

University Funding Reforms in the Nordic Countries

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Abstract: This article focuses on university governance and policies in the Nordic countries and discusses recent funding reforms and their effects on universities. Common trends are identified, namely a move from centralized, highly regulated to decentralized, less regulated approaches, changes towards formula and output based funding, increased linking of basic funding to performance indicators and a growing amount of competitive funding. The reforms, which intend to bring results as regards quality, productivity, efficiency and accountability, might however generate unintended negative effects such as institutions excessive focus on outputs, quantity instead of quality, politically prioritised areas and mainstream, low-risk research.

Introduction

The Nordic countriesⁱ, although not homogeneous, are characterized as welfare states with similarities as to history, social values, cultural, political and socio-economic conditions. Consequently common features exist in the case of higher educationⁱⁱ.

Higher education has traditionally been government controlled and recognised as a key national asset, funded mainly by the state or other public authorities. It is perceived as a means for the state to address socio-economic challenges and globalisation, and a way to deal with increased international competitiveness to secure a leading place in the knowledge-based society.

Compared to other European countries, spending is high on higher education and research in all Nordic countries. Public expenditure on higher education is among the highest in the world (Denmark and Sweden spent respectively 2, 7 and 2, 3 percent of GDP in higher education while Finland and Norway spent 2, 3 and 2, 1 percent in 2006). The share of R&D spending is the highest in Europe (Sweden and Finland spend 3, 8 respectively 3, 5, Denmark and Norway 2, 6 respectively 1, 8 percent of GDP). With a few exceptions, higher education is in principle tuition free and the participation rates are high.

Nordic higher education funding systems are in transition, just as systems are in other parts of the world. Universities are increasingly governed by results and funding allocated on a competitive

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basis. The changes show similarities but also differences due to national strategies and priorities. The key questions addressed in this chapter are: What are the main features of university funding systems in the Nordic countries? Is it possible to identify common trends in Nordic higher education reforms? Which are the mechanisms used for allocation of public funds to universities? Which are the effects of funding reforms on the universities, intended and unintended?

The article is structured in three sections. In section one, main features of the funding systems in the Nordic countries are discussed. In section two, common trends in recent reforms are identified. Section three is a concluding section with a discussion of the intended and unintended effects of recent funding reforms, also at institutional level.

Funding as a policy and governance instrument

As the main funding source for higher education in the Nordic countries is the state, the relationship between the state and the universities is characterized by control, mainly through the funding system. This implies that a great part of the reforms addresses the principles and mechanisms of allocation of public funds (cf. Strehl et al. 2007). Hence, university funding is the principal governance and policy instrument. The policy aims of funding reforms are to improve quality, increase productivity and enhance efficiency and accountability.

As the traditional concept of steering through control has proved ineffective and was gradually abolished by the state, it has been replaced by the governance concept with increased university autonomy. Governance involves both the institutional and the system level structures and procedures of higher education institutions. Institutional governance refers to decision making, lines of authority, financing, staffing etc, i.e. processes within the institutions. System governance refers to macro-level arrangements such as funding, university acts, laws, evaluations etc. The coordination of the two level arrangements constitutes the governance of higher education (De Boer et al. 2009).

The governance concept incorporates several elements of the New Public Management (NPM) model (Pollitt and Bouckaert 2004) namely decentralization of decision making, steering by outcomes and contracts, introduction of market type mechanisms and private sector management instruments such as human resource management and strategic management (Hood 1991). NPM in higher education is based on the principle of "value for money" and "management by objectives", in particular through the use of contracts and linking performance to funding (Jongbloed 2008). In accordance with the governance concept new steering mechanisms have been employed providing universities higher autonomy, strengthening the management of institutions and increasing the amount of competitive funding. According to File and Luijten-Lub (2006), NPM steering instruments in higher education comprise centralisation of the organisational structure, contracts with the management, regulation of outcomes and funding that provides market like incentives.

According to Jongbloed (2004), funding is one of the key instruments used by governments (ministries, public funding agents and research councils) and university leadership (boards, deans, department heads) as part of the governance instruments employed. Funding is hence more than a mechanism to allocate resources to institutions. It is a set of instruments to achieve the goals of higher education and - in an increasingly number of countries - national objectives. Funding allocations are seen as the most effective science policy instruments available (Nieminen 2005). "It is often the foundation of other governance instruments that enforce common goals set for higher education (e.g. access, efficiency), set incentives for certain behavior (e.g. competitive research grants), and attempt to maximize the desired output with limited resources. Governance issues and funding systems are therefore often two sides of the same coin" (Enders 2009, 3).

Whitley and Gläser (2007) state that funding mechanisms are among the most powerful instruments used in higher education policy, affecting not only the allocation of funds but probably also the nature and direction of both research and education, as well as the university management and the working conditions of researchers.

In accordance with the NPM model, university reforms have been strongly oriented towards efficiency (Ferlie et al. 2008), even though it has never been obvious what efficiency implies for an organisation like the university. According to Amaral (2008), the overall argument of efficiency is related to the notions of responsibility and accountability. Universities are accountable not only to the funding body (mainly a ministry) but also to other stakeholders in society, including the private sector (cf. Christensen 2010). This has to be seen also in relation to the changing notion of the social function of higher education in the knowledge economy as driver of economic growth and an increased attention to the needs of the labour market (cf. Godin 2003).

