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**The impact of New Public Management  
(NPM) instruments on PhD education<sup>1</sup>**

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## Abstract

New public governance emphasizes less state, more market and more hierarchy as the cornerstones for effective steering of higher education institutions. Based on an explorative analysis of qualitative and quantitative data of fourteen German and European economics departments, we investigate the steering effects of six new public management (NPM) instruments in the years 2001 to 2002 on subsequent placement success of PhD graduates.

Using crisp set Qualitative Comparative Analysis to analyze the data, our results deliver strong support for the positive effects of competition for resources and the partial harmful effects of hierarchy on PhD education. Governance of **successful** departments is characterized by two solutions: *additional funding based on evaluations* as one single success factor in each solution or a combination of *additional funding based on nationally competitive performance* in addition with either **no public policy regulations for departments** or with **no university regulations for departments**. Governance of **unsuccessful** departments is characterized by one solution: *university regulations for departments* or a combination of **no additional funding based on nationally competitive performance** in addition with no *additional funding based on evaluations*.

Our results strengthen the strong impact of selected competitive mechanisms as an effective indirect governance instrument and the partially detrimental effects of state regulation and more hierarchy as elements of direct governance instruments for successful PhD education.<sup>2</sup>

## Key words

New Public Management instruments, competition, state regulation, hierarchy, economics, PhD education, QCA

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## **1 Introduction**

In the early 90s, almost all European countries viewed their doctoral programs as falling short of the primordial objective of doctoral education: to qualify young academics to do original research on their own. Given this diagnosis, initiatives were taken in many countries to remedy this dismal situation by applying new governance regimes to PhD education (Sadlak 2004) and the university system in general (Leisyte et al. 2006).

Although in many European countries the changes in their doctoral education led to considerable success, several countries, among them Germany, have done little to modify their PhD education (Wissenschaftsrat 2002; DFG 2003). The “German Research Foundation” (DFG 2003) for example documents that in Germany in 2002 only 2% of all doctoral students in the social sciences received some kind of structured education which is supposed to indicate reforms in PhD education; most German economics departments remain in the traditional pure master-apprenticeship model (Berning and Falk 2004: 54-55). Neglecting the importance of PhD education reforms is surprising when we consider the arguable reliance of departments on research conducted by PhD students. PhD students and postgraduates deliver a great part of scientific research in German economics departments (Fabel et al. 2002), but as recent research grant allocations by the European Research Council (2008) indicate, the potential of young German researchers is still valued poorly against many other European researchers. Failing to produce competitive PhD graduates threatens the academic prestige, if not existence of German departments, as the Wissenschaftsrat (2006: 56), a constitutional body, recommended to ban non-performing departments from awarding doctoral degrees.

Governments are the main players in German higher education. They are facing increasing financial constraints and at the same time higher accountability claims of tax payers. Measures to “reinvent government” abound (Davis 2003) and higher education too saw the introduction of administered market competition and a reduction of state regulations in favour of more autonomy in public organizations (Grüning 2000; Schedler and Proeller 2000; Schimank 2005).

Taking these new governance perspectives as frame of reference, our study scrutinizes the effects of six new public management (NPM) instruments on one central element of higher education: PhD education.

The assessment of the impact of NPM instruments on PhD education is surprisingly unexplored yet. The relative impact of different management devices to shape academic behaviour must be of interest for policy-makers trying to introduce more market elements and to achieve more hierarchical self-governance in the spirit of New Public Management.

In the following chapter we will link NPM to PhD education and unfold our level of analysis. In chapter three we explain our empirical design and define the conditions under examination. Results for NPM instruments of successful and unsuccessful PhD education are described in chapter four. The results are then discussed in chapter five and we conclude with limitations to our study and an outlook for further research.

## **2 Linking NPM to PhD education**

It can be claimed that until the mid 1980s the common governance model of most European universities was a combination of academic self-governance and high levels of state regulation and control. NPM aims for less state regulations, but more “quasi-market” elements (Kehm and Lanzendorf 2006b) and more autonomy over internal affairs through managerial hierarchies.

Many German states, “Länder”, for example have introduced performance related funding based on incentive models (e.g. Leszczensky and Orr 2004) and in favour of statewide “Centres of Excellence” which apply incentives to vague or even soft performance criteria to improve PhD education (e.g. number of PhD students, number of female PhDs students, number of habilitations). On the federal level, the “German Research Foundation (DFG)” provides funds for “Collaborative Research Centres” or “Research Training Groups” to enhance efforts in PhD education, based on peer reviewing and rather tight funding criteria.

De Boer, Enders and Schimank (2007) offer a refined categorization of new public governance styles of higher education. We base our analysis on their five basic dimensions: competition, academic self-governance, stakeholder guidance, state regulation and managerial self-governance.

By contrasting governance regimes based on traditional steering and NPM and referring to a crude dichotomous characteristic of each governance dimension of a “low” and a “high” value, Schimank (2007) distinguishes two ideal types of governance in universities: a “perfect” new governance of universities combines high competition, low academic self governance, high stakeholder guidance, low state regulation, and high managerial self-governance. A “perfect” traditional governance model shows the exact opposite characteristic in each of these five governance dimensions.

Even policy regimes in Europe with the longest experience in implementing these NPM instruments like Great Britain (Leisyte et al. 2006) or The Netherlands (de Boer et al. 2006) have by far not yet reached perfect NPM governance. Latecomer countries like Germany (Kehm and Lanzendorf 2006a) or Austria (Lanzendorf 2006) have only implemented some NPM instruments (de Boer, Enders and Schimank 2007). German universities and departments experience steering attempts by many political actors with, at least under a new public governance perspective, inconsistent directions. While the federal government for example introduced more competition

with the ‘initiative for excellence’, a form of indirect or distant steering (BMBF 2005), states impose direct regulations, e.g., as to the particular design of PhD education (ENB 2008). Schimank (2008) convincingly suggested, however, that not only extreme realizations, but mixed configurations could be effective.

