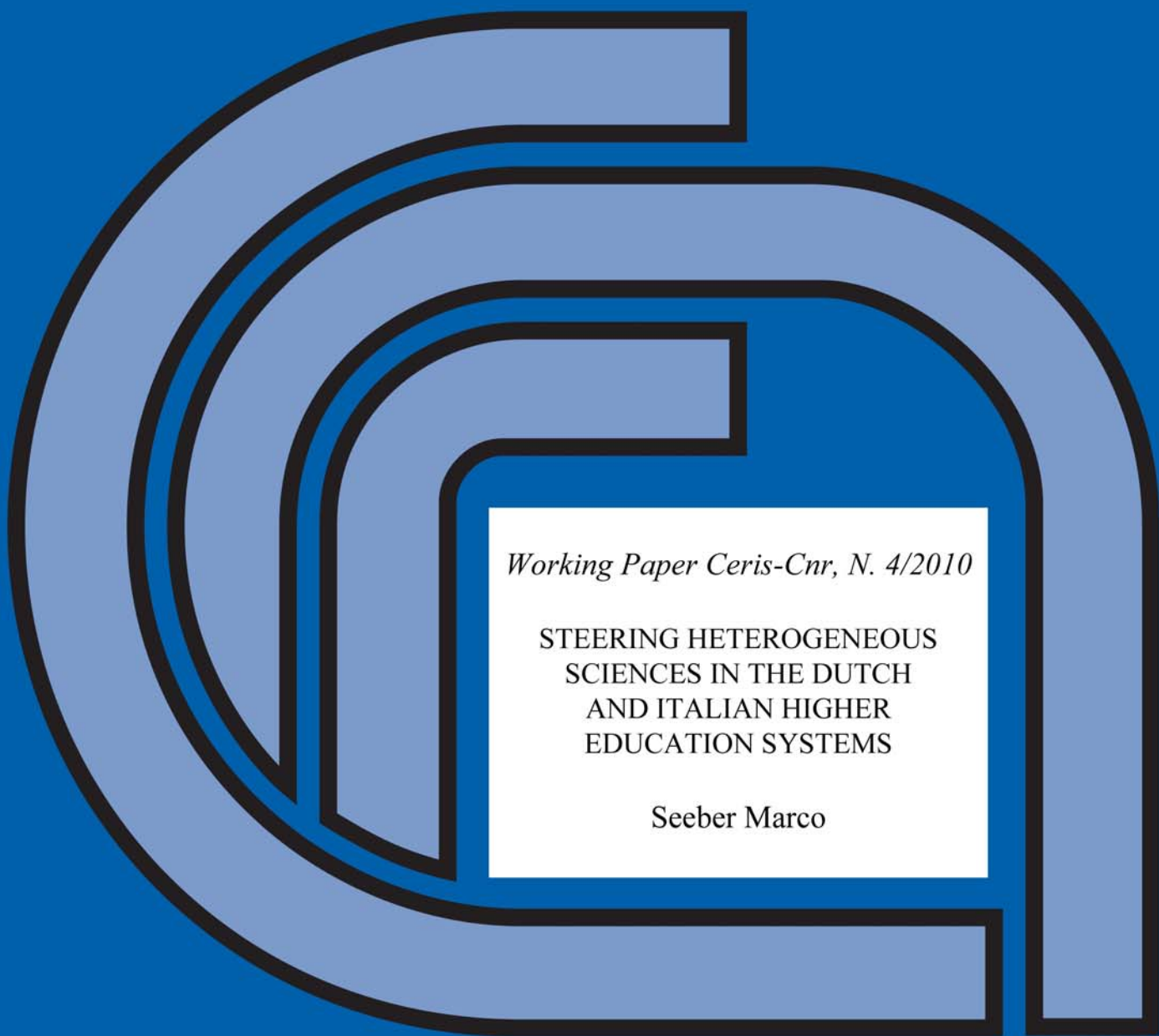


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STEERING HETEROGENEOUS
SCIENCES IN THE DUTCH
AND ITALIAN HIGHER
EDUCATION SYSTEMS

Seeber Marco

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Steering heterogeneous sciences in the Dutch and Italian higher education systems

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ABSTRACT: This paper studies how the implementation of New Public Management reforms in Higher Education affects the academic bodies' steering in different national systems and disciplines. It is assumed that the steering capability depends on the characteristics of each system and discipline. The work includes three case studies (two Italian universities and one Dutch university); two research institutes are selected for each university: one HS institute (either Biomedical Sciences or Physics) and one SoSc institute (Management). Evidence confirms that steering capability improves in some disciplines, while other scientific fields remain hardly steerable because the levers are weak, the interest of society and policy makers in research outcomes is small, and the reputational organisations are very influential.

KEYWORDS: Higher Education, Research, Funding, Evaluation, Steering, Governance, Social Sciences, Hard Sciences, New Public Management

JEL-codes: I21, I23, I28

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INTRODUCTION

Since the beginning of the 1980s, a new paradigm of public management based on managerial principles has provided an ideological ground and practical tools for steering research activity. The New Public Management (NPM) narrative aims at increasing accountability towards the political leadership and at improving steering capabilities and overall system efficiency through the introduction of people and techniques from the private sector (Ferlie *et al.*, 1996). The reforms of the European Higher Education (HE) systems were inspired by this managerial paradigm to different extents (Paradeise *et al.*, 2009). The implementation of NPM in HE results in a stronger university level and in a shift in power from professionals to the strategic apex of the organisation, which should play a leading role.

Thus, NPM reforms increase the steering capability of academic bodies, even though to different extents depending on how and how thoroughly they are implemented. Nevertheless, Science is not monolithic. Scientific fields differ as to their relevance to the policy maker and society, the cost of research activity, and the way new knowledge is produced and evaluated. The main assumption of this paper is that the academic bodies' capability to steer research depends on system and discipline characteristics and on their combination.

This paper aims at verifying the following hypothesis:

The implementation of NPM principles increases steering capabilities in some disciplines while others remain barely steerable. Such variation in steering efficacy depends on a number of peculiar and intrinsic features of each discipline.

