



From a Means to an End

Patenting in the 1999 Danish 'Act on Inventions' and its Effect on Research Practice

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From a means to an end: Patenting in the 1999 Danish 'Act on Inventions' and its effect on research practice

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Abstract

This paper examines the potential pitfalls for academic research associated with goal displacements in the implementation of goals and indicators of research commercialization. We ask why patenting has come to serve as the key policy indicator of innovative capacity and what consequences this has for the organization of academic research. To address these questions, the paper presents a case study from Denmark on, firstly, why and how the 1999 Danish 'Act on Inventions' introduced patenting as a central instrument to Danish science policy and, secondly, the effects the Act has had on Danish university organization and research practices.

We trace why and how commercialization was introduced as an important objective in Danish science policy since the 1980s. The increased focus on patents is explained as an isomorphic adjustment to an international 'science policy field,' manifested in particular through OECD statistics, where patenting has come to serve as a key metric in international rankings.

In a second step, we examine what effects the patenting requirements have had on organization and research practice at a Danish university. We show that in practice 'number of patents' changed from serving as an indicator of innovative capacity to being a policy goal in itself, thus in effect producing a goal displacement that is potentially damaging for both academic research and innovation capacity of the surrounding society. As a consequence of this goal displacement, active scientists now increasingly engage in patenting primarily as a means to fulfill organizational targets and to increase their 'fundability,' rather than to promote commercial applications of their research. In conclusion, we discuss how these unfulfilled policy ambitions have led to a retrospective redefinition of policy goals rather than an adjustment of the actual policy tools.

Keywords: Patenting, Commercialization of research, Intellectual Property Rights (IPR), Science policy, Goal Displacement, Isomorphism, University Performance Contracts, OECD, Denmark

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Introduction

Today scientific knowledge production is considered a key component in the competitiveness of nations in a globalized knowledge economy. The search for policy measures to stimulate knowledge production – and steer it in directions that are conducive for economic growth and competitiveness – has therefore been ongoing across advanced capitalist economies for several decades. The political wish to make academic knowledge production commercially useful has had profound impacts on the organization of academic research, the full organizational and epistemic effects of which are still to be measured out in detail. The pressure to commercialize research is a ubiquitous phenomenon known to academics around the World. However, the precise way in which such pressures have come about and how they impact the everyday life of academics is not yet well understood. In this paper, we analyze how the pressure to commercialize research output has emerged in a particular context, made the transition to another context as a set of policy ideas and eventually manifests itself as specific organizational targets in a specific organizational reality of an academic institution with unforeseen effects.

The question we pose is *what consequences and possible pitfalls for the organization of academic research arise when a proxy of innovative capacity through a process of goal displacement becomes an organizational goal in itself?*

Our hypothesis is that an isomorphic adaptation of internationally dominant ideas are likely to have unforeseen effects, which are unwanted and in some cases even counterproductive to the policy ambitions. We explore this process by means of a case study on the implementation and effects of a particular piece of Danish legislation on patenting, which turned patenting from an indicator to an organizational goal at Danish universities. This goal displacement is essentially changing the rules of the academic game, while its ability to actually stimulate innovation is undocumented. We apply a qualitative case study to examine some of the unforeseen consequences for research practices.

Background: Promoting Research Commercialization through Patents

Contemporary Danish science policy is intimately interwoven with international developments, and particularly US science policy in the post Bayh-Dole era has been influential in the period covered in this analysis (Powell, Owen-Smith et al. 2007; Grimaldi, Kenney et al. 2011; Thursby and Thursby 2011; Valdivia 2011; Lissoni 2012; Winickoff 2013). The Bayh-Dole Act introduced legal opportunities and significant economic incentives for universities to patent inventions and collect royalties emerging from publicly funded research. Since around 1990 the principles of the Bayh-Dole Act have spread from the US. From 1995 onwards no less than 14 European countries adopted comparable IPR laws modelled on the Bayh-Dole Act¹; shifting the ownership from inventor or government funder to the research institution with the aim to speed up the transfer time and -rates from scientific discoveries to commercial innovations (Geuna and Rossi 2011).

