

Are incentives based on quantitative performance indicators effective?

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Abstract

The current political reforms in academia are part of the New Public Management framework, trusting in incentives that are based on relatively simple quantitative indicators. We explore the effectiveness of such indicators by studying the production of economics Ph.D. graduates within German higher education. We select this particular area of inquiry because the production of Ph.D. graduates combines an emphasis on both higher education and scientific research. We pay particular attention to the production of Ph.D.'s headed for the academic labour market.

1. Introduction

The creation of a European Higher Education Area and a European Research Area, initiated by the Bologna process, strengthens the (need for) internationalization of and comparability of academic research. Therefore, universities are queried to rethink and redesign their performance management. The first step in this reform process led to the implementation of instruments from New Public Management approach.

With the Berlin communiqué in 2003 the doctoral phase is not only seen as the third cycle besides Bachelor and Master, but it also serves as the link from the European Higher Education Area to the European Research Area (e.g. Kehm 2005, Berning/Falk 2005, Elton 2005). In its intent, the Ph.D. thesis does not just contribute to scientific progress, but also provides the cornerstone for a researcher's personal scientific profile. A Ph.D. can be interesting both for the academic and the non-academic labor market. Since occupational

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careers at the doctoral level have already been investigated (e.g. Enders/Bornmann 2001) the examination of different vocational fields is not the focus of our research interest. We concentrate on the education of Ph.D. students as an important qualification step for a career in academia. With the introduction of the junior professorship and the abolition of the State doctorate (“Habilitation”) in Germany the Ph.D. increases in importance.

The instruments of New Public Management, which are based on principal-agent theory, aim to set the right incentives for extrinsically motivated individuals. Two prominent instruments are fixed-term contracts and performance related payment for professors, where the performance is measured by short term results. In contrast, the traditional German self-governed system included a long-term socialization and a lifelong membership in the profession. Differentials in resources and payment of professors arose only in the long-run, with subsequent collection of calls and reputation. Principal-agent theories emphasize that asymmetric information may tempt the agent to abuse her autonomy. Therefore, it is suggested to reduce the agents’ discretion. In Germany a performance-related salary system (“W-Besoldung”) has been introduced besides the hitherto existing lump-sum salary system for established professors. This new payment regime is obligatory for “new” professors, while established professors may opt for the performance pay. However, there is serious doubt if the new payment system really strengthens research endeavors. According to the German university association (Deutscher Hochschulverband Newsletter 2/2005: 2) the new salary system is seen as a discouraging loss of income. We investigate how extrinsic incentives could be successful, fail, or harm professorial performance, if a significant percentage of professors are socialized and motivated by more than monetary benefits.

If science is seen as a profession and not merely as a job (Mayer 2002, Weber 1917/19), researchers need autonomy to perfect their skills. Autonomy constitutes a fundamental characteristic of professions, necessary for both innovation and behavioral change. Notably, and inconsistent with classic agency-theory, some German universities and departments have

redesigned their performance management without governmental pressure: internal agreements on objectives were set and the university administration developed concepts to sharpen the profile of the university. Incentives were set by relatively high basic endowments and resources as well as for third party research projects, such as collaborative research centers (“Sonderforschungsbereich”) financed by the German Research Foundation (DFG). Research Training Groups (“Graduiertenkollegs”) have been used to attract excellent early stage researchers. Interestingly, these new governance mechanisms are combined with the “traditional” instruments of tenure - including the state doctorate as a postdoctoral lecture qualification, a long probation period, - and lump-sum payments (Schneider/Sadowski 2004). The education of Ph.D. students shows the complexity of diverse professorial activities as it combines research, teaching, and even some administrative tasks. If Europe tries to become a knowledge community with a worldwide reputation then one has to ask if European Ph.D. graduates are prepared for the international academic market. Whereas on the one hand some European countries have successfully reorganized the doctoral phase, Germany on the other hand is a latecomer to this process (Wissenschaftsrat 2002). The German Science Council (Wissenschaftsrat 2006: 56) noted that the education and fostering of doctoral students is not the responsibility of an individual professors but rather a defining task of the institution (department or university). It even suggested a cut in Ph.D. education possibilities for those universities which do not meet sophisticated scientific requirements.

Educating and fostering early stage researchers are singled out for investigation, as it is one of the core functions of universities (Welsch/Ehrenheim 1999: 455, Allmendinger 2001: 33) and of professorial action. In Germany we can contrast two coexisting types of Ph.D. education regimes: a master-apprentice model versus structured Ph.D. programs influenced by the model of the American research university. The traditional, singly-supervised doctoral education still dominates in Germany (Berning/Falk 2005: 54-55). It implies a very close and personal relationship between supervisor and Ph.D. candidate, like master and apprentice.

The doctoral students are not integrated in a formal and collective study program. Similarly, the qualification is not systematic but rather depends on their supervisor's commitment. Often supervisor and candidate know each other from university, meaning that professors recruit their new doctoral candidates from among their students. In Germany, most doctoral candidates receive their master degree and their Ph.D. from the same university (Wissenschaftsrat 2002: 12, Berning/Falk 2005: 55).

Some German universities have restructured their traditional master-apprentice Ph.D. education towards the model of American research universities, but they remain in the minority. These doctoral programs are often organized as a graduate school, a research training group ("Graduiertenkolleg") or a graduate centre. The doctoral education is no longer an individual arrangement between one supervisor and the Ph.D. candidate, but rather between several supervisors and doctoral candidates. These collective programs are often more structured than the master-apprentice model and include obligatory course work, a strong orientation towards research and clear rules for application and the selection of new candidates.