The hypothesis will be tested by studying the steering capability of academic bodies along three key dimensions: i) the capability to promote integration and coordination of research groups on specific research themes, ii) the capability to affect the growth of research groups, and iii) the capability to

influence the choice of research themes. The analysis considers three extreme cases within European HE: one entrepreneurial university in a system strongly affected by the NPM narrative (University of Twente in the Netherlands) and two generalist universities in a system that is a 'slow mover' within the reform process (the University of Modena – Reggio Emilia and the University of Bologna in Italy). One Biomedical Sciences or Physics department and one Management department have been selected for each university. We will look at the differences between the Dutch and the Italian cases, in relation to the selected departments, by using evidence emerging from interviews and official documents as well as data on personnel and research programmes development.

The paper is organised as follows. The first section introduces the theoretical framework of the research, by describing the main features of NPM reforms to the HE system and the main differences existing among scientific fields. The second paragraph describes the reform process of the Dutch and Italian HE systems. The third paragraph presents the case studies and research policies of the analysed universities. The fourth section analyses the impact of steering actions by academic bodies on different disciplines. The conclusion reports the main findings of the paper.

1. THEORETICAL FRAMEWORK

The growing relevance of science to economy and society increased the interest of policy makers in research activities throughout the second half of the 20th century. From the early 1980s onwards, 'managerial' reform principles became more and more relevant in some European countries, which aimed at increasing accountability toward the political leadership and its steering capability as well as the overall efficiency of the public sector, by introducing methods, people and techniques from the private sector.

In some cases, Managerialism (NPM) inspired HE reforms and provided the policy

maker with a theoretical background and specific tools to steer HEIs: audit, assessment and evaluation, project funding, increased attention to financial control, more elaborated cost and information systems, management by hierarchy and by contract, establishment of quasi-markets, reduction in the self-regulating power of the professionals, and more entrepreneurial management.

Nevertheless, the Higher Education sector has some peculiar features that may limit the effectiveness of the NPM principles. There are at least six *economic* characteristics that make universities fundamentally different from for-profit business firms and such differences may represent an obstacle to the correct functioning of business-like management practices. Some of the most relevant differences are: HEIs are mostly non-profit, their customers do not really know what they are buying, managers of non-profit firms are motivated by different and typically more idealistic goals, etc. (Winston, 1997; Hansmann, 1981). Christensen and Laegreid (2001) argue that one of the main aims of NPM is to establish an autonomous and protected area for policy, because proximity of the politicians to bureaucracy (*with professionals, in HE*) reinforces bureaucracy while eroding the freedom and power of politicians. NPM creates a sharp division that preserves each group's influence area and strengthens the steering capability of the political apex. However, the outcome of teaching and HE research activities is complex, hard to standardise for assessment, and it usually cannot be clearly understood by outsiders. Hence, it is difficult for policy makers to steer without being advised by professionals and the 'sharp division' may well play against their steering capabilities.

The impact of NPM on most European HE systems is evident and there are clear signs that universities are moving from being administrated to being managed organisations, with the development of management tools and external steering by incentives and performance (Kogan and Hanney, 2000; Kogan *et al.*, 2006). Still, an analysis of the field shows elements of path dependence and some common difficulties in the

implementation of managerial principles within the HE system. The emphasis on strong management does not necessarily result in more powerful universities. In most cases, presidents become formal gatekeepers for internal and external interactions but their leadership remains weak: a large part of the university may well remain out of reach of presidential incentives and control, without being aware of university policy. Assessment measures, like indicators, often find opposition because they are not perceived as able to correctly represent academic duties, and they may destroy trust rather than build it. The will to evaluate has often resulted in bureaucratic burden and an impressive number of rules, because of the fleeting and complex nature of academic activities. Government by assessment and indicators causes ambiguities in the relationship between public authorities and uncertainties about whether it is based on trust or distrust (Paradeise *et al.*, 2009).

The Dutch and Italian higher education systems have been depicted as continental models for a long time (Clark, 1977; 1983; Westerheijden *et al.*, 2009). The continental model is characterised by a strong professional oligarchy, a weak university level, and by research activities managed by full professors at the chair level. In the last decades, these systems have undergone reform processes inspired, to different extents, by the managerial paradigm (Paradeise *et al.*, 2009).

It is worth investigating the extent to which NPM reforms have affected the steering capabilities of academic bodies within these systems, without forgetting that Science is not homogeneous. Whitley (2000) indicates the elements that determine the intellectual and social organisation of scientific disciplines: the degree of mutual dependence and the degree of task uncertainty.

As for the first factor: scientists depend on specific groups of peers to produce valuable contributions to collective intellectual goals, and to acquire reputation and material rewards. The degree of mutual dependence is determined both by the degree of functional dependence (i.e. the extent to which

researchers have to use the specific results, ideas and procedures of peers in order to construct knowledge) and by the degree of strategic dependence (i.e. the extent to which researchers have to persuade colleagues of the significance and importance of their problems and approaches in order to increase their reputation). Four kinds of disciplines may be identified based on the combination of low or high levels of such variables. For instance, in the case of Management studies, both dependences are low: researchers are able to make contributions to a variety of goals and do not need to include specific results elaborated by colleagues in a systematic way. In Biomedical Sciences, specialist groups pursue differentiated goals with specific procedures (high technical dependence), while there is little overall concern with hierarchy of goals (low strategic dependence). In Physics, both dependences are high: researchers show a high degree of specialisation coupled with a strong collective identity and there is competition over the centrality of discipline subfields. Increasing dependence generates a growing sense of collective self-consciousness and identity, protecting the discipline from outsiders' influence; research approaches that cross disciplinary boundaries will be ignored.