While it is obvious that NPM is in decline, losing its appeal in a number of European countries, the Nordic countries - emphasising the significance of higher education for the knowledge economy - keep up the pace of reforming higher education based on its principles.

In the following section the latest reforms of the university funding systems in the Nordic countries are described.

1. University funding systems in the Nordic countries

Denmark

The Danish higher education system comprises the university (the largest higher education sector) and the university college sector, which is professional oriented. There are eight universities of different size conducting research and offering research based undergraduate and graduate education.

University governance and funding reforms in Denmark go hand in hand. In recent years

Denmark implemented far-reaching reforms in terms of governance and autonomy. A first major step was the implementation of the 2003 University Act. A significant merging process between universities and government research institutes was carried out in 2007 reducing the number of universities from 12 to 8. Recently, allocation of university research funding has also been changed by increased linking of funding to performance. The later reforms were part of an overall government strategy for Denmark in the global economy that was formulated in the Danish Globalisation Strategyⁱⁱⁱ, launched in 2006 and which aimed, among others, at improving quality and stimulating internationalisation and competitiveness of higher education. It also aimed at making more efficient use of public spending on education and research by allocating more funds in competition and linking performance to funding and to university development contracts.

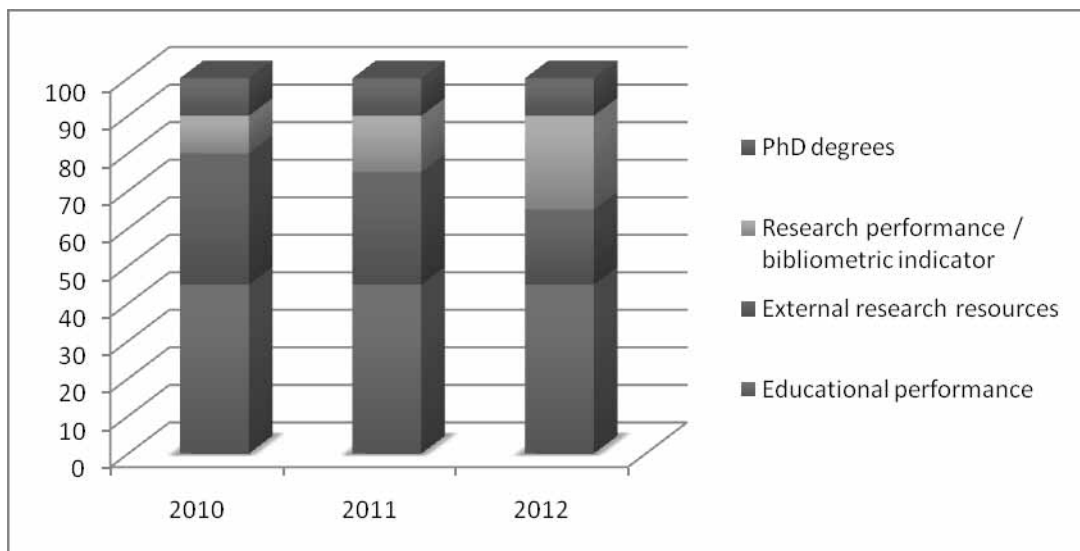
University development contracts were introduced as early as 1999 as a planning tool for the universities and a management tool for the Ministry of Science, Technology and Innovation. Yet, there was no automatic relationship between research achievements and funding. The aim of recent policies however, has been to use contracts as an efficient management and control mechanism by linking funding to research outcome. Contracts since 2010 have as such a direct impact on the funding and probably on the activities of the universities. New university development contracts take account of indicators for education and research (including number and level of publications, number of international publications, PhD activity and amount of external funds), dissemination of knowledge and public service provided (Kalpazidou Schmidt 2010).

In Denmark, funding of teaching and research is separated. Funds are allocated on the basis of contracts, negotiations, formulas and performance indicators. Education is funded through the 'taximeter system' i.e. funding based on passed exams (output-based system). Research is funded through basic and external funds. Basic research grants are allocated to institutions as a lump sum and the level of the basic grant is to some extent calculated on an incremental basis. Part of the grants has been made activity-dependent and additional grants have been distributed based on performance parameters. As a follow-up to the Globalization Strategy it was decided to take a number of indicators into account in the allocation of research funds to the universities, linking funding to performance. Expectations are that encouraging a more competitive environment will lead to improved quality and productivity.

Basic research funding was, in accordance with earlier reforms, distributed based on the 50-40-10-model, where universities were rewarded for earned educational funds, external funded research activities and number of PhD degrees. The share of basic funding of the overall research funding has decreased from 64% in 2003 to 56% in 2009. A political agreement among the parties in the Parliament in 2009 (targeting the distribution model) incorporated bibliometric research indicators as an additional performance parameter. These indicators were integrated in the allocation mechanism based on Norwegian experiences. Studies of the Norwegian funding system

reveal that the number of publications has increased, both as regards research published in low impact journals and in high impact journals (Sivertsen 2010).