In the governance of PhD education, neither Great Britain nor The Netherlands come anywhere close to ideal NPM models (Metcalf Thomson and Green 2002; Park 2005; and de Weert 2004 respectively). While hardly any NPM instruments have reached PhD education in Italy (Moscato 2004), some other European countries are experimenting with to date unclear results: France (Lemerle 2004; Dahan 2007), Switzerland (Groneberg 2007: 19-21) or Germany (Hüfner 2004).

Systematic research on the influence of NPM instruments on activities of departments or individuals is still rare. Some evidence even exists that different governance instruments might enhance PhD education efforts in departments and universities (Colander 2008; Veugelers and van der Ploeg 2008), but in general the effects of different governance instruments vary according to the academic performance criteria under consideration as Kehm and Lanzendorf (2007) show on university level for performance based allocation of resources, evaluations, performance agreements and hierarchical decision making. Effects need not be linear. Jansen, Wald, Franke, Schmoch and Schubert (2007) have shown curvilinear effects of competition for third party funding on publication output.

Concentrating on the impact of NPM on PhD education we apply and simplify the de Boer, Enders and Schimank (2007) framework to our organizational unit of reference, the departments. We neglect the dimensions “stakeholder guidance” and “academic self-governance”, because no one of our interview partners indicated any external stakeholder or any reduction of academic self-governance, thus leaving us with no variance in these two dimensions.

We distinguish three competition instruments to represent **indirect governance**, allowing individuals and departments to decide autonomously whether it is worth increasing academic performance, given certain incentives. Competitive structures seem to explain the success of departments in American universities (Backes-Gellner 1992, 2001). We include three instruments of **direct governance**: regulatory interventions on PhD education by university management, target agreements between university management and faculty members as instruments of managerial self-governance, and finally external regulatory interventions by public policy actors.

One of the main mechanisms of indirect governance is the implementation of (quasi-) markets (Kehm and Lanzendorf 2006b) where participants in the market for PhD students compete for scarce financial resources to pay scholarships or reimburse travel expenses in order to attract excellent PhD students (DFG 2000: 15-16; DFG 2003: 30). Many European countries like The

Netherlands or Great Britain have implemented radical but transparent funding models to distribute research budgets according to academic performance criteria (European Commission 2004; Hammen 2005) whereas other European countries like Germany, France or Italy still stick to traditional budgeting rules with some exceptions.<sup>3</sup> We operationalize indirect governance by three competition instruments: additional funding based 1) on evaluations, 2) on locally competitive performance and 3) on nationally competitive performance.

### **2.1.1 Additional funding based on evaluations**

Although widely criticized (e.g. Frey 2007), evaluations are increasingly used to assess the academic activities of higher education institutions, be it universities, research organisations or university departments. Evaluations may take the form of accreditation or audit (Stensaker and Harvey 2006) and follow different perspectives.

In the context of accreditations, external evaluators focus on a limited and established number of input and output criteria for an institution or programme to arrive at a final dichotomous decision: accredited or not (Harvey 2004). Their decision signals a quality standard in the domains under examination to the outside world. Usually accreditations are rather seldom<sup>4</sup>, and actors in the accredited institution will gain from a positive evaluation by raising tuition fees, attracting better students and recruiting top faculty. In particular the refusal can have a drastic impact for student and professorial applications, funding, and tuition fees. The interest of faculty attracting high quality discussion partners through positive accreditations is articulated in Harvey (2004).

Evaluations in the context of audits follow a different approach. They focus on performance criteria, which need not be guided by established standards as in accreditations, and they do not result in cut-off judgements. Evaluators in quality audits compare an institution and its programme for instance to the average or to some benchmark institution (Stensaker 2000). Favourable as well as unfavourable decisions are informative and they may serve to help organizational development or to internally (re-)negotiate resources.

### **2.1.2 Additional funding based on locally competitive performance**

This form of funding includes two different funding schemes. The first is characterized through low threshold criteria where public authorities or universities determine relevant academic indicators like number of undergraduate teaching, time to degree or gender equality and reward results exceeding that threshold with a certain amount of money (Leszczensky and Orr 2004). For PhD education this usually comprises achievements like total number of graduating PhD students, female/male-ratio or total number of post doc positions (Leszczensky and Orr 2004). The second

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<sup>3</sup> A majority of German states for example established a regime of quasi-competitive elements where they first have forced university departments to cut their basic resources with the perspective to establish a kind of research foundation which will redistribute these savings according to a prospective reward system (Leszczensky & Orr 2004).

<sup>4</sup> Accreditation in the English Research Assessment Exercise took place in 2001 and 2008 for example.

funding scheme has more, though limited competitive elements. Political actors tender competition for research projects that only address departments of a certain region often with political expectations in mind.

### **2.1.3 Additional funding based on nationally competitive performance**

Additional funding based on highly competitive performance is a very strict version of administered competition, often on a national basis. It is usually based on decisions following a peer review process. Whereas individuals can apply for individual research grants, funding of coordinated programmes of departments or department networks (in Germany for example through “Research Training Groups” or “Collaborative Research Centres”) is more influential because it possibly provides large scale funding for PhD education and at the same time integrates the students into a scientific community.

## **2.2 Instruments of direct governance**

Direct governance covers NPM instruments which directly intervene into the behaviour of faculty. External actors or superiors in the administrative hierarchy may in principle have such competence, be it unilaterally or through negotiations.

### **2.2.1 University regulations for departments**

Regulations could be imposed by university management on departments with regard to the selection procedures, the scale, and the maximum length of studies.

### **2.2.2 Target agreements**

Although Schimank (2006) portrays a sobering picture of the effects of target agreements as means of governing universities and departments, they are nowadays one of the popular governance instruments in higher education (Jaeger et al. 2005; Weichselbaumer 2007). Their efficacy has been demonstrated for judges who, like professors, are faced with a complex task and various performance criteria (Schneider 2007). The same should apply to the academic world where however performance criteria are even more diversified and where performance levels may show a considerable time lag (Schneider and Sadowski 2004: 395). The main difference to regulatory interventions lies in their negotiated character which allows to take individual or organizational characteristics into account.