Task uncertainty is a typical feature of research activity but it differs across scientific fields. Task outcomes will tend to be more predictable in disciplines where existing knowledge is more systematic, precise and shared. Kuhn points out that, in disciplines where a paradigm prevails, research activity and its results are more predictable and replicable and there is less room for novelty (Kuhn, 1962). Whitley describes task uncertainty through two components: technical and strategic task uncertainty. Technical task uncertainty depends on the extent to which work techniques are well understood and produce reliable results. Fields with high task uncertainty are characterised by ambiguous results and conflicting interpretations and the use of technical procedures is highly tacit, personal and fluid. Moreover, it is often unclear when particular methods should be used. Strategic task uncertainty concerns uncertainty about

intellectual priorities, significance of research topics and preferred ways of tackling them, as well as reputational payoff of different research strategies. Scientific fields with high strategic task uncertainty deal with a large number of problems whose formulation and importance are subject to alternative evaluations, which may be fluid and rapidly changing. Four disciplinary categories can be identified by the combination of low/high technical and strategic task uncertainty.

The degrees of mutual dependence and task uncertainty of disciplines are influenced by three main contextual factors: reputational autonomy, i.e. the ability to control skill and competence standards; the concentration of control over the means of intellectual production and distribution; the plurality and diversity of the audience. Consequently, in some disciplines there may be variations among countries and historical periods.

The combination of mutual dependence and task uncertainty identifies 16 hypothetical disciplinary categories, only seven of which actually exist. For instance: a discipline with low functional and strategic dependence and high technical and strategic uncertainty is defined as a fragmented adhocracy, producing diffuse, discursive knowledge of common sense objects (Management studies); high functional and low strategic dependence combined with low technical and high strategic task uncertainty indicate a professional adhocracy, which produces empirical, specific knowledge (Biomedical Sciences); high levels of functional and strategic dependence associated with low technical and strategic task uncertainty are typical of a conceptually integrated bureaucracy, producing specific, theoretically oriented knowledge (Physics).

In order to test the hypothesis of this paper, it is possible to identify a set of interrelated factors that differentiate the disciplines and represent potential steering levers, likely to affect the steering capabilities of academic bodies.

1. Cost of research activity and available backers. In fields such as medicine, physics and chemistry, research activities

require large investments in scientific equipment and personnel. In some cases, resources are abundant and researchers manage to remain autonomous. In other cases, researchers have to rely on a few external financial backers and are more easily steerable than researchers working in a field with low cost of research, and numerous funding backers.

2. Importance of large scientific equipment. Research may be highly dependent on the use of costly scientific devices, databases and infrastructures. Controlling them will grant the controller a high steering capability.
3. Capability of academic bodies to scrutinise scientific activity. The ability to successfully steer a discipline is linked to its comprehension, *'where terms and procedures are similar to common sense ones, or borrowed from other fields, it is obviously more difficult to maintain unified control of research than in fields where vocabularies and work methods are more distinct and esoteric. The social sciences are an obvious contrast with nineteen- and twentieth- century natural sciences in this respect'* (Whitley, 2000). Successfully steering a discipline also depends on the ability to measure research productivity. The introduction of NPM principles has spurred requests for simple and easy ways to measure research productivity, which can be understood even by external observers, unveil the 'secrets' of research activity (Weingart, 2005), and drive resource allocation. This process has been affecting knowledge production for a long time. For instance, in 1963 De Solla Price referred to the decline of paper¹, while in the last decades there has been an increasing – and comprehensible – emphasis on the production of scientific articles and on the bibliometric indices that

¹ Three centuries after the emergence of modern science, the role of paper began to change due to the shift from little to big science: "we tend now to communicate person to person instead of paper to paper (...) we publish for the small group (...) only secondarily, with the inertia born of tradition, do we publish for the world at large" (De Solla Price, 1963).

can be computed from them. The use of bibliometric indicators in the Social Sciences (SoSc) is often strongly challenged. Conversely, in the Hard Sciences (HS) bibliometric indicators are largely diffused and they are generally accepted as a reliable measure of quality, thus providing external audiences with an easily available evaluation tool. From this point of view, the HS are more vulnerable than the SoSc.

4. Discipline fragmentation. Experimental results of research in the SoSc cannot be replicated with the same precision as experimental results in exact sciences, neither can SoSc disciplines be described through mathematical models with the same level of accuracy. This has sometimes been indicated as a limit of the SoSc, and techniques, methods and approaches typical of the HS have been applied to some SoSc disciplines with results that are still debated. For instance, it is uncertain whether the heavy use of mathematics in Economics actually enhances or reduces the accuracy of the analysis (Weintraub, 2002). The subjects studied by the SoSc, i.e. the human being and its society, are extremely complex and ever-changing: it is improbable that a single paradigm prevails; rather, different schools are likely to coexist. Godwin and Shepard (1979) affirm that the work of political scientists aims at forcing squares, triangles and ellipses into a circular paradigm without paying too much attention to whether the empirical world conforms to the theoretical model. Referring to the SoSc, Ostrom (1990) states that many theoretical and practical studies should have made political scientists sceptical about relying on a limited set of models to analyse the diversity of real situations. Heterogeneity, variability and fragmentation of the SoSc make them less steerable compared to HS disciplines.

Recruitment policies represent a very strong steering lever, but they do not show

relevant variation across disciplines. Whitley affirms that ‘*how jobs and local resources are allocated and controlled becomes crucial where there is little standardization of work procedures, competence and evaluation criteria*’. Since career paths are linked to a peculiar issue, research approach and school, the chances of being recruited elsewhere are limited. These features are typical of disciplines with low mutual dependence and high task uncertainty. However, Whitley also points out that these disciplines are less esoteric and this helps researchers shift their research focus more easily; hence, their career is not strictly linked to a specific context. Some contextual factors related to each discipline may also have a relevant impact on steering processes:

1. Strength of reputational organisations. Disciplines show different degrees of internal cohesion and hierarchical control; a high level of cohesion enables the elite of a discipline to influence the research policy and reward system established by the employers as well as the goals and procedures used by most researchers in that field (Whitley, 2000).
2. Society’s expectations on research outcomes will increase the interest of policy makers and academic bodies in a specific discipline: they will make bigger steering efforts in order to influence the research subjects.

This paper intends to investigate how each discipline’s characteristics influence research steering by academic bodies in different HEIs. The steering capabilities of central academic bodies will be analysed, as well as the steering capabilities of departments/ research institutes, which represent the basic units for the management of research activities.