Figure 1. The weight of different indicators (%) in the new Danish university research funding model 2010-2012.



The model will be implemented in 2010-2012 and will be evaluated in 2013 with the bibliometric indicator gradually weighting more, as illustrated in figure 1. In 2012, 45% of the funds will be distributed according to earned education appropriations, 20% will be distributed according to research activity financed by external funds, 25% will be distributed based on bibliometric indicators, while 10% will be based on the number of PhD graduates.

It is however of significance to point out that since the 1980s Denmark demonstrated high levels of research productivity and impact even though the university environment has not been the most competitive; performance based parameters were only to a limited degree taken into account in the research funding system (with the exception of recent years).

Finland

Education and research are perceived as the main resources of the Finnish society and has been the driving force for regional development (since 1960s) and for the national innovation system (since the early 1990s). Finland responded to the economic crisis that followed the collapse of the Soviet Union in the 1990s by investing heavily in research and development (the share of R&D is 3,5 percent of GDP, the second highest in Europe after Sweden). The Finnish government has the ambition to develop the best innovation system in the world and higher education is seen as the

most important driving force in public innovation systems (Ministry of Education 2007).

The Finnish higher education system comprises a binary^{iv} system of two sectors with different missions, namely the universities (16 in total, including Universities of Arts) with an academic and theoretical orientation and the polytechnics (26 in total) with a more practice oriented education. The polytechnics were established in 1991 on a trial basis; the practice became permanent in 1996.

The funding model was changed in the beginning of the 1990s from line item to a lump sum system, introducing the principle of management by results through performance contracts. Finland was the first Nordic country to implement management by results in the mid 1990s, whereby legally binding and directly linked to funding contracts were used. The underlying principle for the adoption of the management by results budgeting was that the objectives set for institutional activities and the required funding were determined in negotiations between the ministry and the individual institution. This arrangement has proved effective with high publication rates.

Funding for research and teaching is not separated in Finland. The key components of the system comprise core funding, including the extent factor (19 percent, counting the basic component, new students, facilities), education appropriation (44 percent), research appropriation (30 percent, including graduate schools, number of PhD degrees and number of completed PhD degrees) and societal services appropriation (7 percent), project funding and performance based funding (based on number of Centres of excellence, funded from the Academy of Finland, amount of external resources) (Auranen and Nieminen 2010).

It has been possible for universities since 2006 to establish university companies in order to intensify interaction with society and generate private funding. With a reform in 2010, the autonomy of the universities was further strengthened and institutions became independent legal entities, functioning as public corporations or as foundations under private law. The reform aim was strengthening the role of the institutions in the innovation system and supporting their development in a competitive international environment by diversifying funding, intensifying competition for research funds, allocating resources to strategic areas and ensuring the quality and effectiveness of research and teaching (Aarrevaara et al. 2009).

The universities decision making system was reformed at the same time. The composition of university boards has been changed in line with the strategic management responsibility; at least 40 percent of the members of the boards will be external to the university community with an external chairman. Universities are free to decide on capital income and manage their assets. Faculty is no longer government employees and universities are free to implement staffing policies.

Likewise mergers and alliances have been initiated between universities and polytechnics with a view to increase efficiency and consolidate the Finnish higher education system. The aim is to reduce the current number of 20 universities to 15 and 26 polytechnics to 18 and to establish four

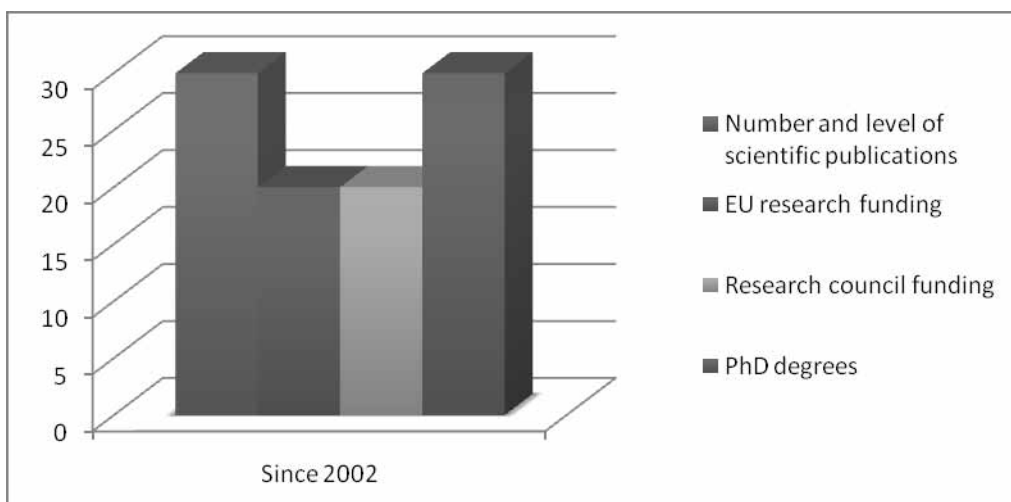
alliances between universities and polytechnics by 2020. In 2010 as a result of mergers of institutions the Aalto University, the University of Eastern Finland and the University of Turku were established (Virtanen 2011).