We contend that many of the instruments associated with the Bayh-Dole Act have been copied into new contexts on what appears to be only thinly documented evidence and with unforeseen consequences. For

¹ The UK was a European frontrunner with The Patent Act in 1977 and has continued institutional IPR ownership (Geuna et al. 2011)

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instance, patenting has been introduced as a key metric of research output, tech-trans offices have been established by most major universities to facilitate commercialization of research results and are expected to generate revenues, and promotion of university-industry collaborations has become central to most science policies today (Geuna and Rossi 2011; Thursby and Thursby 2011). By some observers, these policy changes are considered critically as the product of a general trend of neoliberal governance engulfing the world since the early 1980s, which have installed private incentives and (pseudo)markets in many public institutions, including universities (Winickoff 2013). The effects of the Bayh-Dole Act have therefore been the object of extensive research as well as criticism, in particular in a US context but increasingly also in Europe where the act has been emulated in many countries (Geuna and Nesta 2006; Geuna and Rossi 2011; Grimaldi, Kenney et al. 2011).

Two general avenues have dominated research on science policy in the wake of Bayh-Dole: On the one hand, approaches that seek to identify what factors stimulate or hinder successful knowledge transfer when compared across institutions, sectors and countries (Gulbrandsen and Smeby 2005; Baldini 2009; Kenney and Patton 2009; Lissoni 2012). On the other hand, more critical approaches that examine the impact of the pressures to commercialize research on universities as institutions of free academic inquiry (Vallas and Lee Kleinman 2007; Jones 2009; Valdivia 2011). There is also emerging a critical literature on the performative effects of different measures and indicators of universities' 'third mission' activities (Langford, Hall et al. 2006; Molas-Gallart and Castro-Martínez 2007; Rossi and Rosli 2015). While this literature critically examines how well different indicators match policy ambitions (and in particular what they obscure from view), we find less research that examines the actual effects of the introduction of such indicators on university organization and research practices.

In this paper, we trace how ideas and policy practices regarding patenting of public research results, and the wish to make science more entrepreneurial, have infused Danish science policy over the last couple of decades. We demonstrate how patenting has developed from being a proxy for innovative capacity to a goal in itself, but its performative effects on research practices have been rather superficial and different from the original intention. The policy goal of stimulating the innovative capacity of the Danish economy has not been achieved – or at least this has not been documented. This, however, has led to a retrospective reformulation of policy goals in order to match the policy instrument, which in the meantime has become entrenched in the organizational landscape, rather than a more thorough reconsideration of what are the most appropriate means to stimulate innovation.

While derived from a Danish context, we suspect similar phenomena can be observed in other non-US contexts, which lends a more general relevance to our analysis.

The paper is structured in the following way. We first introduce the theoretical foundation of our investigation as well as our methodological approach and data. We then proceed to analyze the shaping of Danish research policy in the period from the mid-1980s up to the present day. We do this in three steps, focusing in turn on the ideational influx, the political decision making process and the implementation of the 1999 Act on Inventions. From there, we move in time to provide a picture of how the patenting requirements have influenced research practices at a Danish university up until the present day. In the final

section we bring the two analyses together to illustrate how the original policy ambitions have been retrofitted to match the unintended consequences of the implemented policies, and suggest that key drivers of this development are the desire to be perceived as competitive at the government level, to be compliant at the institutional level and to be perceived as 'fundable' at the individual scientist level. Lastly, we address the general implications of our findings and suggest questions for further research.