The United States still leads international university and research rankings (Combes/Linnemer 2003, Coupé 2003) and it dominates the worldwide publication market with 63 percent of the publications in the field of microeconomics in the year 2003 (Thaller 2005: 111). In the United States Ph.D. students are educated in structured programs. So maybe a more structured way of fostering early stage researchers would be a way to increase scientific performance internationally.

The paper is organized as follows: in the next section (2.1), ideas of New Public Management for the university sector will be presented on the basis of principal-agent approaches. The limits of agency theory also indicate some limits of New Public Management. So, the third section (2.2) provides an alternative theoretical framework based on the idea of professors as professionals. To enter a profession one needs education not only in the sense of a formal

training but also an informal training called “socialization”. The members of the professorial profession decide on potential new colleagues in the process of cooptation (2.3). The following section (3.) will present the empirical design and introduce the data. Section six (4.) presents the results and the last section concludes and discusses directions for further research.

2. Theoretical approach – Incentive policy versus Socialization

2.1 New Public Management in universities

Many European countries, for example the Netherlands, have reorganized their Ph.D. education within the last two decades, whereas in Germany this process is still beginning (Wissenschaftsrat 2002). In the Netherlands Ph.D. candidates are educated in Onderzoekscholen (Wissenschaftsrat 2002: 39-40, Wittek 2004: 20-31). These research schools are independent institutions with their own budget responsibility, competitive recruitment processes, and extensive course programs for Ph.D. students.

German universities have a long tradition of self-organized departments with highly autonomous and independent chairs and departments. They have recently suffered large budget cuts, which are mentioned as a practical element of New Public Management (Grüning 2000: 412). Now they encounter new paradigms in state policies that aim to make them more effective and efficient by applying New Public Management principles. Within that implementation process the state sets external goals for public institutions and external monetary incentives for achieving those goals. Success will be measured by quantitative indicators such as the amount of graduated Ph.D. students. At the same time these institutions are formally reorganized: the university’s administration is legally strengthened, i.e. university presidents and deans are empowered by law. Ideally within this process organizations are expected to remodel their structure and their management to become more

efficient and effective in the sense of quantitative measurable indicators trying to be achieved by the implementation of New Public Management (Schimank 2002a, 2002b).

The main characteristics of New Public Management are agreement on objectives and global budgets (Schedler/Proeller 2000). Practical elements of New Public Management are cut offs, performance measurement and external evaluation (Grüning 2000. 412). The idea of New Public Management for the academic sector is that universities' internal governance is transformed from self-organization to hierarchical governance according to management principles. This process happens as “policy-makers have come to read ‘autonomy’ as ‘irresponsibility’” (Schimank 2005: 372).

Principal-agent approaches provide a fruitful framework for analyzing and explaining New Public Management ideas and instruments as the arsenal of New Public Management is compatible with principal-agent theories. The core of principal-agent theories is the problem of information asymmetries (Jost 2001, Göbel 2002, Schreyögg 2003) between principal and agent, in our case between the government and professors. Opportunistic behavior is seen as the agent's only possible answer to her information advantage necessitating a control system implemented by the principal. Economists think that incentives influence the behavior of individuals and groups. In New Public Management such incentives are set by the state. This is understandable as a more or less incentive contract between principal and agent, expected to be responded by the agent with more output of a particular good, i.e. the number of doctoral students, to additional compensation (Lazear 1988: 744). But professors have multiple tasks and thus these contracts will be incomplete, influenced by the actors' bounded rationality (Göbel 2002: 109). Maybe payment by results will work for simple tasks but it will face the limit for more complex and demanding tasks (Frey/Osterloh/Benz 2001). Prendergast (1999: 9) remarks that “[...] complex jobs will typically not be evaluated through explicit contracts”. The introduction of a performance payment for professors (“W-Besoldung”) can be seen as an attempt to formulate explicit contracts.

But there is always the risk that payment by results will lead to crowding out (Deci 1971, Frey/Osterloh/Benz 2001, empirical confirmation: Gneezy/Rustichini 2000a, 2000b) other than financial motivations like reciprocity, fairness, motivation-transfer, and self-determination (Frey/Osterloh/Benz 2001: 568-569). Additionally, empirical studies (Irlenbusch/Sliwka 2005) indicate a better performance within fixed salary than in variable settings, even considering variations in time. Fürstenberg (2005: 94) indicates that payment by results will only be accepted if it is not used as a mean of coercion. Eventually, New Public Management instruments foster a professorial behavior consistent with principal-agent theory. To say it in Schimank's (2005: 375) words: "The best strategy of defence against this procedure [numbers of students graduating, third party income per professor etc., N.T.] would be to ensure that the relevant data are as similar as possible for all units".

A selective performance payment enables only an incomplete assessment of engagement and work. Prendergast (1999: 21) summarizes the consequences: "[...] compensation schemes often have unintended consequences caused by agents changing their activities in other ways that are beneficial to them but not to their employer [...] As a result, the use of explicit contracts cause agents to focus too much on those aspects of the job included in the contract to the detriment of those that are excluded". If only a part of actions will be rewarded they will be biased. It will be hard or insufficient to evolve collective goods, pool resources like a good reputation or innovative ability with market compatible performance payment (Frey/Osterloh/Benz 2001: 574). Schreyögg (2003) indicates that agency theory is not able to picture collective dynamisms or an organizational commitment². "By means of cooperation and social exchange, [faculty, N.T.] members increase their well-being" (Prüfer/Walz 2005: 8).

² One has to ask if payment by results will lead to wish able aims or neglects important scientific fields like basic research. Scepticism will be supported by the shareholder-value orientation in the field of business and its involved short-term profit maximization orientation.