2. THE IMPLEMENTATION OF NPM REFORMS IN THE DUTCH AND ITALIAN HE SYSTEMS

The Netherlands is a leading country in research and represents a good example of the

application of NPM principles in continental Europe. The country has shifted from a situation characterised by ex ante regulations and planning, in which the government played a central role, to a philosophy of ‘steering from a distance’, with largely autonomous educational institutions. Until the 1970s, the Dutch HE system was based on State – academic regulations, coherently with the continental model and the German and French traditions. The system was radically reformed at the end of the 1990s through a top-down intervention and the introduction of the MUB² Act (De Boer *et al.*, 2007; Westerheijden *et al.*, 2009).

The MUB Act changed the governance of universities. Power, which had been horizontal – collegial, became vertical: executive boards now rule together with appointed deans and directors (Figure 1). The main changes to the governance structure of the universities concerned: the strengthening of executive positions at the university and faculty/research institute levels; the introduction of a top-down appointment system, from the ministry to the directors; both governance and management embodied in the same positions; university and faculty councils essentially becoming representative advisory bodies; the abolition of disciplinary research groups. Within this framework, universities are free to design their internal organisation (Boezeroy and Weert, 2007).

This intervention was combined with changes to the steering, funding and evaluation mechanisms.

Every year the national government releases the HOOP, a strategic agenda setting out the guidelines of governmental intervention for the years to come. The basic allocation has been reduced and determined by a mild formula funding, while competitive funding and third-party flow from companies have become more consistent. The evaluation

² Several attempts at reforming had previously been made – i.e. the BUOZ paper (Policy Document University Research) in 1979 and the HOAK white paper (Higher Education, Autonomy and Quality) in 1985 – but the major change in governance occurred in late 1990s with the MUB Act - Modernising University Governance.

procedure is quite complex and aims at assessing scientific performance as well management quality.

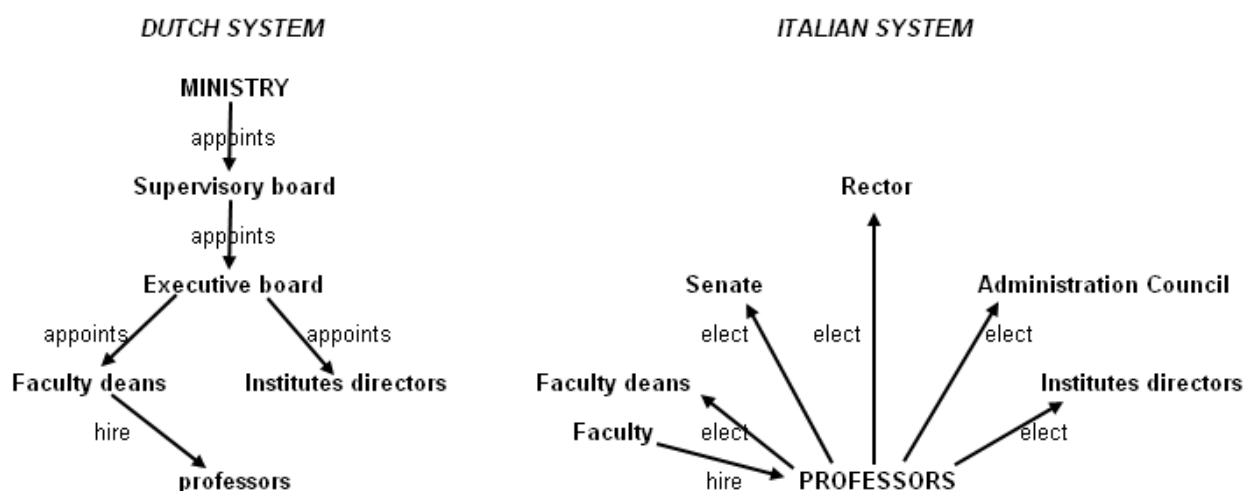
To sum up, although the system does not encourage competition among universities but rather stimulates cooperation, the academic bodies gain important responsibilities and powers and have a strong managerial position, with considerable control over financial and human resources. Moreover, evaluation is a key source of information to steer research activities.

Italy is a particular case, extreme within the European context, of a long-time unchanged organisational structure of universities, where the implementation of reforms has been constrained by policy legacy and academic prominence, despite the Government's attempts to steer the system (Reale and Potì, 2009). Despite this legacy, some significant changes have occurred in the last decades, though not all coherent with the NPM logic. The Department was introduced in the early 1980s and it was supposed to replace the Chair as the basic unit for research management. The State has guaranteed wider autonomy to the universities from the late 1990s onwards, despite imposing strong limitations on topical issues, such as

expenditure, salaries and fees (Capano, 1999). The government has used the financial and evaluation levers too cautiously and without sufficient perseverance, since the allocation of funds remains mostly linked to historical sums. The reform has been pushed forward through many legislative measures, which were, however, hardly implemented, often suspended after a short time, or incoherent with the managerial paradigm (Seeber, 2009).

University governance has not been modified in its formal setup: a strong collegial attitude remains at all levels of government and professors still elect all the most important governing bodies (Paletta, 2004). In spite of this, some changes have indeed occurred in practice, since the Rector has emerged as a key figure at the university level (Cammelli, 2004). This change appears to be an effect of greater autonomy: within an increasing competitive context, a stronger decision centre enables universities to overcome some limits of the collegial decision process. Nevertheless, governance at the faculty and department levels is still collegial and discipline-based, resulting in strong steering inefficiencies, and departments still do not play a key role in steering research.

FIGURE 1: GOVERNANCE OF THE DUTCH AND ITALIAN UNIVERSITIES: MAIN INTERNAL RELATIONSHIPS



Source: elaboration by the author

The universities and departments do not exploit the potential of the funding lever; on the contrary, new influential actors (the EU, firms, and not-for-profit institutions) and competitive funding schemes have emerged in the last decade. Evaluation practices have been promoted both at the national and local level, but their application and influence on resource allocation and decision processes is very limited. Universities do not fully internalise these practices, since they evaluate under obligation or incentives and see evaluation simply as nothing more than a bureaucratic mechanism to allocate scarce resources (Seeber, 2009).