Norway

The Norwegian higher education system consists of six universities, six specialised university colleges, 31 university colleges and two art colleges.

Recent years, Norwegian higher education policy has focused on internationalisation, globalization and the contribution of higher education and research to innovation and competitiveness. In 2002 Norway implemented a performance and formula based funding system for both education and research as part of a comprehensive reform of higher education, the Quality Reform. It aimed to improve education, boost research production by allocating funds on the basis of publications and augment relevance, measured in terms of external funds. According to the Quality Reform, 60 percent of the funding is allocated as basic grant, 25 percent allocated based on education outcome and 15 percent based on research performance (Frølich et al. 2010). The performance based research funding comprises the following components: completed PhD degrees (30 percent), amount of EU research funds (20 percent), amount of research council research funds (20 percent) and number and level^v of scientific publications (30 percent) (see figure 2). App. 17 percent of the research funds are allocated through the Research Councils.

Figure 2. The weight of different indicators (%) in the performance based research funding



The Quality Reform involved changes to governance structures at the institutional level, granting higher education institutions greater management, organizational and financial autonomy

and provided some types of colleges the possibility to become universities. A new degree structure in accordance with the Bologna^{vi} process and new forms of student guidance and evaluation were introduced. Other innovations were increases in the number of external members of university boards and the strengthening of academic management (basic units and departments) by appointing the heads of the institutes instead of electing them.

An evaluation of the Quality Reform conducted in 2006 showed an increase in competition between institutions, increase in operational efficiency (as a result of professional and strategic management of institutions) and research performance both in terms of quality and quantity as well as considerable growth in number of applicants and improvement of student performance. However, the system resulted in a series of unintended effects as well, such as less time devoted to research activities as a result of concentration of resources on education and the students (Michelsen and Aamodt 2006). Despite these unintended effects, the research performance both in terms of quality and productivity improved (Sivertsen 2010).

Sweden

The Swedish higher education system comprises 14 public universities and 20 university colleges. There are also 10 private higher education institutions. Sweden was one of the first countries to introduce a unified national higher education system already in the 1970s by integrating all post-secondary education to a single system.

Reforms started already in the 1990s. Key components of the reforms were decentralization, management by objectives, quality assurance, increased demands for accountability and performance-based funding. The system was essentially transformed starting with the 1993 reform and the introduction of a performance based system where 60 percent of undergraduate funding was based on enrolment while 40 percent was a reward for completion of an individual course (not degree). Funds were distributed through an institution based allocation system that gave a maximum amount of funds to each institution. The transformation of the higher education system was influenced by the NPM concept and aimed to make public spending more cost efficient (Sörlin 2007).

Recently, a new higher education structure came into effect in accordance with the Bologna process aiming to introduce three level study programmes and a new credit system, and increase student mobility. A new quality assurance system, placing greater responsibility for quality assurance on the institutions was also established in 2007 (Kalpazidou Schmidt 2009).

Budget allocation is in form of a lump sum, which implies that the universities decide on distribution of funds among faculties and other units. The criteria are calculated in terms of full time equivalents for students and study achievements (estimated in terms of annual performance equivalents for the students, which varies between 35-55 percent of total). 60 percent of the

government's investments in R&D are allocated to universities, of which 43 percent are directly distributed. The remainder is managed by the research councils.

A new quality-based funding system with increased autonomy will be introduced building on the academic community's own criteria of what is good education (based on completion of studies within normal study period) and research (based on number of articles and field-normalized citations). Allocation of one block grant consisting of resources for both education and research will be implemented. Through the new system, funds are to be tied to quality. Research quality will be measured by publications, competence of staff (including share of female professors) and share of external funding. A model that contains specific indicators and evaluations (carried out every four years) will be introduced. The funding model will be managed and quality assured by an academic intermediary body, the Higher Education Funding Council for Sweden (HEFCSwe).

2. A comparison of the Nordic university funding systems

Common trends

From the above it is evident that funding arrangements vary among the Nordic countries. Accordingly, there are differences in universities funding systems and the mechanisms utilised to allocate funds. One categorisation is based on the principle of actual results and/or projected results in the budget. Another categorisation makes a distinction between four different approaches, namely (i) funding through negotiations between the ministry and the individual university; (ii) incremental funding i.e. allocation based on historical criteria; (iii) funding based on a formula i.e. an algorithm based on standard criteria that include input components and/or performance indicators; and (iv) contract funding.

Leszczensky et al. (2004) make use of another categorisation involving three types of public funding steering instruments for higher education, namely (i) formula based instruments (divided in a fixed amount that increases incrementally, formula based on inputs and formula based on output indicators); (ii) project based funding (divided in projects awarded competitively and in non-competitive projects) and (iii) contract based funding (divided into contracts formulated as framework agreements and contracts in which activities and performance are specified in detail).

The most common funding approach is a combination of several of the mentioned mechanisms. Funding systems in the Nordic countries countries utilise a combination of different instruments for allocation of resources. Public funding (in terms of core funding) as the dominant source of university income is allocated mainly through contracts, formula, negotiations and incremental allocations. Table 1 illustrates the development in funding mechanisms determining the amount of public funding distributed to public universities.