### **2.2.3 Public policy regulations for departments**

Academic behaviour of departments and individuals can also be steered by regulations of public policy actors requiring for instance a certain ratio of foreign PhD students in a program (ENB 2008) or the fixing of the financial assistance or the legal status of PhD students (de Weert 2004).

*Table 1* summarizes the NPM instruments along the two governance dimensions

Table 1: The NPM instruments according to indirect and direct governance and coordination forms

| <i>Competition</i>   | <i>Managerial self-governance / hierarchy</i>   |
|--|---|
| additional funding based on<br>- evaluations (NPM1)<br>- locally competitive performance (NPM2)<br>- nationally competitive performance (NPM3) | - university regulations for departments (NPM4)<br>- target agreements (NPM5)<br><i>State regulations</i><br>- public policy regulations for departments (NPM6) |

*Legend:* NPM1, NPM2, NPM3, NPM4, NPM5, NPM6: abbreviations for new public management instruments.

As Schimank (2007) and de Boer, Enders and Schimank (2007) have demonstrated, configurations of pure traditional models as well as pure NPM models hardly exist. High academic quality also occurs among “mixed” governance regimes<sup>5</sup> – at least according to NPM standards. They presume that the effectiveness of governance regimes depends upon the intended results and that a certain combination of governance elements might be favorable for one academic performance indicator (e.g. PhD placement in the general labour market), while another governance regime might be conducive to another performance indicator (e.g. publication record of PhD students). We share these assumptions and claim that it might be the interplay of several governance mechanisms that leads to or prevents an intended result (similarly Braun and Merrien 1999: 19). Our empirical study wants to answer this very question:

Which NPM instruments or combinations thereof lead to successful PhD education?

### **3 Empirical Design**

We focus on the producers of PhD education, university departments and their faculty. We assess how faculty perceives and experiences NPM instruments and whether these instruments enable successful PhD education.

In a case study design, the information is retrieved through in-depth interviews combined with document analyses. Interview partners were asked whether they perceive an influence of either one of the instruments under consideration, either personally or for the department’s PhD education. We decided to ask several interview partners in each department to control for reliability in the statements.

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<sup>5</sup> According to Combes and Linnemers (2003) weighted ranking of publications, the economics department in Toulouse (France), which would operate under a suboptimal governance regime, is ranked 1<sup>st</sup> and the London School of Economics (Great Britain), operating in a governance regime very close to “perfect” NPM criteria, is ranked 2<sup>nd</sup> for publications in Europe.

We deliberately refrained from the widely used comparisons of national governance regimes to assess diversity in governance regimes. Instead of considering governance regimes as input factor, we selected departments according to the organizational form of their PhD education and their research record (measured by quality weighted publications according to Combes and Linnemer (2003)), assuming that these configurations are organizational and behavioral reactions to governance regimes. In line with Mayntz (2004), we argue that departments operate in a unique governance regime or “system of rules” which offers a set of incentives and consequences which lead to a particular form of PhD production and publication output as ‘corps d’esprit’.

We distinguish departments with an unstructured PhD education in a pure master-apprenticeship model, ones with a structured PhD education embedded in graduate schools or graduate centers, and mixtures between structured and unstructured PhD education. We then assigned them their publication output to receive a wide variety of different governance forms.

In pure master-apprenticeship models, PhD students are selected by a single professor who has often known the students well through undergraduate classes. Students acquire new methods by working on the research topics of their supervisors and are connected tightly to the administrative and teaching duties of a professor and his chair. Professors introduce their students to the scientific community, finance them and finally grade their dissertations. We suspect that PhD education according to this model is not very susceptible to regulations and leaves autonomy over details of PhD education to the individual professor. Incentives and consequences through market (in)activity may only be effective, if the individuals assign value to market success.

Structured PhD education is characterized by the selection of candidates from a large pool of candidates through a committee of delegates. Students acquire new methods and additional academic knowledge in seminars and lectures, they do assignments and write examinations. Supervisors and students match not from the beginning, but only after a year or so, the grading is done by a committee, not solely the supervisor. Several forms of structured PhD education exist. Graduate schools often comprise a variety of departments. They may be run by a dean with the competence to control the procedures and overall outcomes for all departments. Structured and centered PhD education leaves much less process autonomy to the individual professor, it requires much more coordination and collective action and should therefore be susceptible to NPM instruments which favor hierarchical coordination or set incentives based on joint performance.

For the analysis we construct a set of input conditions<sup>6</sup> (the six above mentioned instruments) as described in table 1 and relate them to successful PhD education which in our perspective means: generating young researchers.

### 3.1 Sample

Our data consists out of 14 European economics departments which vary in the organization of their PhD education and are indicated as D1 to D14. They are from Germany, Switzerland, Italy, Great Britain, France and The Netherlands. PhD students were trained in a master-apprenticeship setting in three departments (D11, D12 and D13), in a graduate school in two departments (D6 and D8), in a graduate centre in three departments (D3, D7 and D9) and in a mixed way in six departments (D1, D2, D4, D5, D10 and D14). Departments are defined to be research active if their publication output was among the best 100 European economics departments and “inactive in research” if their publication output was not among the top 100 departments (Combes and Linnemer 2003). Table 2 describes the sample.

Table 2: Sample according to PhD production form and department publication record.

|                        |                 | Department publication record |               |
|------------------------|-----------------|-------------------------------|---------------|
|                        |                 | High                          | Low           |
| <b>PhD</b>             | M-A-model       | -                             | D11, D12, D13 |
| <b>Production-form</b> | Graduate school | D6, D8                        | -             |
|                        | Graduate centre | D7, D9                        | D3            |
|                        | Mixed models    | D1, D4, D5, D10, D14          | D2            |

*Legend:* M-A-model: master-apprenticeship model; Mixed model: production form of master-apprenticeship model and graduate school or graduate centre co-exist; High: publication output of the department is among the top 100 departments; Low: publication output of the department is *not* among the top 100 departments; D1 to D14: departments in our sample.