In brief, the role of the Rector in Italian universities has become stronger but their internal governance is still collegial and researchers remain the major source of power (Figure 1). This situation limits the academic bodies' capability to steer organisation and the management of research activities is still fragmented. The fact that the reform applies the managerial paradigm only loosely prevents the rising of a strong corporate identity, which Braun and Merrien (2003) identify as the key precondition for the development of a real NPM system.

The reforms have increased the governing bodies' steering capabilities in the two national systems, but they have been much

3. CASE STUDIES

Case study is an ideal methodology when a holistic, in-depth investigation is needed (Sjoberg *et al.*, 1991). It is designed to bring out the details from the viewpoint of the participants, actors and relevant groups of actors, and to triangulate them by using multiple sources of data. Case studies are a suitable method to answer questions like 'how?' and 'why?', because these questions focus on operative bonds that must be traced through time, rather than on simple frequencies and incidences. Case studies are also suited to the analysis of contemporaneous phenomena and behaviours that cannot be manipulated by the researcher (Yin, 1989).

One common criticism to case studies is that replication is not possible. Yin refuted this criticism by distinguishing statistical and analytic generalisation. In statistical generalisation, an inference is drawn on the basis of the results provided by a sample. The strength of statistical generalisation is the strength of numbers, but this is not without inconveniences, such as the well-known induction problem stated by Hume: "If we see one million black crows, can we conclude that all crows are black?". Using statistical generalisation in case studies is a fatal error because cases are not sample units and they must not be selected for this purpose. Rather, a case should be selected as a template against which to compare a previously developed theory: surveying the literature does not provide answers, but the right questions (Yin, 1989).

The aim of research is also to produce 'meaningful case studies', i.e. unusual cases or cases of public interest, which address relevant theoretical or practical issues (Yin, 1989).

Three case studies were developed for this research and they concern two Italian universities and one Dutch university. Two departments/research institutes were selected for each university: one HS institute (either Biomedical Sciences or Physics) and one SoSc institute (Management) (Table 1). The choice of the Italian and Dutch systems aims at covering a wide spectrum of systems in relation to how deeply the NPM reform has been carried out, with Italy being a slow mover and the Netherlands a forerunner in this regard. The University of Bologna (UNIBO) is a very large university, while the University of Modena and Reggio Emilia (UNIMORE) is of medium size; they are both generalist universities and are located in a similar geographical context (North East of Italy). They were selected in order to investigate how size affects the functioning of HEIs and to avoid any possible distortion deriving from geographical location. The University of Twente is an interesting and peculiar case, because it is one of the most advanced examples of entrepreneurial university with technical and scientific orientation.

TABLE 1: CASE STUDIES

University	Bologna	Modena e Reggio Emilia	Twente
founded	1088	1175	1964
budget in million Euros (2006)	366	109	283*
students	86000	18000	8000
professors	3200**	875**	1382***
location	north east of Italy	north east of Italy	east Netherlands
typology	generalist	generalist	entrepreneurial - technical
organisation	network	double seat	single seat
interviews	46	26	17
research institutes	under analysis Physics; Business Economics	Biomedical Sciences; Business Economics	Biomedical Sciences (BMTI****); Institute for Innovation and Governance Studies (IGS): finance and accounting department and Nikos Center

* 2007 ** only permanent positions *** academic personnel ****in 2008 BMTI merged with the institute for Technical Medicine creating MIRA, Research Institute for Biomedical Technology and Technical Medicine

Source: designed by the author

The choice of disciplines was driven by the need to cover a wide spectrum of them, considering two main dimensions: social science vs. hard science orientation, and well-rooted vs. emerging status. Management is representative of an emerging discipline in the social sciences, while Biomedical Science and Physics are representative of well-rooted disciplines in the hard sciences.

The analysis was carried out by collecting data from institutional websites, consulting official documents and databases of the ministry and national agencies, analysing the results of local and national research evaluation processes, and examining 89 semi-structured interviews. The interviewees were chosen in order to draw up a detailed picture of all the sub-disciplines, research groups and roles involved. They included the directors of the departments, faculty deans, members of the academic bodies, student representatives, and members of relevant external bodies. The interviews focused on the impact of the reforms on governance, the changes in research funding and evaluation, as well as on other steering instruments.

The information collected was sampled in order to study the steering capabilities of academic bodies, both at the university and at the institute level, along three key dimensions: i) the capability to promote integration and

coordination of research groups, ii) the capability to affect the growth of research groups, and iii) the capability to influence the choice of research themes.

The three universities under investigation are briefly presented, focusing on their main features and research policy initiatives by their university bodies.

The University of Twente is of medium-small size, has recently been established, and has a technical-scientific orientation. These features have probably favoured the development of an organisational structure that is a unique case in the Dutch context. In Dutch universities the faculty manages both teaching and research activities and this organisation tends to favour disciplinary specialisation of research activities. In 1997 the Rector promoted the reorganisation of the university, with the aim of increasing autonomy in research activities and focusing on critical mass and multidisciplinary approaches, by promoting cooperation among different research fields. A few well-structured research themes of major importance were identified and provided with enough resources; moreover, the research institutes were given stronger decision power. The crucial goal was to achieve a high international standing in such fields.

The number of teaching and research

structures was reduced: from 10 to 5 faculties and from 28 to 6 institutes. This process lasted for 6-7 years and generated a matrix organisation, in which the faculties 'purchase' the activity of the academic personnel in teaching and the institutes 'purchase' the activity of the academic personnel in research. The research groups are given resources according to the activities they perform.

In 2003, multidisciplinary research was also stimulated by means of competitive funding to inter-institute 5-years strategic research programmes (research portfolio – SRO). The aim was to avoid a situation in which institutes “have walls around them and no cooperation among them” and to identify challenging opportunities involving the institutes as well as excellent research capabilities. Since 2008, the SROs have been designed by the university management team, which informally groups together the executive board, deans, institute directors, and some relevant external representatives of the industrial sector. Nevertheless, decisions are mainly up to the executive board and to the directors, who also support the programmes through the allocation of 20% of research funding, 10% each³.