Deferred financial benefits are one possible instrument to evolve enduring engagement. Corporate law partnerships compensate their partners with a seniority rule and minimize the threat of divergent aims between agent and principal, e.g. for a partner it is not attractive to leave the firm and take away key clients (Lazega 2001: 64-70).

Different empirical studies investigated the effects of performance pay, lastly Dohmen and Falk (2006). They find that preferences for a certain payment scheme are not a reliable signal for expected performance. A focus only on monetary aspects of behavior neglects other influencing dimensions, e.g. gender typical preferences in the study of Dohmen and Falk (2006).

The New Public Management governance of enforced performance and impact orientation uses performance indicators not only as information but also as control systems (Schedler/Proeller 2000: 76). In the current discussion politics seem to trust in a carrot and stick philosophy: the instruments implemented by the New Public Management place emphasis on external (monetary) incentives and external control. The assumption behind these management ideas is that external incentives, state-run rules of financing (“performance-related financing”) or the centralization of decision making will initiate change in academia.

There are some observations against this assumption: Firstly, even without governmental objectives and New Public Management some universities in Germany have initiated and established successful programs to foster early stage researchers. For example, the Bonn Graduate School started in the 70s of the last century – without external control or external incentives. Secondly, governmental objectives and incentives are directed towards a university as a whole and should therefore affect departments of one single university similarly. But the results of different university and research rankings (e.g. by CHE 2005) suggest that one university is not similar in its research strength for all disciplines and departments. So heterogeneity can be assumed between departments. If only some

departments are active in research, action induced by governing rules seems not to be sufficient to explain performance. This observation gives first hints why we suggest analyzing endogenous development determinants at departments' level. Thirdly, international publication rankings (Combes/Linnemer 2003, Coupé 2003) show that the United States is at the top level of such international comparisons. In the United States this high research output is achieved without state-run enacted reforms: excellence in research does not necessarily seem to be conditioned by governmental pressure but rather by the internal competition of universities.

2.2 Professions, Socialization, Habitus and Autonomy

If the United States' academic system is seen as the reference model, one should bear in mind that reforms in the United States were not initiated by government, but induced by competition between universities. Interviews with American scientists³ revealed that an outstanding Ph.D.-Program, with several professors engaged, is a necessary condition for excellent researchers to accept an offer for a professorship at that university. Similarly thinking professors will facilitate scientific exchange and cooperation: educating doctoral students is essential not only for the department but also for the single professor's research.

Max Weber (1917/19) has mentioned the different socialization of German and American researchers. Our interviews aim to provide some evidence on Weber's presumption. Siegrist (1998) also indicates country differences. While in some countries the professional-civil identity affects entrepreneurs, it is contrary in the United States. Perhaps this historical development causes that professors socialized in the United States behave more like entrepreneurs than those who stayed not in the United States. We see that as a hint that socialization is also connected with individual interests and utility maximization.

³ Telephone interview (24. October 2005) with Gene Grossman, former chairman of the economics department of Princeton University. Others asked not to be named.

Professors belong to the professions (Collins 1990, Huber/Portele 1983, Siegrist 1998, Skopp 1980, Stichweh 1992). Professions are characterized by expert knowledge acquired through formal training, by self-control and autonomy as well as by flat hierarchies. Their members control the recruitment, education and admittance of new professionals. Astoundingly, the institutionalized research in academia does not draw on the theory of professions (Stock/Wernet 2005). Autonomy is a constituting criterion of professions (Beckman 1990, Huber/Portele 1983, Mintzberg 1979, 1989, Siegrist 1998, Skopp 1980, Stichweh 1992) which has to be granted for innovations. Autonomy enables researchers to strengthen their skills (see Mintzberg 1979). Additionally, autonomy may have been the reason for the acceptance of lower salaries in the academic sector compared to the non-academic market for a given qualification (see Aghion/Dewatripont/Stein 2005: 2-3). Thus, there are different arguments against governmental restrictions of professorial autonomy.

According to Collins (1990: 35) a profession is “a ‘calling’, not merely a job”. Mintzberg (1979) introduces the concept of *professional bureaucracies* and hints at the professional’s identification with her profession. Maybe that explains why professors understand a good reputation by the scientific community as an incentive. In the years of academic and Ph.D. education, early stage researchers are trained to follow the conventions and norms of their profession; they are socialized: “Professionals are left to decide on their own only because years of training have ensured that they will decide in ways generally accepted in their professions” (Mintzberg 1989: 184). The lengthy phase of scientists’ socialization (Schneider/Sadowski 2004) builds up a professional ethos and a professional self-discipline helping to overcome the difficulties resulting from an explicit performance related payment. As not all aspects of complex tasks can be measured, this form of payment does not work for multitasking occupations (see Frey/Osterloh/Benz 2001, Scheider/Sadowski 2004, Schmidt/Schnitzer 1994).

Taking socialization into consideration, the principal-agent theory assumption of agents' abuse of autonomy becomes questionable. Socialization may lead to a behavior which is not based on individual cost-benefit considerations, but on a voluntary commitment (Schneider 2004, Schneider/Sadowski 2004: 385, Aghion/Dewatripont/Stein 2005). Furthermore, the norms of the group are accepted by the individual and tasks are processed as in duty bound. Socialization may be seen as a process of the formation of identity (Joas 2001: 123-144). That is, during occupational socialization the individual norms, values, and convictions are assimilated to those of the profession or professional organization. This mechanism is emphasized by Lazega (2001), who indicates possible conflicts between individual and collective interests, as it is the general suspicion from principal-agent theory. Lazega (2001) illustrates this problem with the admittance of an attorney to become a partner in a firm of solicitors: she has to get acquainted with the intern rules, build up several networks and integrate in existing networks.