We conducted semi-structured in-depth interviews with 43 academic and administrative key persons between May 2005 and March 2007 and probed into the influence of NPM instruments on departments and individuals. We asked questions about the steering of a variety of their daily academic activities like administration, teaching, research in general and PhD education in particular for the years 2001-2002. We left our interviewees unaware of our definition of a successful department. We wanted them to compare the governance styles and instruments in 2001 and 2002 to the ones predominant when the interviews took place. We were interested in their perception of individual and departmental effects. The characteristics of each instrument were scrutinized for each case and then related to the outcome, placement success, for the years 2002-2006.

<sup>6</sup> In order not to confuse the basic assumptions of statistical methods with csQCA we use the term “condition” instead of “independent variable.”

## 3.2 Analysis

In order to analyze the interview statements we use “crisp set Qualitative Comparative Analysis” (csQCA) by Ragin (1987, 2000). It allows statements about coherence in conditions that are characteristic for the sample under consideration and uses the principles of Boole’s algebra to analyze the data. The case oriented character of the method allows statements even for qualitative data of small and medium sized samples and can be considered as “third way” (Schneider and Wagemann 2007) between pure case studies and statistical methods. csQCA searches for necessary or sufficient relations between input conditions and one outcome and although a configurational analysis – which input conditions come with which outcomes? - it suggests inferences about causal effects.

The database for csQCA can be qualitative or quantitative, but the latter is then transformed into qualitative, dichotomous values as has already been done here for the outcome. Quantitative conditions can either be transformed into qualitative values by theoretical assumptions or according to mathematical standards through clusters and thresholds provided by standard software. Depending on the data, both transformations have their own value (Cronqvist 2007a: 90) but should always be made transparent.

We analyzed the data with the free software TOSMANA (Cronqvist 2007b). TOSMANA calculates csQCA and allows following each calculation stepwise which ensures transparency. The calculation is based on a data table or “truth table” comprising the input conditions and the outcome for each case, all coded as either 1 or 0. The analysis starts with all observed configurations and then removes one redundant condition after the other until it ends with the final most simplistic set of “causal conditions” that cannot be reduced any further. “If two Boolean expressions differ in only one causal condition yet produce the same outcome, then the causal condition that distinguishes the two expressions can be considered irrelevant and can be removed to create a simpler, combined expression.” (Ragin 1987: 93).

The results then present groups of cases that are characterized by one identical input condition or by the same input configurations and the same outcome. Finally, csQCA singles out configurations (“solutions”) with necessary or sufficient (or both) conditions for a certain outcome. This allows to detect subgroups of cases which all cause the outcome under examination and to discover complex or even contradictory conditions for a given outcome.

Classical statistical models (e.g. regression analysis) find “unifinal” results that are represented in one single regression equation where the individual contribution of each condition to the output is added to the equation. In csQCA though, the results are “equifinal”, meaning that different conditions may lead to the same outcome.

### 3.3 Conditions

#### 3.3.1 Output: PhD placement ratio

The choice of criteria for performance in PhD education is complex and not always easy to agree upon (Colander 2008). One common measure is the publication record of PhD graduates (Hilmer and Hilmer 2007) or professors (Rauber and Ursprung 2006) but the total number of graduates (Leszczensky and Orr 2004) or the reputation of a graduate school (Ehrenberg 2004; Burriss 2004) also serve as indicators for success. Yet these criteria suffer from pitfalls. Total numbers of PhD graduates do not speak about quality, publication records are watered down by long time lags, and for European institutions there is no agreed upon prestige hierarchy of PhD programs.

We therefore choose the share of PhD graduates who gain an appointment as postdocs or professors in the academic sector, i.e. at a PhD granting university or a university related research institute. To create this unique dataset we obtained the names of all PhD graduates in our sample departments<sup>7</sup> for the years 2002 to 2006 and followed each individual career<sup>8</sup>.

The threshold for successful and unsuccessful departments was based on theoretical assumptions at a ratio of 0.3 which is also reflected by the mathematical threshold of TOSMANA after the clustering of the data and which is in line with the average of academic placements in Europe<sup>9</sup>. The ratio of placements in our sample varies from 0.09 (9% of PhD graduates find a position as postdocs in the academic sector) to 0.60 (60% of PhD graduates find a position as postdocs in the academic sector). The condition is divided into two categories:

- 0=placement ratio is < 0.3 (no successful placement);
- 1=placement ratio is  $\geq$  0.3 (successful placement).

#### 3.3.2 Input conditions: NPM instruments

All six NPM instruments of table 1 serve as input conditions. The coding is again dichotomous and will be explained in more detail shortly. The ratio of input conditions to cases fits the theoretical findings of Marx (2006) and limits the risk of random results in the data.

##### 3.3.2.1 Indirect governance

The condition *funding based on evaluations* (condition NPM1) captures whether departments are faced with evaluations of their academic performances in the context of either accreditations or audits. It is coded “to be present” when the interviewees indicated that one or more of their

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<sup>7</sup> The average total number of PhD graduates varies from 2.6 graduates per year to 24.8 graduates per year with a mean of 9.0 PhD graduates per year per department.

<sup>8</sup> Amir and Knauff (2006) point to the high correlation between placement success of PhD graduates and the academic level of the departments they graduated from.

<sup>9</sup> The figure fits calculations about post-doc positions in several countries in the EU. In France and The Netherlands around 29% of all PhDs graduates obtain a job in academia. In Great Britain about 27% of all PhD graduates pursue a job in universities (STRATA-ETAN 2002:84-86). In Germany only little data exists about post-doc positions. But as Enders and Bornmann (2001) have shown, around 29% of PhD graduates in biology and mathematics find a job in academia.

academic achievements are evaluated and that the outcome of the evaluations can result in positive or negative funding consequences. We code the condition:

0=funding based on evaluations does **not** exist;  
1=funding based on evaluations does exist.