Theoretical Framework: Isomorphic Diffusion of Ideas in Science Policy

As our research concerns how the import of internationally dominant policy ideas into Danish (macro) science policy has shaped (local) research practices, we draw inspiration from an analytical approach that focuses exactly on the link between policy and knowledge production, namely, *The New Political Sociology of Science* (NPSS) proposed by Frickel and Moore (Frickel 2006). The NPSS framework focuses on how (local) social structures and processes of science are intertwined with the economic, political and social organization of the larger society in which knowledge production is embedded. Consequently, scientific knowledge production must be analyzed in relation to its wider socio-political environment. The NPSS advocates a combination of detailed, case specific methodologies from science and technology studies (STS) focusing on local knowledge production practices with a broader focus on power and institutions found, for instance, in the sociological neo-institutionalist literature. We suggest that the neo-institutional approach provides a fruitful tool to interpret the interconnectedness of Danish science policy with dominant international developments, and we apply the concepts of *organizational fields*, *isomorphism*, and *rational myths* as conceptual tools to interpret how local practices of policy formation and knowledge production are shaped by the wider international context of science policy ideas.

The NPSS approach thus suggests that Danish policy is co-structured by the organizational fields it is interwoven with internationally. To our knowledge this has not been analyzed before. According to DiMaggio and Powell (DiMaggio and Powell 1983), an organizational field is made up of organizations characterized by connectedness and structural equivalence. Similar organizations in different contexts, such as, e.g., ministries of science in different polities, interact and take each other into account in their actions, based on their knowledge of each other's locations and relations in the field. Danish policy can thus be analyzed as embedded in a particular international *political-organizational field of science policy*. Key actors in Danish science policy are thus negotiating not only with other political actors in Denmark, but are also imitating similar policy actors in other countries, from which they seek inspiration and benchmark their performance against. We apply this concept of the organizational field to examine and explain how and why the Danish government adopted an act inspired by the US Bayh-Dole Act and how this was legitimated in particular through the ideational and comparative work of the OECD.

Organizations that make up a particular field interact with each other in various ways. One way to account for these modes of interaction is *isomorphism*. Isomorphism is "a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" (Hawley cited in DiMaggio and Powell 1983). In the economic sphere isomorphism is related to competition for customers and resources, while in the political sphere it concerns political power and legitimacy. According to DiMaggio and Powell, there are three basic mechanisms of institutional isomorphism in the political sphere:

coercive, mimetic and *normative*. Coercive isomorphism sets in when outside pressure is applied by political authorities for organizations to change in a similar direction. Mimetic isomorphism entails that organizations mimic other more successful organizations in order to better their position in the organizational field. Normative isomorphism operates where organizations adhere to what is perceived as appropriate in a given situation, for instance, propagated through professional standards.

Isomorphism explains why organizations engage in actions and practices that do not necessarily produce optimal outcomes, but seek to establish legitimacy through imitation and reference to other actors perceived as successful (Beckert 2010). Isomorphism can thus explain why organizations engage in practices that may seem counter-productive from the perspective of an outside observer. The neo-institutionalist approach suggests that for organizations located in a particular field, the legitimacy – internally and externally – of their operations may be equally or more important than operational efficiency. Organizations consequently rely on *rational myths* when accounting for their practices and decisions. Rational myths are institutionalized rules that depict certain formal structures as rational means to the attainment of (constructed) desirable ends (Meyer and Rowan 1977: 345), rather independently of their actual performance. This corresponds closely to what Mollas-Gallart and Castro-Martinez (2007) refer to as 'symbolic implementation' (Molas-Gallart and Castro-Martinez 2007). As we demonstrate in our analysis, this provides a useful conceptual vocabulary to interpret the way Danish research policies were implemented: as an isomorphic adaptation of a rational myth concerning the value of patenting university research. This, in turn, has implications for how the policy affects research practices, and in particular why policies may be difficult to modify despite a lack of success. One of the ways in which rational myths become entrenched in organizational realities is through goal displacement whereby "...proxies become de facto goals and shape the evaluation of relationships" (Langford, Hall et al. 2006: 1587).

Methods & Data

Our analysis consists of two interrelated case studies. The first pertains to the introduction of patenting as a policy instrument; the second examines the effects of the policy on university organization and patenting as a component of research practice.