According to Bourdieu (1988: 102) *habitus* result in particular reception, thinking, and action dispositions, which are internalized during the process of socialization, instead of being congenital. Professors with a professional *habitus* will act with a long-term orientation without calculating all their efforts. In principle the *habitus* is able to be in consciousness (see Schaeper 1997: 116, 123). Approximately, one can imagine *habitus* as internalized structures. It will be developed by explicit conveyance, by training, and learning by imitation (Schaeper 1997: 117). Habit may be seen as a manifestation of socialization processes which provides a framework of decisions and actions, but leaves also space for individual decisions. The *habitus*-concept also comprises actors with specific group position (see Schwingel 1995: 72), e.g. perceiving a crisis and initiating a turnaround.

Another argument to consider socialization and *habitus* comes from Liefner (2002). He indicates that principal-agent theories cannot explain academic success, because the factor of success is not external incentives but the quality of scientific personal. One possibility to

enhance academic potential is to raise the quality of Ph.D. education. Socialization aspects (Huber/Portele 1983: 204-205) arise during the long way with several steps to become a professor. Not only theoretical paradigms but also social norms have to be learned. Another aspect is the orientation towards research abilities and performance. Professors influence their students' socialization; a part of them will be the next potential generation of the academic profession.

Even in regular times of professional bureaucracies the reward system trusts not alone in financial incentives, as classic principal-agent approaches let assume, but also uses symbolic rewards, e.g. a special status in a partnership (Lazega 2001: 242-266). Even in the economic literature external incentives are not regarded as sufficient for a complete explanation of behavior. Instead internal motivation, self-commitment, and reciprocity gain in importance (Kirchgässner 2005).

Coupé, Smeets and Warzynski (2003) investigated incentives in economics departments. They find the following sorting effect: productive professors will match with productive universities during their careers. Schmidt and Schnitzer (1994) investigate explicit and implicit contracts. They detect that implicit contracts with reciprocity, understood as a confidence-mechanism in such contracts, have the tendency to be self-enforced. Consistent with principal-agent approaches explicit contracts need a costly control system to be enforced. Rubinstein's (2006) empirical results indicate a socialization process of economics students that can be influenced actively e.g. by changing the teaching methods. Allmendinger (2001: 36) mentions that embedding in the profession, the process of socialization also requires learning (academic) cooperation or writing research papers. She sees the way of publishing as „profession making“ (Allmendinger 2001: 30).

We wonder if the carrot and stick philosophy of New Public Management is needed more as crowding out effects are expected (Frey/Osterloh/Benz 2001; Deci 1971). Instead of governmental regimentation lacking positive effectiveness moreover they can be harmful

when connected with resistance and inner resignation of professional professors (Huber/Portele 1983: 213). We assume that socializing governance-mechanisms enable more likely a long-term and stable behavior of professors. With Mintzberg (1979: 378) we will conclude this chapter's core idea: „[...] change seeps in, by the slow process of changing the professionals – changing who can enter the profession, what they learn in its professional schools [...]“. Human resource development for early stage researchers (Müller-Böling 2005: 339) gains increased importance with socialization processes in mind.

2.3. Cooptation

Cooptation, the selection of a new member by the vote of the existing membership, is the human resource development instrument of university faculties. According to Loewenstein (1973: 214) cooptation is a universal occurrence of social life. Examples come from policy, religion, clubs, business and science. In academia cooptation is accompanied by some specifics like peer review (Bornmann/Daniel 2003), a seniority rule for compensation and tenure (Siow 1998). Siow (1998: 154) indicates that these tools to solve the problems of asymmetric information at academia are unique.

In spite of different academic guidelines by the *Länder* and guidelines by the universities the procedure's structure is comparable (Wissenschaftsrat 2005: 15-23): first a recruitment commission is constituted. Then the job offer's text is formulated and decided and maybe used as mechanism controlling who applies: the less concrete the content is, the wider the applicants' spectrum will be. Probably an internal criteria list helps to assess the potential candidates, their former and their expected performance. In Germany cooptation is divided work between state and universities: three candidates are chosen by the faculty and the federal state minister for education and research decides about on who receives the calling. Some *Länder* transferred the calling procedure completely to the universities (see Wissenschaftsrat 2005: 4, 13-14, 112-113).

Galizia and Fischer (2005) claim a reform of the German cooptation procedure. They suggest creating conditions enabling all persons concerned to profit by choosing the “best” candidate. If individual success is connected with the group’s success then faculties become “spoil communities” (Galizia/Fischer 2005: 2, Hamacher 2005: 1). Their cooperative behavior would be rewarded, e.g. with an additional overhead for third party income. Merton (1968) investigates Nobel Prize winners and finds that excellent scientists convey to their assistants or even colleagues their norms, also reducing the necessity of external incentives. Empirical studies in behavioral economics confirm this finding (Falk/Ichino 2006: 54): “‘bad apples’, far from damaging ‘good apples’, seem instead to gain in quality when paired with these latter”.

For Musselin (2005: 118-126, 2001) the different recruitment decisions are helpful to understand the diversity of departments. The definition about the “best” candidate can differ and often specific criteria (Wissenschaftsrat 2005: 29) for a concrete position have to be fulfilled. Musselin (2001, 2005) identifies the following criteria: research activities, teaching quality, and being a “good citizen”. Some departments will weight teaching abilities higher than others. Research is maybe assessed by the amount, the quality or the specification of publications. The evaluation of good citizenship will often be difficult for not being documented in the files. Cooptation does not only mean formal but also informal, non-articulated rules, determined by internalized structures and the *habitus* (Bourdieu 1988, see also chapter before) of the existing group. In Dreijmanis’ (2004: 61) words: “In academia as elsewhere, it is not the formal recruitment procedures that are decisive, but the more informal and subjective evaluations of candidates, especially in cases where there are large numbers of at least minimally qualified applicants”.