The condition was coded “0” for statements as in the following quote<sup>10</sup>: “... *if now they finally started assessing your performance in research and teaching as a criterion, one would put more attention on the external presentation. That I would actually strongly welcome.*”

The condition was coded “1” for statements like: “...*They are coming three times per year and have a look on what we are doing. I actually have to write a self-evaluation report, where everything is included about what we have done. We actually have to compare ourselves with other institutions, that’s very developed here. I actually think that’s not at all bad, because you always have arguments to get top guys when you have to staff new faculty and it even has financial implications.*”

**Funding based on locally competitive performance** (condition NPM2) indicates whether a department jointly competes for resources with departments in the same local area like a state, a city or the same university. The application and allocation of funding is much less competitive than in funding based on peer reviews and often reflects local political goals. The condition is divided into two categories:

0=**no** joint applications for funding based on locally competitive performance;  
1=joint applications for funding based on locally competitive performance.

We coded „0“ if statements were as follows: “... *questions about in what direction do we want to specialize and take respective initiatives showed us in the last few years that we rather continue to pursue third party funding in our individual research area where we have chances to compete for additional funding.*”

The condition was coded “1” in the following case: “... *we tried to compete for the research centre [which was tendered by the state] but there was the conflict with another institute [in the same state] who they [the state] promised it to ... so our university president said that he can support us for a little while with scholarships but his budget does not allow him doing it for a long time...*”

**Funding based on nationally competitive performance** (condition NPM3) indicates whether a department regularly competes for refereed research funding on a (supra-) national level. It is considered to be present if the interview partners indicate that several people of the faculty regularly apply together for this kind of funding. The condition is divided into two categories:

0=**no** joint applications for highly competitive performance;  
1=joint applications for highly competitive performance.

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<sup>10</sup> Several statements are not in English language, what made the authors translate them to come as close as possible to the original statements.

Statements of the first case (code=0) were for example: “...*I am not participating in efforts of the departments. I know from experience they are never finished arguing. I only have bad experiences. They waste too much time and at the end all the envy comes up again so it’s not worth the effort.*”

Or: “*I haven’t heard that there are efforts in the department to go in this direction [apply for a research program].*”

Statements of the second case (code=1) were for example: “... *we all agreed that we do it [the research program] pretty well but money has to come from somewhere so we just applied for it [the research program] again and I just wrote the application.*”

Or: “*It was worth several millions [the research program] and Mr. X and Mr. Y reeled it in. I was with them as well. And that’s a good way to employ PhD students for a long time and to make them aware of the research subject.*”

### 3.3.2.2 *Direct governance*

The condition *university regulations for departments* (condition NPM4) reflects the influence or attempts of individuals in a managing position within the university or the department to influence the faculty and to align their academic activities to a certain academic direction, sometimes even against the majority of the faculty. The condition pertains to different issues including PhD education. It is divided into two categories:

- 0=university regulations do **not** exist;
- 1=university regulations exist.

Statements of interview partners that allow for coding “0” are descriptions like the following: “...*no, there is absolutely nothing I perceive in this direction [positions of deans or university president towards department activities].*”

Statements of interview partners that allow for coding “1” would comprise statements like the following: “...*and indeed we have a university director who actually wants to enforce the [new higher education] law.*”

Or: “*I like Mr. X [the department chairman] quite a lot but the independence is not granted, I don’t have the impression I can work freely.*”

The condition *target agreements* (condition NPM5) denotes whether university or department leaders agree upon shared goals of academic performances with the faculty. The main difference to university regulations for departments lies in the joint agreement of two parties based on negotiations or shared traditions, but not on unilateral regulations. The condition is divided into two categories:

- 0=target agreements do **not** exist between the partners;
- 1=target agreements exist between the partners.

We coded the condition „0“ if the interview partners had answers like: “*Not yet [target agreements], but they have been talking about it for a long time already.*”

Or: “*God beware, no [target agreements].*”

We code “1”, if our interview partners made statements like: “... *there has been a smoothing over the years, it's roughly xx students per year and roughly xx graduates, that's kind of the target.*”

The condition **public policy regulations for departments** (condition NPM6) captures whether PhD education in departments is affected by regulations of public authorities, e. g. a fixed financial level of scholarships or a fixed goal for foreign PhD students. The condition is divided into two categories:

- 0=public policy regulations do **not** exist;
- 1=public policy regulations exist.

We coded “0” in the case of: “*They [politics] can impose nothing on you. You are totally free in your research. ... and so pressure on you is quite impossible.*”

An example for coding “1” is : „... *well yes, we received X PhD positions and X assistant professorship but then afterwards we were told that we can pay them only X% of the full salary, what I personally find quite annoying.*”

The configurations of all conditions for each case are shown in the data table (table 3). There is a great variety in the way NPM is carried out among the departments, demonstrating that we realized a sample with great variance in the application of instruments.

Table 3: Data table of NPM configurations and their respective outcome for 14 departments

| Competition |                   |                      | Managerial self-governance |                   | State regulations         | Outcome   | Cases      |
|-------------|-------------------|----------------------|----------------------------|-------------------|---------------------------|-----------|------------|
| Evaluations | Local competition | National competition | University regulations     | Target agreements | Public policy regulations | Placement | Department |
| <b>NPM1</b> | <b>NPM2</b>       | <b>NPM3</b>          | <b>NPM4</b>                | <b>NPM5</b>       | <b>NPM6</b>               | <b>O</b>  | <b>ID</b>  |
| 0           | 0                 | 1                    | 0                          | 1                 | 0                         | 1         | D1         |
| 0           | 1                 | 0                    | 1                          | 0                 | 0                         | 0         | D2         |
| 0           | 1                 | 0                    | 0                          | 0                 | 1                         | 0         | D3         |
| 0           | 1                 | 0                    | 0                          | 0                 | 0                         | 0         | D4         |
| 0           | 0                 | 1                    | 1                          | 0                 | 1                         | 0         | D5         |
| 1           | 1                 | 1                    | 0                          | 1                 | 0                         | 1         | D6         |
| 1           | 1                 | 1                    | 0                          | 1                 | 1                         | 1         | D7         |
| 1           | 1                 | 0                    | 0                          | 1                 | 1                         | 1         | D8         |
| 1           | 1                 | 0                    | 0                          | 0                 | 0                         | 1         | D9         |
| 0           | 1                 | 1                    | 0                          | 1                 | 0                         | 1         | D10        |
| 0           | 0                 | 0                    | 1                          | 0                 | 0                         | 0         | D11        |
| 0           | 0                 | 0                    | 1                          | 0                 | 1                         | 0         | D12        |
| 0           | 0                 | 0                    | 0                          | 0                 | 0                         | 0         | D13        |
| 0           | 1                 | 1                    | 0                          | 0                 | 0                         | 1         | D14        |

