. Doing contract research was necessary for many professors not only to be able to support their research staff, but also to be able to buy and repair very expensive research equipment (interviews 1, 3, 20, 23, 40). Contract research was often noninnovative, routine work, and the professors were sometimes exploited by the firms as cheap R&D consultants (interview 19). Professors had to suffer with changes of priorities of research topics coming from the firms or government agencies that could be sudden and erratic (interviews 19, 23); they also had to bear with restrictions on their rights to publish their research results and with very short deadlines for projects, which meant that they were repeatedly forced to go on to the next subject before a thorough analysis of the research results could be completed (interview 19). By informal agreement, the routine work entailed in a research contract was occasionally done by an advanced student who could use it as his graduate thesis, while the theoretically interesting aspects were sometimes dealt with by one of the doctoral candidates (interview 23). Nevertheless, even under comparatively favorable circumstances, the necessity to accept one research contract after another, for fear of otherwise being driven out of this market and missing out on potentially important future options, remained, pushing self-determined research alternatives aside. Professors saw clearly that, in time, this might result in their losing the ability to keep pace with scientific progress in their academic field (interviews 3, 19, 22, 23). Some of them therefore classified contract research as being their last resort, as the high-risk step of "prostituting oneself" – as one professor drastically put it (interview 39) – if there was no other way to survive as a researcher (interview 12, 16). Government policies aimed at the promotion of transfer-oriented research sometimes reinforced such deleterious tendencies.

Fourthly, it might be suspected that the resource trouble drove out unconventional, risky research approaches in favor of middle-of-the-road research.[18] This seems probable because the research orthodoxy is usually well represented in the peer-review committees which determine who gets separately budgeted funds for which kind of research. The research establishment serves itself first. As long as comparatively plentiful resources are available, there still remains a significant amount for outsiders and newcomers. But if resources become more scarce, even adherents to the established ortho-

18 A tendency Dietmar Braun also identifies in his case study of biomedical research in Great Britain and the United States (in this volume).

doxy have more difficulties acquiring the resources they need: They become more determined than ever to protect their claims against invaders. Being able to legitimize this by the supposed cognitive superiority of their established theoretical positions reinforces this tendency even more. In the long run, however, this eliminates important opportunities for radical innovations in science and, in fact, increases the danger that the orthodoxy will run into a blind alley sooner or later. Because "... progress can occur along unlikely and deviant paths ...," it is essential that "... space ... be left for the individual variants of knowledge to grow and mature ..." (Nowotny 1989: 342).

The problem with all of these harmful tendencies is not so much that they have already grown to dangerous proportions. We do not know for sure if this is the case. The real problem, rather, is that there are no alarm signals to warn us about these tendencies, and no emergency brakes to bring them to a halt. These tendencies can continue for a long time without the damage becoming visible. What does it mean for research and for society at large if the most outstanding researchers are worn down by resource acquisition and research is conducted by largely unsupervised, relatively inexperienced staff? How harmful is it if many research projects have to be stopped half way? What happens if university research becomes streamlined according to narrow and short-term extrascientific priorities? Where are we headed if research orthodoxy is allowed to reign virtually undisputed? The answers will only become evident in the long run – and this may very well be too late.

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