3. Empirical design – Research question and data

The current political reforms in academia are part of the New Public Management framework, trusting in incentives that are based on relative simple quantitative indicators. These governmental monetary incentive schemes reward quantities like the number of undergraduates or Ph.D. students. We explore the effectiveness of such indicators by studying the production of economics Ph.D. graduates within European higher education. We select this particular area of inquiry because the production of Ph.D. graduates combines an emphasis on both higher education and scientific research. We pay particular attention to the production of Ph.D.'s headed for the academic labor market.

Another mechanism of external incentives, besides financial bonus systems, are rankings. Ranking positions can be used to allocate financial resources. In the United States such rankings of Ph.D. programs are important to be attractive for a huge amount of applicants. Interestingly, Hilmer and Hilmer (2004) find that the matching of Ph.D. candidate and advisor is more important than a program's ranking position. If such a match fits, even Ph.D. students in lower ranked programs can be successful, e.g. publishing in more prestigious journals than Ph.D. students from the top-ranked programs. Together with Hilmer and Hilmer (2004) we assume that inner-organizational conditions like research-active advisers should not be neglected.

This study provides an explorative case study design showing a comparison of organizational preconditions, modes of action and the type of graduates produced by varying forms of Ph.D. programs in Germany. On the basis of theoretical sampling, different types of doctoral education are identified and compared with each other to achieve a maximum variation of types with regard to doctoral action and governance forms. The internet is used as an important data source because of public available information. So not only the scientific criterion of transparency is fulfilled but this medium can also be used by potentially doctoral students for an overview.

Using document analysis, bibliometric analysis, and interviews, we study economics departments in Germany. With document analysis and bibliometric analysis we identify research active professors and departments as we assume a connection of research activity and a convergence towards structured Ph.D. programs. Research activity will be defined by publication patterns. That procedure is consistent with the literature in this field (e.g. Coupé/Smeets/Warzynski 2003).

Publication activity will be measured in published articles listed in Scopus database. Scopus is a worldwide bibliographic database. It encompasses more than 14000 titles from natural science, technical science, medicine, and social science. It is possible to select the 2700 titles from social science. Our main argument to use Scopus and not other databases like Econlit is the possibility to conduct publication and citation analysis for more than two decades. With Econlit only publication analysis is feasible. All titles recorded in Scopus are peer-reviewed ensuring the measurement of qualitative publications instead of just counting numbers. We are aware of the critic from bibliometric and scientometric researchers that counting the number of publications will not evaluate adequately a department's research productivity. Combes and Linnemer (2003) as well as Rauber and Ursprung (2006) use AER-page equivalents and a quality weight for the journals to compare different publication outcomes. These procedures give not only an impression of the attempts to measure quality but also of the difficulties as the authors provide no instrument to incorporate the different time periods needed for publications in top ranked versus lower ranked journals. For our search we used the surname and the first letter of the first name. If such a name combination creates results for more than one person, it is possible to continue search processes by typing in one or more of a professor's affiliation. We tried to avoid this procedure as it may swallow up several search results. Some of the encountered difficulties were caused by differently written names of the same professor.

Guided interviews with professors of the sample's departments reveal information about the different organizational conditions, the characteristics of doctoral action and the contribution to scientific progress. We assume that intra-subject homogeneity of a department is a condition for academic exchange, cooperation and for a collective engagement in educating Ph.D. students. Studies on innovative working teams (e.g. Agrell/Gustafson 1996) have shown that common aims and orientation towards excellent performance are important parameters for success.

We assume that not only a common orientation but also age is an important organizational condition to explain differences between departments' engagement in education Ph.D. students. Given an ongoing methodological change, a heterogeneous age structure seems to be most conducive to provide and teach scientific progress. If older professors have younger colleagues prepared with new methods then the first ones will face more demand to develop their own knowledge. The variable age is an example that only the combination of document analysis and interviews will provide an appropriate database for our investigation. Document analysis is used to receive a department's age structure. Our interviews aim to gain information about its effects. Combining different empirical methods, triangulation (e.g. Franke/Wald 2005), is seen appropriate to gain more properly and more encompassing knowledge about the kind of collegiality, the socialization process, and the acceptance and the appraisal of external monetary incentives than is possible with one instrument of investigation.

Academic cooptation is decisive for a strategic change or for keeping a department's profile. Rauber and Ursprung (2006) find that the professorial publication level reached about six years after the Ph.D. is relatively constant in time. If professorial research activity is persistent then the effectiveness of external incentives is bounded. Instead selection of personnel becomes the decisive criterion of success. Prüfer and Walz (2005) show that especially persons with high status e.g. measured in high ranked publications are important partners for

cooperation – particular for members with their own high status. That could be a hint why faculty members may favor different cooptation strategies. We want to receive more and further information about the differently practiced cooptation principle of the different departments. Therefore we analyze published job offers' texts for academic positions to get insight into the different recruitment strategies followed by departments.