**Legend:** A “1” in each cell indicates that the NPM instrument is used, a “0” in each cell indicates that the NPM instrument is not used; O=Output (1=placement success, 0=no placement success); ID case number:

D1 to D14: departments in the sample.

## 4 Results

### 4.1 Successful PhD education

The csQCA delivers two most parsimonious solutions of NPM instruments to explain success in PhD education (outcome=1). Each solution consists of two configurations of instruments and their characteristics for achieving successful PhD education. The first configuration of each solution is always alike, while the second configuration of each solution disposes of different instruments. Yet the first instrument of the second configuration also remains the same in both solutions. Altogether the most parsimonious solutions consist of four NPM instruments with different combinations as summarized in table 4a.

Table 4a: Configurations for successful PhD education (outcome=1)

| Solution 1 | Configuration 1a             |    | Configuration 1b                                    |     |  |
|------------|------------------------------|----|---|-----|--|
| Condition  | Funding based on evaluations | OR | Funding based on nationally competitive performance | AND | No public policy regulations for departments |
|            | NPM1 {1}                     | +  | NPM3 {1}  | •   | NPM6 {0}                                     |
| Cases      | (D6, D7, D8, D9)             |    | (D1, D6, D10, D14)                                  |     |  |
| Solution 2 | Configuration 2a             |    | Configuration 2b                                    |     |  |
| Condition  | Funding based on evaluations | OR | Funding based on nationally competitive performance | AND | No university regulations for departments    |
|            | NPM1 {1}                     | +  | NPM3 {1}  | •   | NPM4 {0}                                     |
| cases      | (D6, D7, D8, D9)             |    | (D1, D6, D7, D10, D14)                              |     |  |

*Legend:* level of the input condition in curly brackets; “+” means logical OR; “•” means logical AND; in contrast to capital and lower-case letters to denote for presence and absence of a NPM instrument we code them {1} for presence and {0} for absence of the respective NPM instrument; NPM1: funding based on evaluations; NPM3: funding based on nationally competitive performance; NPM4: university regulations for departments; NPM6: public policy regulations for departments; D1, D6, D7, D8, D9, D10 and D14: departments in our sample with successful PhD education (outcome=1).

Analysis of configurations 1a, and 2a of solutions 1 and 2 demonstrate that successful PhD education (outcome=1) takes place in four departments (D6, D7, D8 and D9) which face *funding based on evaluations* (NPM1 {1}). Yet as can be seen in table 3 the data demonstrates that successful PhD education takes also place in departments (D1, D10 and D14) that do not experience evaluations (NPM1 {0}) which indicates that the presence of *evaluations* (NPM1 {1}) is a sufficient, but not necessary condition for successful PhD education.

The analysis of configuration 1b of solution 1 gives a combination of two further NPM instruments for success. Competition for *funding based on nationally competitive performance* (NPM3 {1}) in addition with *no public policy regulations for departments* (NPM6 {0}) is present in four

successful departments (D1, D6, D10 and D14). Since successful PhD education takes also place in departments without this combination (D7, D8 and D9), configuration 1b is a sufficient, but not necessary configuration for success.

Accordingly, configuration 2b of solution 2 adds a second combination of two NPM instruments. It identifies that the configuration of *funding based on nationally competitive performance* (NPM3 {1}) in accordance with *no university regulations for departments* (NPM4 {0}) is present in five successful departments (D1, D6, D7, D10 and D14). As in configurations 1a, 2a and 1b, successful PhD education takes also place in departments (D8 and D9) which do not exhibit this combination. Configuration 2b is therefore a sufficient, but not necessary configuration for success. None of the four configurations is a necessary condition.

The relative importance of each solution and its configurations for explaining success in PhD education can be evaluated through **coverage scores** (Ragin 2006). Coverage scores for sufficient conditions reflect the proportion of cases in one configuration in relation to all cases and configurations in the same solution. They illustrate the weight of each configuration in a solution to explain the outcome in relation to the additional configurations of the same solution.

A coverage score yields two information. The first information, the **raw coverage** provides data about the total coverage of all cases of one configuration in relation to all cases with the same outcome. In configuration 1a a raw coverage is composed of 4 cases (D6, D7, D8 and D9) divided by 7 cases (D1, D6, D7, D8 and D9, D10 and D14) which equals 0.57 or 57% raw coverage. This means 57% of the outcome in solution 1 is explained by configuration 1a (the presence of evaluations). In configuration 1b the raw coverage also consists of four cases (D1, D6, D10, and D14), yielding a raw coverage also for configuration 1b of 0.57 or 57%. The raw coverage scores in solution 2 are calculated respectively. Since configuration 2a equals configuration 1a it also has a raw coverage score of 57%. Configuration 2b though consists out of five cases (D1, D6, D7, D10 and D14) and divided by the total seven cases, it leads to a raw coverage score of 71%.

The second information provides data about the **unique coverage** of the configuration. Unique coverage takes overlapping cases into account (case D6 in solution 1 and cases D6 and D7 in solution 2) which are cases that belong to more than one configuration and might therefore inflate the relevance of certain configurations. Unique coverage scores of each configuration are therefore calculated by subtracting the cases which are present in both configurations (overlap) from the cases of the configuration under consideration. Therefore solution 1 leads to a unique coverage score for configuration 1a of 43% ( $0.57 - 0.14 = 0.43$ ) and for configuration 1b of 43% ( $0.57 -$

0.14=0.43) also<sup>11</sup>. Solution 2 leads to a unique coverage score for configuration 2a of 29% (0.57-0.28) and a unique coverage score for configuration 2b of 43% (0.71-0.28).