Table 1. Funding mechanisms determining the amount of public funding for public universities in the Nordic countries

Country	Negotiation		Incremental all.		Formula		Contracts	
	1995	current	1995	current	1995	current	1995	current
Denmark	X	X	XX	X	XX	XXX	0	XXX
Finland (univ)	X XX		XXX	X	X XXX		X	XXX
Norway	X XX		XXX	XX	X	XX	X	X
Sweden	XX	XX	XXX	XXX	0	X	XX	XX

Developed from European Commission 2009.

Nordic countries make use of formula based budget – Sweden to a lesser degree – which is perceived as a more transparent and consistent mechanism. In addition, all countries employ instruments for specific research project allocation of funds based on competitive procedures. A dual model of formula based and competitive funding is the most usual approach, which implies that next to core funding there is a parallel competitive funding stream, usually awarded by the research councils or other public bodies such as regional authorities.

There is a general trend towards decreasing core funding (incremental allocation) with an increase in employing competitive grants and at the same time linking of research performance to funding (cf. Kalpazidou Schmidt 2009, Salerno et al. 2005). Targeted funds are used as well both for education and research to encourage universities to take into account national strategies and priorities (cf. European Commission 2008).

Finland, Denmark and Sweden demonstrate a long tradition of performance contracts use. However, as pointed out earlier, such contracts in Denmark had not - until very recently - been linked directly to funding and had no legally binding character, as was the case in Finland.

The following most important *common trends* emerge from the mapping of the characteristics of the funding systems of Nordic universities: (i) a trend towards greater transparency, and simplification and straightforwardness of the mechanisms through use of formula based funding, (ii) increasing linking of basic funding to performance indicators and contracts, (iii) a change from input to output based funding, (iv) an increase of funding based on competitive procedures (v) encouraging of diversification of funding sources and finally (vi) a move from centralized, regulated approaches to decentralized, less regulated, market approaches.

Considering the *indicators* used in the allocation of funds, the comparison reveals some variations among the Nordic countries. While the tendency is clearly towards an increased use of performance parameters, there is no uniformity in the selection of indicators (with the exception of Denmark and Norway as the first country implements a similar system as the later with some modifications), which may vary from number of master and PhD degrees, to success in external grants, number and level of publications and research evaluation outcomes (cf. Jonbloed 2008). The weighting of the different measures varies as well, depending on national priorities and needs. An illustrative example is the high weighting of the number of completed PhD degrees as a research performance parameter in Norway, which is an instrument in achieving the strategic target to increase the number of doctors in the country.

Funding reforms go hand in hand with other reforms

The above discussed trends are the outcome of a range of changes in the systems and mechanisms for university funding. Reforms of funding mechanisms for research are only one element in the overall higher education policy and reforms in the studied countries. The reforms of funding systems go hand in hand with other changes: increased institutional autonomy, structural reforms, modernisation of university management and governance structures, introduction of quality assurance and accreditation mechanisms, mergers to strengthen the strategic profile of universities and intensification of internationalisation policies. Studies reveal though that when governments change the principle of core funding allocation to universities, this usually takes place gradually, i.e. not by reforming the whole system but by progressively changing some key elements of the existing system (cf. Auranen and Nieminen 2010).

The Nordic university reforms have to be seen in the context of international developments (widening access and expanding higher education without additional funding, governance and funding reforms) and European higher education trends. In addition, there is a close cooperation between the Nordic countries based on the Helsinki Agreement signed in 1962, which among others involves educational and research issues.

The key drivers of developments in Europe, the Bologna Process and the Lisbon Strategy, have reshaped the higher education landscape. The Bologna Process is an intergovernmental initiative aiming at higher education convergence in the European Higher Education Area while the Lisbon Strategy aims at transforming the European Union (EU) to the most dynamic and competitive knowledge-based economy in the world through the establishment of a European Research Area. The EU is a player in the European policy on reforming the universities mainly through EU programmes promoting mobility and proposals on the modernization agenda for universities (European Commission 2008). As a consequence of these drivers, comprehensive reforms are carried out in many European countries.

It is nevertheless evident that despite international and European trends and policy influences, funding reforms are not carried out in a uniform way (cf. Geuna and Martin 2003, Jongbloed and Vossensteyn 2001). The pace, intensity and range of reforms vary. Several features are of importance in this connection; among others socio-economic and cultural factors; adaptation and implementation of new ideas over time; lack of political will to introduce quick system changes; a wait and see policy in order to learn from the experiences and mistakes of frontrunner countries; waiting for stakeholders reactions; and path dependencies that hamper policy actions (Auranen and Nieminen 2010).

From one perspective it looks like the Nordic university systems, influenced by European developments, are converging. Despite the fact that there are similar trends, namely increased autonomy, stronger governance and management by results, the timing, the pace of the changes and the intensity of the implementations differ among the Nordic countries (see table 2). Finland, hit by an economic crisis in the beginning of 1990s, implemented management by results at higher education institutions from the mid 1990s. Norway carried out a comprehensive reform in 2002, while Sweden introduced contracts in the mid 1990s. Denmark only recently established a link between performance and allocation of research funds while having practiced for many years performance based funding for education through the “taximeter” system.