The faculty deans and institute directors have a strong managerial and steering role, and their duties and responsibilities are intertwined. Each director is responsible for the overall strategy and research performance of his/her institute and selects the SROs

³ The research budget of the formula funding of UTwente consists of four parts: 1) 50% - a Research Performance share, that pays out premiums for each PhD thesis and post-graduate certificate produced, as well as for each full-time equivalent researcher in competitive research programmes sponsored by the research council (NWO), the European Union (Framework Programme and similar), the Academy of Sciences, or in PhD training projects sponsored by the industry. 2) 30% - an Education-related Research share which emphasises that education and research are intertwined. It is based on the number of ECTS credits (exams passed) accumulated by students. 3) - Decentralised Stimulation to Research, which enables the scientific directors of the six university-wide research institutes to carry out the institutes' research programmes. 4) - Central Stimulation to Research, at the discretion of the Executive Board to be spent after consulting the assembly of deans and scientific directors (Jongbloed, 2007).

together with the other directors and the Rector; he/she makes sure that group activities are coherent with the institutes' goals and pushes the groups towards strategic research areas by motivating them and supporting interaction with other groups. The director also supports project management, for instance by coordinating the groups in order to attract external funding, and has the power to influence the flow of financial resources to those groups that successfully adhere to the research goals of the institute. Moreover, the director plays a key role in the purchasing of large scientific devices. The role of the dean is to steer the teaching activity and to deal with personnel management and development within the groups. The dean also assesses the financial status of the groups (positive or negative financial balance), eventually stopping the recruitment of new staff, and plays a key role in career advancement by promoting and hiring full professors.

In the IGS institute of UTwente there are other sub-units that deal with research management: the centres and the departments. The departments carry out the pre-existing research organisation, with a major role played by chairs and individual research. On the contrary, the centres represent an innovative organisation pursuing critical mass and coordination of researchers in SoSc fields.

UNIMORE represents a common type of university within the Italian HE context, since it is a medium-sized (18,000 students) and generalist university. UNIBO is the second largest university in Italy (86,000 students), with a long and strong academic tradition, and it essentially covers all the disciplines.

The governance of UNIMORE and UNIBO does not formally differ from the governance system of other Italian universities. However, in both cases, some relevant powers have been concentrated into the hands of the Rector, even though to different extents and with different consequences on research steering. While the central steering of the university has become stronger, the department decision making remains collegial and limited in scope. The lack of an incisive reform prevents the governance rationalisation from spreading beyond the university level and produces a

disconnection between the apex of the university and the other governing levels, which may affect the choice and pursuit of research policy goals.

During his three mandates, the Rector of UNIMORE gradually became the centre of all the most important decisions. In the Senate, *'Faculties are afraid to be against the Rector, it is very difficult to form coalitions... because there is fear that open hostility will sooner or later rebound on the faculty'*. Thus, the deans experienced a sort of 'prisoner's dilemma'. The Rector was able to reinforce his position by acquiring a central role in the distribution of key resources, such as personnel and large investments, and to strengthen the ruling coalition by including or mediating with the most influential groups. Such unusual concentration of powers enabled the apex of the institution to support some specific research topics (mainly mechanical engineering, computer engineering and tissue regeneration bioscience)⁴ through investments in personnel and equipment.

In UNIBO the statute of the university was changed in order to make the decision process smoother. The elaboration of decisions is delegated to smaller bodies (commissions); then, a university committee draws up a summary of said decisions and submits a proposal to senate and administrative council. The Rector has a major influence on the composition of the university committee and commissions, which actually 'pre-cook' the decisions. The Rector sets the research policy together with the committee but limitations are still strong. The university level does not choose which disciplines or research themes to support; it rather works to improve management efficiency, for instance by allocating core research funding on the basis of scientific merit, or by promoting new multidisciplinary interdepartmental centres and the integrated research area (IRT)⁵.

Briefly, in Twente the university level

⁴ These topics were supported because of existing synergies with the local socio-economic context and because they were able to attract external funds.

⁵ The IRT is a computer-based virtual space which researchers use to communicate and exchange documents useful for the definition of proposals for the construction of European platforms.

seems to effectively pursue the integration and coordination of research groups through a rationalisation of the teaching and research structure. It can affect the growth of the research institutes by managing resource flows and influence the choice of research themes by shaping the SROs together with the institutes' directors.

At UNIMORE some peculiar elements, such as a powerful leading coalition and extra funds provided by a prosperous local foundation⁶, enable the university level to promote the growth of a few research themes, by supporting the groups involved. However, this situation is not likely to remain stable because the governance has not been rationalised: the room for bargaining has not been reduced and the central academic bodies still lack clear and strong powers.

Differently from UNIMORE, at UNIBO the university level cannot choose the research themes to support. The university leadership tries to increase efficiency and resource attraction by integrating research groups into new organisational units, but these lack any relevant power. Such initiatives produce a reaction by some actors, who see their own prerogatives reduced. Department directors complain about their declining role and they oppose proposals to reduce the number of departments as well as the centralisation of the research budget. Two points of view emerge concerning the issue of research activity management: one is oriented towards increasing integration, coordination and attraction of external funds as key factors to increase quality and productivity; the other believes that the professors should remain the centre of the system, fearing a centralisation and bureaucratisation of research activities, and it rejects managerial experiences originating outside the academic context. Neither position has managed to prevail.

⁶ The 'Fondazione Cassa di Risparmio di Modena' (FCRM) is a non-profit foundation, whose estimated revenues for 2007 are 80.7 million Euros. Its mission is to make investments that benefit the province of Modena and scientific research is one of its main investment fields, with around 6 million each year. The FCRM distributes 6 million Euros annually, about four times the amount of money distributed by the central administration of UNIMORE.