The coverage scores (table 4b) demonstrate that although unique coverage scores turn out to be lower in each configuration than their raw value, the unique coverage scores still remain high for all configurations (between 0.29 and 0.43)<sup>12</sup>. The results indicate that each configuration of the NPM instruments deliver a substantial explanation for success in PhD education with robust coverage scores.

**Table 4b: Raw coverage, overlap and unique coverage scores for configurations 1a to 2b**

| Configuration | raw coverage        | Coverage score |                 |                           |
|---------------|---------------------|----------------|-----------------|---------------------------|
|               |                     | Overlap        | unique coverage |                           |
| 1a            | NPM1 {1}            | 4/7 = 0.57     | 1/7 = 0.14      | 0.57 – 0.14 = 0.43 or 43% |
| 1b            | NPM3 {1} • NPM6 {0} | 4/7 = 0.57     | 1/7 = 0.14      | 0.57 – 0.14 = 0.43 or 43% |
| 2a            | NPM1 {1}            | 4/7 = 0.57     | 2/7 = 0.28      | 0.57 – 0.28 = 0.29 or 29% |
| 2b            | NPM3 {1} • NPM4 {0} | 5/7 = 0.71     | 2/7 = 0.28      | 0.71 – 0.28 = 0.43 or 43% |

*Legend:* level of the input condition in curly brackets; “•” means logical AND; in contrast to capital and lower-case letters to denote for presence and absence of a NPM instrument we code them {1} for presence and {0} for absence of the respective NPM instrument; NPM1: funding based on evaluations; NPM3: funding based on nationally competitive performance; NPM4: university regulations for departments; NPM6: public policy regulations for departments; D1, D6, D7, D8, D9, D10 and D14: departments in our sample with successful PhD education (outcome=1).

Next to the analysis of favorable NPM configurations for successful departments, csQCA also offers the possibility to scrutinize for configurations of unsuccessful departments, an information that interestingly enough cannot be directly inferred from the success stories.

## 4.2 Unsuccessful PhD education

The analysis of NPM instruments for unsuccessful departments (outcome=0) delivers one solution (table 5a) with two configurations. In three departments (D5, D11 and D12) *university regulations for departments* (NPM4 {1}) cause PhD education that is “unsuccessful” according to our definition. The data table (table 3) though demonstrates, that non-successful PhD education takes also place in departments (D2, D3, D4 and D13) that do not face *university regulations for departments* which indicates that configuration 3a is a sufficient, but not necessary condition for unsuccessful PhD education

In addition, solution 3 exhibits a second configuration consisting of two conditions. Non successful PhD education takes place in departments (D2, D3, D4, D11, D12 and D13) with *no nationally*

<sup>11</sup> We calculate the unique coverage scores with overlapping cases, but it is also possible to come to the same conclusion by subtracting the percentage of the raw coverage score of the opposite configuration from the total coverage, 100% (e. g. 100%-57%=43%). The latter procedure only works for two configurations.

<sup>12</sup> According to Ragin (2006), a coverage score of 0.326 is “substantial”, at least for fuzzy sets.

competitive performance (NPM3 {0}) in combination with *no funding based on evaluations* (NPM1 {0}). Since department D5 do not succeed either, but does not show this combination, configuration 3b is a sufficient, but not necessary configuration for non success.

**Table 5a: Configurations for unsuccessful PhD education (outcome=0)**

| Solution 3 | Configuration 3a                       |    | Configuration 3b                                       |     |                                 |
|------------|--|----|--|-----|---------------------------------|
| Condition  | University regulations for departments | OR | No funding based on nationally competitive performance | AND | No funding based on evaluations |
|            | NPM4 {1}                               | +  | NPM3 {0}   | •   | NPM1 {0}                        |
| cases      | (D5, D11, D12)                         |    | (D2, D3, D4, D11, D12, D13)                            |     |                                 |

*Legend:* level of the input condition in curly brackets; “+” means logical OR; “•” means logical AND; In contrast to capital and lower-case letters to denote for presence and absence of a NPM instrument, we code them “1” for presence and “0” for absence of the respective NPM instrument; NPM1: funding based on evaluations; NPM3: funding based on nationally competitive performance; NPM4: university regulations for departments; D2, D3, D4, D11, D12, D13 and D5: departments in our sample with unsuccessful PhD education (outcome=0).

The **coverage** scores are calculated as before. They are shown in table 5b. Just regarding configuration 3a, 43% of the outcome “0” is explained by *university regulations for departments*. Two cases (D11 and D12) overlap with configuration 3b so that we subtract this fraction from the raw coverage which leaves us with 15 % unique coverage for configuration 3a.

**Table 5b: Raw coverage, overlap and unique coverage scores for configurations 3a and 3b**

| Configuration           | raw coverage | Coverage score |                           |
|-------------------------|--------------|----------------|---------------------------|
|                         |              | Overlap        | unique coverage           |
| 3a NPM4 {1}             | 3/7 = 0.43   | 2/7 = 0.28     | 0.43 – 0.28 = 0.15 or 15% |
| 3b NPM3 {0} • NPM 1 {0} | 6/7 = 0.86   | 2/7 = 0.28     | 0.86 – 0.28 = 0.58 or 58% |

*Legend:* level of the input condition in curly brackets; “•” means logical AND; In contrast to capital and lower-case letters to denote for presence and absence of a NPM instrument, we code them “1” for presence and “0” for absence of the respective NPM instrument; NPM1: funding based on evaluations; NPM3: funding based on nationally competitive performance; NPM4: university regulations for departments; D2, D3, D4, D11, D12, D13 and D5: departments in our sample with unsuccessful PhD education (outcome=0).