The first part of our analysis traces the process leading to the implementation of the Act on Inventions and is based primarily on an analysis of key policy documents from the OECD², Danish government reports 1992-1999³ and records of parliamentary debates 1998-2000⁴. This part of the analysis has been corroborated through three semi-structured, in-depth interviews with two former civil servants and a former consultant working for the Danish government. All informants were centrally involved in the policy process leading up to the passing of the law in 1999⁵.

² 1987 and 1994 OECD evaluation reports of the Danish research system

³ The 1995 Report on Research Counseling, White Paper on a National Research Strategy 1995, Research A Broad Concern 1997, The National Research Strategy 1997, National Research for Materials Research 1999

⁴ The Act on Inventions 1st reading December 1st 1998, 2nd reading May 18 1999, 3rd reading May 25 1999

⁵ Former civil servant 1, Expert interview (1) conducted June 29 2016

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The second part of the analysis is based on documents retrieved from the website of the University of Copenhagen describing its commercialization strategy (University of Copenhagen 2016) and four semi-structured, in-depth interviews with active, senior university researchers⁶. The researchers are all actively involved in patenting results of their research and have between 10 and 30 years of post-graduate experience. The researchers are all working in the natural sciences and biomedicine. The interviews with the active researchers have all been fully transcribed and analyzed thematically with NVivo. All interviewees have been promised confidentiality.

PART I: Origin and Implementation of the Act on Inventions

Danish science policy from the 1980s onwards is shaped by a growing influence of a discourse on *global competition*. This discourse derives from a multiplicity of sources, but a central source in relation to science policy is the OECD. In Denmark, the discourse on global competition is linked to perceived threats to the Danish welfare state, which has been a permanent theme on the political agenda in Denmark from 1990 onwards. At that time a link was established between many policy domains, including science policy, and the (fiscal) wellbeing and long-term survival of the welfare state (Pedersen 2006).

In this section we examine how this political consensus is manifested in the conception and implementation of the 1999 Act on Inventions. The argument proceeds in three steps, accounting in turn for 1) the ideational influx and reconfiguration of Danish science policy-making institutions, 2) the political process preceding the passing of the Act and 3) the implementation of the Act by means of novel economic incentives in university governance in Denmark.

Ideational Influx and Institutional Reconfiguration

Two evaluations of the Danish research system conducted by the OECD in 1987 and 1994, respectively, are crucial turning points in Danish science policy (Soerensen 1999; Mejlgaard 2009). The OECD reports delivered both a particular framing of the challenges to be addressed and suggested solutions for them. In 1994, the then incoming Social Democratic-led government took office with an agenda to bolster the Danish welfare society against increasing global completion, and science policy was seen as an important element in this ambition. According to our interviewees, the reports thus got to serve as legitimating devices internally in the Danish political landscape. Domestic political challenges made it pertinent to imitate countries perceived as more successful than Denmark at the time.

In 1987, the OECD published a report on the organization of research in its member-states. The report provided a general set of recommendations, and pointed to the need for more targeted policy efforts to stay competitive in the 'knowledge-based economy' (OECD 1988). The knowledge-based economy is a term

Former civil servant 2, Expert interview (2) conducted June 2 2016

Former consultant to the Danish Government, Expert interview (3) conducted June 28 2016