Some difficulties arose while collecting the data. It was not possible to receive information for all professors. Kürschners Deutscher-Gelehrtenkalender (2005), Who is Who (2004), and the register of members of the Verein für Socialpolitik (2000) were queried to complete data from the internet. We could conduct bibliometric analysis only if it was possible to get the complete faculty's names. We had to handle missing values for some variables like 'age' or 'stays in the United States' if a professor's curriculum vita was not in the internet⁴. Requesting the dean's offices to complete the missing pieces of data was forwarded to the concerning persons. Unfortunately, they often refused to send their curriculum vitae or similar information. Another serious problem is collecting data of graduated Ph.D.s. While in Germany, the graduate schools have relative transparent websites informing about their doctoral students and graduates, departments with master-apprentice models do mostly not list their former doctoral students. Collecting data for those Ph.D. candidates or graduates was difficult or even impossible. In these cases we could only use the interviews to receive information about the placement of former Ph.D. students in academic positions.

In the process of developing a structure and questions for the interviews we developed a questionnaire which was tested at one university surveying all professors of one department. The results, difficulties und differences in answering the questionnaire delivered important hints for the structure and content of the interviews. It also revealed that the complexity of successfully fostering early stage researchers by collegial organizations cannot be captured adequately with a non-reactive questionnaire. A trustful interview atmosphere is required to

⁴ Rauber and Ursprung (2006: 22) show that the faculty lists used by the CHE "are grossly at variance". So we preferred to survey the names on our own and asked professors at the investigated departments.

receive professors' self descriptions. We interviewed 20 professors at eight German economics departments. The duration of an interview was approximately one and a half to two hours. The interviews took place during May 2005 and March 2006. For our study we chose the subject of "economics" as its content and structure seem to be internationally quite similar. In this manner, we hope to avoid our results being generated due to different production conditions but referring to the differences in the types and characteristics of doctoral education.

4. Empirical results

We contrast two types of doctoral education, and refer to them as Type A and Type B. To compare real data, we singled out one clearly attributable example for each type. Type A is an example of a department educating Ph.D. students singly-supervised, without an obligatory course program, the classic model in Germany. Type B organizes its Ph.D. education in a graduate school and a research training group.

Because of insufficient statistics of Ph.D. education we generated data for the last five years (2000-2004) regarding the scientific careers of former Ph.D. students. Table 1 shows the results: the number of Ph.D. graduates differs only slightly (26 vs. 29 graduates in between the years 2000 and 2004). The number of Ph.D.s can be interpreted as an output measure, used to determine state funding (Lesczensky/Orr 2004) in the New Public Management framework. But there are obvious differences regarding the national reputation (Berghoff et al. 2005) and the international publication output (Combes/Linnemer 2003) of these department types. While the departments appear similar when measuring their output of Ph.D. graduates, they differ along other, potentially important dimensions. These differences have implications for the impact of funding schemes based purely on quantitative output measures, such as the number of Ph.D. students. The ratio of Ph.D. candidates per professor is almost

twice as high for the Type A department compared to the Type B department. If funding is based primarily on the number of Ph.D. students, this appears to be advantageous for a Type A department.

Table 1: Number of Ph.D.s (2000-2004)

Department	Ph.D.s	Ph.D./ Prof	Scientific career
Type A	26	3,25	2 (8%)
Type B	29	1,7	14 (48%)

To help to put the output measure into perspective the last column reports the number and percentage of graduates pursuing academic careers on the completion of their studies. This measure assesses the effectiveness of the Ph.D. training in preparing students to further scientific inquiry. Type B produced 14 (48%) persons compared with only 2 (8%) persons from Type A placed at an academic position. Clearly focusing only on the produced number of Ph.D. students obscures important differences between the departments.

Empirical studies (e.g. Rubinstein 2006) find different cultures of the professions. We investigate if this macro finding can also be applied to the micro perspective of a single profession. Therefore we conduct content analysis of published job offers' texts for academic positions. We present the results for our compared cases type A, without an obligatory program, and type B, with a structured and collective Ph.D. program. We analyze the texts archived by the German university association (Deutscher Hochschulverband) for the period 1998-2005. In total 1240 positions for professors were offered in this eight-year period. Type B offered 16 positions for professors compared to only one explicit economics position at type A. Even with the different department sizes in mind, eight professors at type A versus 17 professors at type B, these numbers indicate a more homogeneous age structure and a lower mixture of younger and older scientists at type A than at type B.

Type B job offers' texts are short, not only compared to type A but to all other universities. The general and short texts enable a greater variety of applicants. This openness for different

kinds of specialization is formulated by and-or-possibilities. The focus is on academic excellence rather than specialization. The texts indicate a strong research orientation of type B versus a stronger teaching orientation of type A. The advertisements of type A are twice or thrice as long as those of type B and describe a relatively precise position profile: teaching and supporting undergraduate students come to the fore, presence at the university's location is necessary, and a list with the teaching experience is wanted. One should keep in mind that a huge amount of hold teaching courses does not automatically mean that this person is a brilliant lecturer. Quantity is not a sufficient evidence of quality. An instrument measuring quality is needed: Type B requires the results of teaching evaluations to assess the lecturer qualities of an applicant.

During the complete observation period 1998-2005 type A emphasizes teaching and less research excellence. In contrast, the focus on research of type B can already be seen in the job offers' texts, e.g. with the required engagement for the graduate school. Apparently, human resource development at type B is used for fostering Ph.D. students and research. So we can conclude that different subject cultures exist between the two types of departments explaining some of the departments' differences like their approach fostering early stage researchers.

We investigated if a departments' research activity is related to the type of Ph.D. education or the placement success. Research activity is constructed by publication activity and scientific visibility. Publication activity will be measured in published articles listed in Scopus database (see previous chapter "empirical design"). We conducted bibliometric analysis for the period 2000-2005 (P1) and for 1995-1999 (P2). Table 2 shows the results.