Table 2. An overview of the Nordic Higher Education reforms

	-1995	1995-1999	2000-2004	2004-2011
DK		1999: University Development contracts	2003: University Act Public, self-governing institutions Boards with external majority (chairman external) appointed by the Minister	2006: Globalisation Strategy 2007: Mergers of HEIs (including government research institutes New independent quality assurance agency 2010: Performance based funding of research
FI	1994: Budgeting based on operational expenditures and performance agreements 1991: Introduction of Polytechnics	1997: University Act HEIs responsible for quality assessment National coordination of quality assurance by Finnish Education Evaluation Council	2003: Polytechnics Act	2006: New salary system based on work load and performance Universities establish companies Introduction of National and Regional Innovation systems 2010: New Act Mergers and alliances

				Over the last decade a shift from line item budgeting to lump sum funding and from incremental to formula based funding
NO			2002/2004: Implementation of Quality Reform with more output based funding New quality assurance agency 2003: Colleges may apply for university status Introduction of Bologna principles with new degree structures and performance based student support system	
SE	1993: Higher Education Act Decentralisation, management by objectives, quality assurance, accountability and performance based funding	1997: More detailed result specification funding. All HEIs granted funding for research 1999: New rules for HR based on merits and research production	1999/2000: HEIs may apply for changed status – colleges becoming universities 2000/2001: Establishment of four research funding bodies. Increased focus on strategic management	2006: Globalisation Council Implementation of Bologna principles 2009: New public funding system – gradually more research performance based funding 2007/2012: Development of new quality assurance systems 2011: Changing legal status, universities as autonomous organisations with special public law status – staff no longer governmental employees, more entrepreneurialism, more institutional strategic profiling, multi annual contracts

Developed from European Commission 2009

In conclusion, the organisation and governance of universities has been transformed in all Nordic countries. The main objectives of the reforms have been to decrease the direct state control

and improve the quality, attractiveness and competitiveness of higher education. The reforms are thus largely following the same pattern: increasing autonomy, changes in governance, strengthening of management, growing involvement of external stakeholders, diversifying funding resources, increasing competitive funding, establishing new accountability and evaluation procedures (Kalpazidou Schmidt 2010).

3. Effects of funding reforms

Mapping of the Nordic funding systems revealed – as can be seen in the prior section – important trends, namely a move towards formula based funding; an increase in linking of basic funding to performance indicators and contracts; a change from input to output based funding; and an increase of funding based on competitive procedures. Advantages and disadvantages as well as potential effects, intended and unintended, are discussed hereby.

Increasing funding based on formula

Formula based allocation implies mathematical formula calculating funds, more or less automatically. The formula may be based on inputs or outputs (Lepori et al. 2007). Formula funding stands for increased freedom for institutions to decide their internal re-allocation of funds between teaching, research and other expenditure, a development that is based on the growing university autonomy and the lump sum granting of funds. This type of funding is perceived as providing greater transparency, simplification, straightforwardness of the mechanisms and a uniform approach. The key advantage of formula funding is, due to use of objective criteria, to provide transparency to the distribution of funds among universities and thus facilitate comparisons, reducing lobbying by institutions.

Formula funding is also perceived as an asset for universities and their efforts to achieve long term planning as well as for their ability to adapt to changing environmental conditions. The effects of formula based funding depend on whether input or output indicators dominate, and likewise whether the formula is based on an open-end or a closed budget (cf. Gines-Mora et al. 2007, Kalpazidou Schmidt et al. 2007, Strehl et al. 2007).

On the other hand as universities are assessed based on quantitative grounds while qualitative criteria are difficult to establish in formulas, formula funding might lead to mediocrity, reinforcing of the established order and mainstreaming of research. According to Leifner (2003) researchers will tend to stay away from high-risk projects, concentrating on activities where success can be expected in order to meet funding formula criteria.

The task of developing quality measures for incorporation into formulas and calculations is a key issue that is exceptionally complex (Salmi and Hauptman 2006). The combination of formula for parts of allocations and other allocation approaches might provide the “best of two worlds”

(Jongbloed 2001).

Linking basic funding to objectives through performance indicators and contracts

Performance based allocation schemes reward institutions for actual, rather than promised or expected performance. The use of performance indicators should reflect public policy objectives rather than institutions needs and at the same time encompass incentives for institutional improvement (Salmi and Hauptman 2006). In a performance based funding scheme, attention is given to university production in terms of students and research.

Linking funding to objectives through performance indicators is designed to increase quality, productivity and efficiency, and sharpen the international profile of universities. However, the challenge is to formulate accurate key objectives for this instrument to become effective. Studies reveal that even a relatively small share of funding linked to modest amounts of objectives improves efficiency, while linking funding to a complex set of objectives results in difficulties defining appropriate indicators. This could ultimately lead to efficiency problems.

According to Salmi and Hauptman (2006), performance based funding does enhance efficiency but its ability to improve quality is less convincing as the task of developing measures of quality to be incorporated into formula and calculations is very difficult. Performance based funding requires assessments of quality that are valid, reliable and generally accepted by the higher education system.