TABLE 2: CASE STUDIES AT DISCIPLINE LEVEL

	Unimore		Unibo		Utwente		BMTI
	Management	Biomedical Sciences	Management	Physics	IGS		
					NIKOS	F&A	
Foundation	1981	1993	1983	1981	2002		1992
Researchers*	41	94	82	155	35	18	66
Doctoral students	12	41	30	65	11	7	134
Budget for research (mil €)	0.58	1.71	0.34	2.92	3		11.9

Source: designed by the author from: Italy - Cnvsu 2006 and university accounting system 2006; Utwente - BMTI-2006 progress report; IGS- website 2009 * full time researchers, temporary researchers and lecturers

4. INFLUENCE OF THE DISCIPLINE ON RESEARCH STEERING

Steering initiatives by the universities' central bodies may be accepted and supported, modified and completed, or even totally refused by the institute governing bodies and by the researchers. The efficacy of steering at the work floor level is likely to vary across cases and disciplines. We expect steering capabilities to be higher at the University of Twente than in the two Italian universities because in the former case a thorough NPM reform has strongly empowered the academic bodies. However, even in a system heavily influenced by the NPM paradigm, we expect steering capabilities to be quite limited in disciplines in which steering levers are weak and contextual factors discourage the involvement of the academic bodies.

At the University of Twente the following institutes were analysed: the Biomedical research institute (BMTI) and the Governance studies institute (IGS), with a focus on the NIKOS Centre⁷ and the Finance and Accounting department (F&A). The department of Physics and the department of 'Scienze Aziendali' (Management) were studied at UNIBO, while the department of Biomedical Sciences and the department of 'Economia Aziendale' (Management) were studied at UNIMORE (Table 2).

⁷ The Nikos centre focuses on researching, teaching, offering consultancies, as well as on training and business development support in Entrepreneurship, Marketing, Strategic Management, and International Management.

4.1 Integration and coordination of research groups

The University of Twente strongly pursues the integration and coordination of research groups by merging research institutes and supporting cross-institute strategic projects. The integration process has occurred in two phases. In 1997 only the groups focusing on high-priority research themes were included into the new spearhead institutes. Then, in 2006, the executive board decided to include all the institutes' research activities, with the objective of integrating them into the stream of strategic research: "*We wished the scientific director to make sharp choices and decide what was good research, in terms of not only quality but also relevance to society, (...) and make cross disciplinary proposals*". This produced varying consequences across the institutes.

No big change occurred at the BMTI because only a small portion of its research capacity was outside the institute (less than 10%). Cooperation and integration frequently occur among research groups and this common practice has been further stimulated in order to go beyond traditional disciplinary boundaries.

On the contrary, major transformations occurred in the social science area, in which a large share of research activity was outside the institute. In 2006, the director was still coping with the coordination of the SROs when he suddenly had to include all the research groups into the institute. The creation of the research institute and the later inclusion of all research activity are not perceived as helping cooperation; moreover, the benefits

expected by researchers from integration and critical mass are not as significant as in HS: *“The impact on SoSc, on the feeling of autonomy or even freedom, was much stronger; many academics felt that they were all of a sudden forced to work with their colleagues, and they had not been doing that for 20 years. They were not judged based on their own performance but as a team and that was very difficult to explain to SoSc faculties”*. In the words of the former Rector of UTwente, the fragmentation of the discipline represents a serious obstacle to integration: *“The SoSc are more fragmented, small little units, only one chair and two researchers (...). The diversity of our activities in the SoSc (...) was much broader than the diversity of research activity in (...) the Bmti or Mesa, where researchers were already combining efforts in very large scale programmes and working together. In the SoSc they were not, or barely”*.

At UNIBO the integration and coordination of research activities is pursued by promoting the creation of interdepartmental centres. The centres enjoy some popularity among minority groups in Physics, since they represent a new organisational space granting more freedom than the departments, which are structured around traditional disciplinary sectors. On the contrary, research groups in Management are quite independent and the diffusion of interdepartmental centres is limited.

Due to the lack of a leading role at the university and department levels, the researchers' strategic responses to external pressures show a low degree of cohesion (Reale and Seeber, 2010). Nevertheless, there is a trend towards aggregation in order to obtain research funds, since external funding sources are very important for the Biomedical Sciences department at UNIMORE as well as for the Physics department at UNIBO. In these disciplines, the cost of research represents a strong steering lever, which enables a few external stakeholders to influence a large portion of the research activity. At UNIMORE, the FCRM has gained a very important position by paying close attention to the benefits of biomedical

research for society. The Foundation plays a key role in promoting cooperation among researchers and is the only institution that provides large, stable amounts of funds and clear goals. In the department of Physics at UNIBO, the INFN centre⁸ is a crucial funding source for nuclear and sub-nuclear scientists. The allocation of funds follows a national procedure managed by the most important professors of Italian universities and institutes involved in these fields. The INFN represents a very important guidance, giving direction to research activities from a national and, in some cases, international level of coordination (for instance, researchers working at CERN).

4.2 Growth of the research groups

Personnel policy is a key issue in the academia. UTwente's central academic bodies do not have a direct influence on this matter. The most important decisions are taken by the director and the dean, and different behaviours can be observed at the BMTI and IGS.

At the BMTI, the scientific director considers two basic issues when deciding whether a group deserves to grow or not: *“‘Do you fit in with the strategic objective of the institute?’ and ‘how are you going to organize your activities: where do you get people, money, infrastructures?’”*. The strategic goals are set together with the executive board and the director can influence the allocation of funding and the purchase of large scientific devices. Thus, the dean must take into consideration the opinion of the director, since funding and scientific infrastructures are key elements in the development of a group and they cannot be decoupled from the recruitment policy.

On the contrary, at the IGS the fragmentation and low cost of research work in favour of the groups' independence. There

⁸ National Institute for Nuclear Physics. INFN sections are often located within the universities, as in Bologna. A portion of the research personnel is internal to the INFN but the majority is from the University. The Director of the INFN section of Bologna is a professor from the Department.

is something of a self-development process, since the dean “*only monitors whether the amount of income is in line with the costs; if it is, they can hire* (junior researchers, post docs, doctoral students)”. The dean hires associate and full professors, but teaching is his/her priority and may be in conflict with the research goals of the director. For instance, it may happen that the institute wants “*to focus on water management, and the faculty will oppose this because they don’t have a teaching programme in water management*”. In this discipline, the ‘cost of research’ and ‘scientific devices’ levers are weak, since the dean pulls a stronger lever, i.e. recruitment.