Our investigated departments are named D1, D2,... D8. Because of sensitive data we secure both our interview partners' and the investigated departments' autonomy. We decide this procedure as our interview partners asked us to secure their anonymity. All departments apart from D8 improved their publication output from the period 1995-1999 to the period 2000-2005.

Table 2: Publication activity and Citations

	D1	D2	D3	D4	D5	D6	D7	D8
Articles 2000-2005 (P1)	4.67	1.36	2	8.75	3.78	3.5	1.9	0.11
Articles 1995-1999 (P2)	3.42	0.64	1.67	4.38	1.44	1.5	1.1	0.11
Citations	37.5	4.36	12.8	29.1	13	7.82	7.2	0.11

D8's mean is 0.11 published articles for both observation periods. A department is referred as publication active with more than three articles for every period. P2 indicates D1 and D4 as publication active while in P1 two more departments, D5 and D6, also enter this group. Those departments with a longer history of publication activity are also those most visible to the scientific community. D1 is the most visible department and the professors of D4 received the second most citations of our sample. Because of strength in both publication and citation we refer D1 and D4 research active.

The publication output of D1's graduate school's speaker is in the departments mean (P2) or above (P1). Although this professor needs a huge amount of his working time for the graduate school's administration duties, he does his own research published in international journals. D1's publication numbers are at a relatively constant high level, our interview partners mention that publications from Ph.D. students will be fostered and not counted to the professors' publication list – remarkably interview partner 5 indicates that this praxis is not common for all German professors. D1 has two main actors fostering a structured Ph.D. education. The second main actor belongs to the younger professors aged under 45 years and received his Ph.D. education at a graduate school. Additionally to this experience he has been socialized in the United States.

D2 is a good example of not to trust just in quantitative indicators. The absolute publication numbers do not indicate a research active department but a more differentiated view is adequate. Three of the younger professors are responsible for doubling the publication output from period 1995-1999 to period 2000-2005. We interpret the high publication

numbers in peer reviewed and in Scopus listed journals of the younger professors as adaptation to a changed scientific system: journal articles indicate research activity and are the preferred publication form instead of monographs. Our bibliometric analysis indicates that research orientated professors adopt the up-to-date institutions in the scientific system with a greater probability than teaching orientated professors. These three professors also have in common that they stayed in the United States for more than six months.

D6 belongs for the period 2000-2005 to the publication active group and fosters its Ph.D. students for an academic career. But the education is organized rather as a master-apprentice model than a structured, collective program. Here the organizational conditions of research orientation and single doctoral seminars seem to have more explaining power than a formal structure of Ph.D. education. We interpret our findings as follows: publication activity seems not to be a sufficient variable for explaining the type of Ph.D. education. On the one hand not only departments with collective and structured forms of Ph.D. education but also departments with a master-apprentice model can be research active. On the other hand all departments fostering their Ph.D. students for a scientific career are also research active.

Our interviews provide an insight into how the instruments of New Public Management are seen by professors. We present aggregated results at the departments' level. Firstly we asked what our interview partners think about the impact of financial incentives gained as private income ("W-Besoldung"). All professors agree that research cannot be motivated by individual financial incentives. D3 and D8 expect even negative effects: early stage researchers will leave Germany to foreign countries where professors are better paid-off. Interview partner 4 claims "Scientific career will not be worthwhile any more". D5 sees the danger that quality will suffer from quantitative criteria. Low bonuses may be seen as an insult, meaning that the current incentives are not high enough. D6 suggests incentives for quality not just for quantity.

This rejection of performance payment cannot be reduced to differences in the individual performance, measured in peer reviewed, international publications. Even the most research-active professors and departments see financial incentives as useless or even harmful. Interview partner 12: “I think people don’t choose being a professor to maximize their lifetime income”. Imagine an economics professor!

We explore if the answers regarding individual incentives can be replicated for incentives at department or even university level. All departments provide some information for our question which impact indicator based funding schemes have on departments’ behavior. Notably, that department starting very early with forms of structured Ph.D. education in Germany is the one not knowing the bonus for every finished Ph.D. In general, all interview partners mention that the present financial incentives set by the state are too low to act as real incentives. The research orientated department D5 articulated it as a problem if only increases but not holding a high position is rewarded. D6 does not expect an increase in quality induced by financial incentives. Our interview partners at D6 indicate that their recruitment strategy is the quality of potential Ph.D. candidates instead of promised funding for an increase in quantity. D5 even claims that external incentives are not adequate and pass the demands. D8 suggests that instead of financial incentives rather the environment should be changed and cooperation possibilities should be enabled. This answer provokes another question: why does this department so little to start cooperation and change itself? At the current state of our research we find two different reasons: First, we met a very homogenous age structure with all professors being aged above 60 years, with a mean of 63.3 years. No new ideas swept in the last years. None of the professors stayed in the United States or has gained experience with the Anglo-American Ph.D. programs. Our interviews suggest that at least some of them are just waiting that they are given emeritus status⁵. Second, these professors do not publish in international journals and they are not cited authors by the scientific community. They are

⁵ Normally, in Germany emeritus status is received at 65 years age.

characterized as research inactive. Even more, it was not possible to identify one or more actors fostering a Ph.D. education that focus a scientific career. We were not able to find efforts to reorganize the Ph.D. education within the department; instead it is seen as a task of the single chairs. Additionally, our interviews indicate an unincisive group spirit.