The identification of appropriate indicators has been the point of attention in the literature. The contractual and competitive oriented approach to allocation of funds for university research is based on the assumption that it is possible to evaluate the quality of the research output accurately and identify promising research avenues (Geuna 2001). The success of implementations of funding reforms linking funding to performance is closely related to establishing reliable and uncontested indicators that accurately measure education and research performance (cf. Enders 2009, Jongbloed and Vossenssteyn 2001). In funding systems where indicators are used as parameters in resource allocations, validity and reliability should be high and side-effects should be avoided, which is a highly complex task (cf. Sizer et al. 1992). A significant limitation that impacts the implementation of performance indicators is the availability of data (Layzell 1999).

Other risks, associated with increasing demands on performance, are decreasing standards and manipulation of outcomes in order to achieve expected performance; use of indicators may promote a "more is better" attitude, where research quality issues could be neglected (cf. Gines-Mora et al. 2007). Taylor and Taylor (2003) emphasise that performance indicators may encourage standardization and discourage diversity and innovation in terms of operations and outcomes. Moreover, expectations on institutional and individual performance can be unrealistically high, compelling universities and individuals to manipulate behavior.

Moving from input based towards output based funding

There is a general consent that input funding based on reimbursement, with no possibility for the institutions to reallocate funds, provides limited incentives to increasing efficiency (Kaiser et al. 1992). On the other hand, output based funding (funding based on the number of graduates and/or research performance) implies changes in the universities focus, i.e. it signals the importance of shifting focus from input to output. Paying attention to outputs and improving efficiency may generate additional resources and provide tangible feedback to productive institutions and researchers (cf. Jongbloed 2008).

However, output based funding involves the risk that universities focus more on quantity instead of quality, lowering the standards and/or manipulating the indicators when output systems are linked to rewards or penalties and/or prioritising by concentrating resources to profitable research areas. There is thus a high risk to marginalise small and/or interdisciplinary areas that have difficulties to publish in established journals and generate the expected output.

Another issue is the often criticised comparison of outputs from different types of universities, different disciplines, faculties and research areas. "One size fits all" cannot be applied to all types of institutions effectively without diminishing diverse missions (Layzell 1999). Field-normalised output must be taken into account in order to address this assessment problem.

Among the most criticised elements of output based funding are: incomplete measures, which obscure more than reveal; over-complex systems that are expensive and unusable; high transaction costs attached to running systems; the linkage between outputs and outcomes issue; the quantity versus quality issue. Other unintended effects consist of political processes undermining output based systems by changing the indicators and not allowing for sufficient historical data, and a more general critique of rational planning versus politics as a muddling through process (Talbot 2005).

Increasing the share of funds allocated through competition

Higher competition for funds provides incentives to additional resources and may stimulate more dynamic research agendas by promoting quality and societal relevance of research. Competition among researchers and institutions may enhance creativity, originality and innovation, raising the added value of research outcomes.

On the other hand, growing competitive funding involves risks if competition is ill-targeted. Firstly, it might limit the possibilities for long-term planning for the universities due to decreasing amount of core funding. Secondly, competition may force the universities to focus on areas, where funding is available rather than on areas where they have high competence and competitive advantages. Thirdly, it might lead to cut of resources within areas where competitive funding is difficult to obtain (mainly within humanities and basic research) and threaten the existence of fields of science that lack competitive advantage but are of value to society. Finally, it might generate a

move as regards strategic management of universities towards the research funding agencies, giving thus agencies the opportunity to dominate the research agenda by priority setting (cf. Gines-Mora et al. 2007, Kalpazidou Schmidt 2007, Strehl et al. 2007).

An international comparison of the university research funding and publication performance in eight countries concludes that the notion of competition for funding as a promoter of productivity is not clear-cut. The results question whether financial incentives boost performance in terms of publications or whether policy makers should put greater emphasis on other factors related to productivity (Auranen and Nieminen 2010).

Moreover, there is no empirical evidence on what the right mix or balance is between core funding allocated at institutional level, which allows the universities to set priorities, versus risk-based competitive funding. While it is obvious that there are benefits to be derived from the move towards competitive funding, university research cannot be fully dependent on such funding. Development of institutions strategic activities can be restricted by an over-reliance on competitive funding. In order for institutions to maintain a degree of flexibility that enables them to make long-term strategic planning and successfully target competitive research funding, it is important that they retain a noteworthy part of core funding from the state (Kalpazidou Schmidt et al. 2007, Kalpazidou Schmidt 2009).

Wrapping up, the trends discussed hereby are not characterizing only Nordic higher education. An OECD (Strehl et al. 2007) study of funding systems in ten countries reveals that the trends are similar in almost all the studied countries. Despite this development, there is little empirical evidence on which model is the most productive and effective. An Expert Group Report from the European Commission (2008) reveals that many OECD countries have extended their competitive research funding with the aim of improving the effectiveness and efficiency of scientific research through increased focus on performance and competition. Nonetheless, the report concludes that there appears to be no fundamental superiority of any specific type of funding over another.