In the Italian system, the departments’ role in the recruitment process consists in an informal pre-selection of candidates, representing a compromise that considers the needs of the different disciplinary sectors. A rotation principle usually prevails. The preferences expressed by the disciplinary sectors are grouped at the department level and later submitted to the faculty level, which is formally in charge of recruitment. This procedure displays no meaningful variations across disciplines.

The relationship with the faculty may become very important and have a relevant impact on the development of research. For instance, the Faculty of Bioscience was established in 2004 and recruited all the new professors from the Department of Biomedical Sciences, thus enabling the development of a number of research groups⁹.

4.3 Choice of research themes

At UTwente the strategic plan of the institutes and the SROs are discussed with the board. The procedure is formally the same for all the institutes but in practice its effectiveness

⁹ Some factors explain the strong bond between the Faculty of Bioscience and the Department of Biomedical Sciences: institutional aspects (the dean of the Faculty worked in the Department of Biomedical Science), critical mass (more than one third of the professors of the Faculty of Bioscience works in the Department of Biomedical Sciences), and similarities between the subjects taught at the faculty and the research topics of the department.

varies greatly between the BMTI and the IGS.

Social expectations on research outcomes in Biomedical Sciences are high and lead policy makers to make greater efforts to influence research themes. In Holland, an ever growing amount of funding to research comes from consortia and large cooperation projects. The themes are decided jointly by the political and academic apexes: “*The ministries do not come with proposals, they have contacts with research groups that can formulate proposals, and the ministry will usually make a pre selection*”. The director “*defines what is important (...) through a combination of in-house expertise and national and international trends*”.

The picture is quite different at the IGS. Policy makers and international networks of scientists have a much weaker influence. The academic bodies’ decision to integrate all the research groups into the institutes could have affected the choice of research themes, but in practice it generated dissatisfaction among groups whose research themes were not already included in the IGS programmes. Some groups are now trying to get involved and some are still working independently. The director can barely manage the level of fragmentation internal to the discipline; hence, he has agreed with the newly arrived professors that: “*within a period of 3 years they should redirect their research focus towards the priority field. If they don’t, then I will designate their research as non-priority*”. Instead, the centre emerges as the most relevant level for the effective coordination of research themes. The smaller size of the centre, compared to the institute, enables complexity to be reduced and to become more manageable. The steering tools that the Director of Nikos can use are less crucial than those available to the Director of the Institute, so he tries to harmonise the research subjects through a soft leadership, through “*talking, discussing, showing opportunities, (...) bringing people from outside, showing that there are possibilities*”.

In Italy, the academic bodies do not steer research activities. Professors set their research agenda autonomously or in coordination with peers.

In Economics, researchers have access to many public and private resources; no funding body or scheme has the ability to exert a stable influence on research.

In Biomedical Sciences and Physics the cost of research activities and the relevance of scientific devices represent important elements that affect the choice of research themes. Cuts in resources endanger minor groups that are not able to shift their research focus towards applied, interdisciplinary, and emerging fields. So, large facilities may gather researchers around a common subject and convince some of them to shift their focus. This happens not because of pressures by the academic bodies but rather thanks to

the coordination between influential professors and a rich external source.

To sum up, in Management the steering levers are weak, while Physics and Biomedical Sciences appear to be ‘steerable’. Steering in Physics is not performed by the academic bodies, both because the expectation of society concerning research outcomes are not very high and because the reputational organisations are very strong and control the allocation of important resources. As for Biomedical Sciences, society has a big interest in biomedical research and the discipline’s relatively weak strategic dependence leaves room for external influence (Table 3).

TABLE 3: COMBINATION BETWEEN STEERING LEVERS AND CONTEXTUAL FACTORS

STEERING LEVERS * weak lever *** strong lever	Management	Physics	Biomedical Science
	Cost of research activity	low *	high ***
Availability of funding sources	high *	low ***	medium **
Importance of large scientific devices	low *	high ***	high **
Capability of academic bodies to scrutinise scientific activity	medium **	medium **	medium **
Discipline fragmentation	high *	low ***	medium **
	hardly steerable	steerable	steerable
CONTEXTUAL FACTORS			
Strength of reputational organisations	low	high	medium
Society expectations on research outcomes	low	low	high
	↓	↓	↓
potential impact of NPM on academic steering	LOW	MEDIUM	HIGH

Source: elaboration by the author

5. CONCLUSIONS

This paper studies how the implementation of NPM reforms in HE affects the academic bodies' steering activity in different national systems and disciplines. It is assumed that the steering capability depends on the characteristics of each system and discipline. Our analysis then tests the hypothesis that such capability is stronger in some disciplines and weaker in others, due to their peculiar features. The work includes three case studies (two Italian universities and one Dutch university); two departments/research institutes are selected for each university: one HS institute (either Biomedical Sciences or Physics) and one SoSc institute (Management).

A set of interrelated factors is identified; said factors differentiate the disciplines and represent potential steering levers likely to affect the academic bodies's steering capability. Some contextual factors related to each discipline are identified, which may have a relevant impact on the involvement of the academic bodies in the steering process. The combination of such factors affects the potential impact of NPM reforms on academic steering.

The steering capability of the academic bodies, at the university and institute levels, is analysed along three key dimensions: i) the capability to promote integration and coordination of research groups, ii) the capability to affect the growth of research groups, and iii) the capability to influence the choice of research themes.

The NPM principles improve the academic bodies' steering capability, even when they are only partially implemented, like in the Italian system. Evidence confirms the hypothesis of the paper: steering capabilities improve in some disciplines, while other scientific fields remain hardly steerable because the steering levers are weak, the interest of society and policy makers in research outcomes is small, and the reputational organisations are very influential.

The Dutch case also illustrates that the distribution of managerial and steering powers

across the different governing levels should be coherent with each discipline's specific features. In Management, the centre emerges as a research aggregation and coordination unit that proves more effective than the institute; however, the director of the centre cannot use steering tools as powerful as those available to the institute's director and he can only rely on 'soft' management. This example suggests an organisational principle: managerial powers should be assigned to the government level, which can best exploit their potential, and, where fragmentation and complexity are higher, then that level must be closer to the work floor level.

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