A department indicating that new professors are good for initiating change is D2. Here, the new professors implemented a graduate school with a course program taught in English – a precondition for international competitiveness. That research active and in the United States socialized group engages themselves in fostering early stage researchers in a structured and collective Ph.D. program organized in a graduate centre while the remaining faculty stays passive. The engaged professors do not gain individual incentives, moreover the opposite holds: their engagement and their taught courses do not reduce their other teaching duties. If incentives are not convincing in explaining professorial action than principal-agent approaches and New Public management are not sufficient for explaining behavior of professionals. Instead we find that the engaged professors are socialized in a research and competitively orientated environment; they are familiar with the scientific system of the United States; they have experienced the Ph.D. education model of the American research university. We wanted to know why they do this unpaid extra work. The professors engaged in structured and collective Ph.D. education at D4 answered that fostering Ph.D. students belongs to the professional tasks and it would not be necessary to motivate them by external incentives. Interview partner 16 mentions that during the long socialization procedure of becoming a full professor one internalize a professional ethic. We conclude that the details of the current indicator based funding schemes are not well known by faculty. This finding raises doubt that incentive schemes based on quantitative indicators are effective.

Due to financial and political pressure, the legislator is searching for ways to sustain or even enhance scientific research without increasing costs but rather by decreasing spending. Therefore, politics encourage more and more diverse organizational units to enter a

competition for public money to carry out research activities or even to expand. New Public Management intends to strengthen the dean's and the president's position. Our interview partners draw a different picture. We find no real power increase of a dean. Interview partner 12 thinks that a stronger dean is needless: "The department needs no dictator!". D2 - a department with a graduate school involving the neighbor universities - and D6 - a department with the master-apprentice model - are similar in assessing the impact of New Public Management for a new dean's role. D2 thinks that personality changes more than law. D6 adds that a strong or a weak dean cannot be reduced to New Public Management, personality makes the difference. We could not find that departments with a structured Ph.D. education have implemented more New Public Management mechanisms than departments with master-apprentice Ph.D. education.

Interestingly, although the government affirms to enhance scientific progress it is sometimes more a delayer. D5 asked the ministry for several years and finally started its graduate school unofficial without explicit governmental permission. Eventually, external governance sometimes hinders engagement rather than enhancing it. D1 started the collective and structured Ph.D. education before New Public Management with its external financial incentives was implemented at the university sector.

The advocates of New Public Management believe in the idea of financial incentives. And so there exists a model to give a prize for every finished Ph.D. education. But such a scheme just rewards the quantity of output rather than the quality. We found that those financial incentives are not important for professors. For successfully promoting young researchers professors do not need extra money that is added to their wage, but personal initiative. Our interview results suggest that people acting like entrepreneurs and not like free riders are needed. Our results which are generated by a great variety of different department types and Ph. D. students education regimes suggest that the policy makers should think more about scientific reputation and less about financial incentives if they really try to improve research

and to help the European countries to become a community with a worldwide scientific reputation.

5. Discussion and Outlook

We were interested in why some academic departments are more successful at producing internationally competitive Ph.D. students than other departments. We compared the outcomes from the traditional master-apprentice model with those of structured Ph.D. programs, which include obligatory courses and a team of potential supervisors. Using document analysis, bibliometric analysis, and interviews with professors, we investigated the interrelation between internal dynamics and intensity of excellence in fostering young talents at economics departments in Germany.

Our results indicate that external incentives based on quantitative indicators and the instruments of New Public Management are not sufficient to explain performance differences. Different Ph.D. “production” regimes, organizational structures, and a department’s intra-subject homogeneity provide insights into the varying success of departments at fostering and placing early stage researchers. Barker and Barr (2002) mention another argument that weakens trust in the ability of external (governmental) actors to facilitate organizational change: Those persons who attribute a decline in performance to internal sources will engage more for strategic reorientation than those blaming external causes.

Further, our results suggest that engaged and purposeful socialized professors are essential to maintain a research orientated atmosphere: They have a conception of how Ph.D. education should be organized, ideas of how to improve the status quo, and more importantly the authority and power of persuasion to motivate other professors to implement new methods of educating Ph.D. students. In the literature of network analysis such positions are called broker (Ryall/Sorenson 2006). On the one hand she bridges “structural holes” (Burt 1992, 2000), on

the other hand her position must not be too strong; she has to maintain a colleague. Here, we introduce the “entrepreneurial academic” as a person who shares the characteristics of a professional and the independence of an entrepreneur. One characteristic of entrepreneurs is that they may use their autonomy and bridge such holes. Further research is needed to investigate the role of such an engaged initiator, such a scientific entrepreneur more precisely. Interestingly, the interpretation of our interviews shows that the details of the current funding scheme are not well known by faculty. This finding raises doubt that incentive schemes based on quantitative indicators are effective. By now, the impact of such monetary incentives on the production of Ph.D. students is not finally clarified. Maybe it matters how resources are allocated within departments. A research question for the future is if performance is influenced to a higher degree by self-determined collective group financing or by individual level financing. Perhaps those departments will perform better where restructuring is not enforced exogenously by state regulations and reforms but rather relates to an endogenous institutional choice. Sutter, Haigner and Kocher (2006) find evidence for the efficiency of endogenous institutions for the level of cooperation in their experimental public goods game study.

On the one hand the university management and the deans have gained own decision-making abilities while the individual professor has lost some autonomy. On the other hand the reforms are still in process. If the academic profession uses its potential collective capacity they can act in the decision-making process. Some departments already started or are successful in using their collective capacity for educating Ph.D. students. If fostering Ph.D. students is a team production process then problems in providing collective goods, e.g. free riding, may arise. Another question for future research is which conditions and rules – if any at all – the departments implement to avoid or mitigate a possible free rider’s problem.

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