Effects of funding reforms on the universities

The higher degree of institutional autonomy has been followed by higher accountability levels and demands on quality assurance and evaluations. The growing use of formula, performance based funding, contracts and project funding are attempts to copy markets by introducing competition and management by results (cf. Pollitt and Bouckaert 2000). The key question is what the effects of funding reforms are on the *universities and their behaviour as institutions*.

According to Leifner (2003), changes in funding systems will likely have a major impact on the behaviour of universities, also as to their internal processes of allocation of funds. Studies show that when the context and framework conditions are changed through increased competition and marketisation, universities employ strategies to meet new challenges and try to position themselves

in the higher education landscape (cf. Bonaccorsi and Dario 2007, Strehl et al. 2007). In order to benefit from the changes, universities respond by concentrating and focusing their research activities, and strengthening their profiles in an attempt to maintain and enhance activities by broadening and diversifying their funding basis (cf. Geuna 2001, Jongbloed and Vossensteyn 2001, Kaiser et al. 2001, Strehl et al. 2007).

An OECD study of ten funding systems and their effects on higher education systems concludes that funding systems are major influencing factors for institutional strategies and restructuring (Strehl et al. 2007). The study concludes that there is as a strong response to changing funding systems i.e. a general tendency among universities to increasingly use various strategies to address the changes, including restructuring, formulating explicit goals and objectives, using monitoring and strengthening their leadership and management. Strategies target the basic core tasks teaching and research on the one hand and organisation structures and processes on the other.

The fact that changes in funding systems increasingly reflect decreasing resources raises the institutions awareness as to efficiency, performance and effectiveness. Universities thus strive, in the frame of a growing competitive environment, to behave as “strategic actors” and distinguish themselves from other institutions by identifying their particular areas of strength and further build their research profile (Bonaccorsi et al. 2007).

A study of 100 European universities (see CHINC^{vii}), summarises the main strategies employed by universities as: (i) creating centers of excellence through selectivity, critical mass and profiling, (ii) strengthening steering capacity through managerialism and devolving responsibility to departments, (iii) reforming financial instruments as well as supporting researchers in revenue generation and research commercialisation, (iv) collecting information on performance and environment, (v) emphasising flexibility and performance orientation in human resources management, and finally (vi) engaging with the outside world and building alliances.

4. Concluding remarks

Implementation of performance, output and competitive funding systems to promote quality, productivity and efficiency is a complex issue as the relation between funding and outcome, both in terms of quantity and quality, is not straightforward.

The use of strong funding incentives may boost productivity, efficiency and accountability but may also lead to unintended, negative effects. Value may be attached narrowly to what is measurable instead of rewarding quality. It may also lead to lowering of standards and manipulation of outcomes, mainstreaming of research (impeding creativity, originality and innovation), marginalisation of small science fields and loosing of the research agenda to other stakeholders (cf. Butler 2003, Laudel 2006, Ziman 2000).

Wrapping up, funding of universities cannot be seen isolated from the wider policy context of higher education. Although similar trends have been identified in the Nordic countries and the systems tend to converge, the analysis reveals that changes do not take place in a uniform manner or at the same time, and/or with the same pace and intensity; changes are rather dependent on national strategies and priorities. Country-specific and comparative studies on the relation between funding systems and their effects on universities performance require hence linking funding systems objectives and their implementations to overall higher education policies.

Notes

- i The Nordic countries comprise Denmark, Finland, Iceland, Norway and Sweden. Iceland has a very small higher education system and is not discussed in this article.
- ii The term higher education refers to the university sector
- iii For a detailed description of the Danish Globalisation Strategy see Danish Prime Minister's Office [Statsministeriet] (2006). *Progress, Innovation and Cohesion Strategy for Denmark in the Global Economy - Summary*. Copenhagen, 2006.
- iv This article focuses on the funding of the universities
- v There are two levels of journals (level 2 refers to high impact journals while level 1 to low impact journals)
- vi The Bologna process..^{vi} The Bologna Process was initiated in 1999, when twenty-nine European ministers in charge of higher education met in Bologna to lay the basis for establishing a European Higher Education Area by 2010 and promoting the European system of higher education worldwide. 10 years later, the total number of signatory countries in the Bologna Process is forty-five. In the Bologna Declaration, the ministers affirmed their intention to: (a) adopt comparable degrees; (b) implement a system with two main cycles (undergraduate/graduate); (c) establish a common system of credits, encourage mobility, and promote European cooperation in quality assurance; (f) promote European dimensions in higher education.
- vii At the Lisbon and Barcelona European Councils in the beginning of the new century, the European Union committed its member states to become the most competitive and dynamic knowledge-based society and economy in the world by 2010, and to increase investment in research on average to 3 percent of GDP. The European Council, in March 2005 based on an evaluation of the progress made, re-launched the Lisbon Strategy and refocused priorities on growth and employment, placing the main emphasis on knowledge, innovation, and optimization of human capital.
- viii For more details on the CHINC project see Salerno, C., Jongbloed, B., Slipsaeter, S. & Lepori, B. (2005). Changes in European higher education institutions' research income, structures and strategies. Interim report for the project changes in university incomes: their impact on university based research and innovation (CHINC).

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