## 5 Discussion

The solutions for successful and unsuccessful PhD education allow us to discuss the effects of direct and indirect controlling PhD education. We analyzed the NPM assumptions or convictions that a combination of less state regulations, more managerial self-governance and more market elements will be more effective for academic performance than the traditional combination of state regulations and academic self-governance. We distinguished indirect governance instruments to

reflect elements of market competition and direct governance instruments to represent managerial self-governance and state regulations.

Our results demonstrate that NPM instruments of **indirect governance** favor successful PhD education either individually or in the absence of additional direct steering instruments.

The first instrument of indirect governance, *funding based on evaluations*, explains successful PhD education in four out of seven departments (D6, D7, D8 and D9). The raw and unique coverage scores (table 4b) underline the potential of this instrument alone. Its absence in combination with no joint efforts to apply for *funding based on highly competitive performance* in turn can explain unsuccessful PhD education (configuration 3b) for six departments (D2, D3, D4, D11, D12 and D13), thus demonstrating its strong influence on faculty behavior.

We suspect two mechanisms explain this positive effect despite the high investment costs usually involved in evaluations. Through positive accreditations, departments signal the quality of their infrastructure as well as their relative performance level which will lead to higher revenues in tuition fees and also enlarge the pool of attractive applicants. Favorable audits, on the other hand, strengthen the position for departments to negotiate for resources within a university, the same might be true for unfavorable ones insofar as they justify the demand for more resources for improvement often in the preparation of an accreditation.

If incentives like additional funds depend on joint efforts of a department, such incentives ease collective action and perhaps the view that the local collective good PhD education is beneficial to the reputation and the quality of the research output of a department.

*Funding based on nationally competitive performance* as another example of indirect governance is also an effective steering instrument, but only sufficiently explains successful PhD education in combination with the absence of two direct NPM instruments. Only if departments face **no public policy regulations** (departments D1, D6, D10 and D14) and **no university regulations** (departments D1, D6, D7, D10 and D14) *funding based on nationally competitive performance* was effective.

Although the third instrument of indirect steering under consideration, *funding based on locally competitive performance*, is one possibility for departments to take advantage from additional resources on a lower academic threshold in order to improve research and PhD education, it is not part of the final solutions in our csQCA analysis. While only one department (D1) is successful without this extra financial support, and two successful departments (D8 and D9) use it as additional financing base, *funding based on nationally competitive performance*, even though in combination with additional instruments, is much more effective to explain success in PhD education. According to our results, departments which are already financing themselves through highly competitive peer reviewed funding benefit more than departments at the eve of highly

competitive research which questions the intended effects of this instrument to initiate more PhD education and hence research.

For the analysis of **direct governance** our results indicate that the absence of *regulations for departments* either by *public policy* or by *university* in combination with strong competitive elements for peer reviewed funding are sufficient configurations for successful departments, while the presence of *university regulations for departments* is by itself sufficient to explain failure. We suspect that the positive effects of absence of regulations points to the fact that joint actions follow local patterns and that faculty has to find its local best way to arrange PhD education where regulations might impede activities conducive for successful PhD education. As can be seen from table 2, the successful departments D1, D10 and D14 conduct mixed models of PhD education and might therefore still be on their way to a final model. The absence of regulations in accordance with *funding based on nationally competitive performance* is sufficient to explain their successful PhD education.

In sum, our results demonstrate that different governance configurations lead to the same outcome and that only a few governance instruments determine successful PhD education. They point to the importance of indirect governance instruments for successful PhD education and the partly detrimental effects of direct governance by intervening into faculty behavior.

## **6 Limitations and outlook**

The design of our study followed the theoretical assumptions of Schimank (2007, 2008) that governance in higher education can be grouped along (five) broad dimensions and the empirical findings by de Boer, Enders and Schimank (2007) that to date internationally differently mixed new public management patterns exist that potentially produce similar results. By using csQCA, the present study focuses on the level of departments as recipients of governing attempts in particular on the interplay of multiple instruments that aim for improving the education of PhD students to become future researchers. We demonstrated that different NPM instruments cause successful and unsuccessful PhD education and that it depends on a distinct combination of NPM instruments to enable (un-)successful PhD education.

We have to account for some limitations in our study though.

One of the main NPM instruments proposed is the allocation of lump sum budgets to universities to enable them to administer these funds autonomously according to their preferences. We have not taken them into account because none of our interview partners indicated any awareness. The same holds true for the governance dimension of stakeholder guidance and academic self-governance as used in the study by de Boer, Enders and Schimank (2007). No one of our interview partners

reported any influence of university boards on their daily activities or a cut in academic self-governance. The opposite was true for rankings of departments either by the press, public institutions or in scientific research (e.g. Combes and Linnemer 2003; Coupé 2003; Berghoff et al. 2002; Shanghai Jiao Tong University Ranking 2005). Almost everyone was concerned about the relative standing of their departments in league tables, leaving us with no variance of this particular condition.

As this case study covers only 14 economics departments, the number of input conditions was limited to six new public management instruments. By using csQCA and coverage scores, we are able to find and weight distinct configurations, but it was not possible to find the relative or marginal influence of each instrument on academic performances. Statistical analyses are yet to be done. That would allow to integrate control variables, such as the goal orientation of departments (Breneman 1976; Bartelse 1999; Sadowski et al. 2008), the didactic elements of PhD education (Bowen and Rudenstine 1992; Hilmer and Hilmer 2007) or differing resource levels (Schneider et al. 2009) and the interaction of these variables.

The departments in our sample are predominately located in continental Europe. This also means that the governance of higher education is still rather characterized by high degrees of political authority. It would be of utmost research interest to scrutinize the effects of governance forms which realize a much higher degrees of an ideal type of “no state” and “real markets” for the higher education sector as seems to be the case for the university system in Great Britain and the research universities in the US.

Our study focuses only on one discipline, economics, an extension to less standardized academic fields might shed more light on the influence of NPM instruments on PhD education. Finally we restricted our PhD success variable on its value to academia. Beyond any doubt, other goals are certainly legitimate.

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