⁶ Scientist interview 1, *Biology, University of Copenhagen, 40-50, male, conducted May 26 2015*;
Scientist Interview 2 Physics, University of Copenhagen, 30-40, male conducted May 28 2015;
Scientist Interview 3 Chemistry/biology, University of Copenhagen, 50-60, male June 2nd 2015;
Scientist Interview Chemistry, University of Copenhagen, 30-40, male June 4 2015

coined to describe a reality all advanced economies need to adapt to, where systematic production of knowledge is an essential production factor and key to competitiveness. The report also provided country specific recommendations for each member state. For Denmark, the OECD suggested a national strategy to coordinate both public and private research spending strategically as well as measures to increase the *utility* of knowledge produced in the country. The 1987 recommendations are often cited as the immediate occasion for the creation of the first Ministry of Research and Technology in 1994. Research and innovation was thus formally established as a distinct policy domain in Denmark, which manifests a growing consensus among the policy establishment that the transition to a 'knowledge-based economy' requires active political supervision and support. Prior to this, the Danish innovation policy was mostly implicit and in practice it resembled the 'linear model of innovation' (Edgerton 2004; Sarewitz 2016). However, this was now perceived as insufficient and in need of catalysts to couple funding and the different steps in the innovation process more directly (White Paper on a National Research Strategy 1995). In particular, it became a political priority to ensure that Danish industry would benefit more directly from publicly funded research, much in line with the ideas entailed in the US Bayh-Dole Act.

Yet, when the Ministry was created it had virtually no political capital, according to our informants. Thus, the new ministry needed leverage to manifest itself in the internal government hierarchy (Expert interview 3, June 29 2016). For this end, one of the first initiatives taken by the newly appointed Minister of Research and Technology was to request the OECD to carry out a second, extended evaluation of the Danish research system with a particular focus on the interplay between research spending, on the one hand, and economic growth and job creation, on the other (OECD 1995). At the time, there was an understanding in the Ministry that Danish university research lacked in both focus and quality and that Danish universities had insufficient incentives to interact with the surrounding society, in particular with the private sector (Expert interview 2, June 28 2016). As the policy development in the Ministry was already strongly inspired by the problem-framing of the first OECD report, the second report mostly served to gain political leverage by pointing to an external authority rather than filling a genuine knowledge gap, as explained to us by a former civil servant. The 1994 evaluation emphasized the need for firm steering and a strategic prioritization of national research, which was well in line with the existing political ambitions. In 1995, the work on a National Research Strategy was initiated to flesh out such priorities, strongly inspired by the OECD recommendations.

A key goal of the National Research Strategy was to facilitate commercialization of research. The Act on Inventions was thus introduced to increase knowledge transfer from research to the private sector. For this end, the Ministry considered the standardization of merits and methods to trace and measure research performance essential. Because the OECD considered (and still considers) 'number of patents' as a central indicator of innovative capacity, patenting became one of the central metrics to assess the level of knowledge transfer specifically as well as societal benefits from research more generally. When queried about why patenting got to serve this purpose, our interviewees unanimously explained that the number of patents was central to OECD statistics. While there were a lot of *input* measures on research available, the number of patents was considered the only available *output* measure of any value. Patenting was the key international benchmark of quality and relevance of research for commercial purposes. Hence, it was selected as the key performance indicator of successful knowledge production. Not because it was a particularly good measure,

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but because it was a convenient and internationally legitimized measure, as one interviewee explained (Expert interview 2, June 28, 2016).

Parliamentary Consensus Politics on the Act on Inventions

When the Minister of Research and Technology forwarded the bill to the Danish Parliament, the need for increasing utility of publicly funded research was stated as the primary policy goal⁷. Loosely informed by the US experiences with the Bayh-Dole Act, it was also suggested that the universities would benefit economically from commercialization, generating additional resources for research. During the three readings that saw the bill through Parliament, there was an almost uncontested consensus among the political parties for the two objectives. The essence of the arguments presented was that Denmark was facing global competition and without reforms Denmark would fall behind in this competition, leaving insufficient resources to fund the Danish welfare state. The protection of the welfare state is a key priority, on which there is high consensus in Danish political discourse. As this policy goal is widely shared, even today, political competition in Denmark is mostly centered on what means are the best to achieve this goal. Science policy specifically has been a rather uncontested area with less political competition (Mejlgaard 2009). During the parliament readings, the government as well as opposition stated that the evidence supporting the need for change could be found in the 1994 OECD evaluation as well as in recommendations made by the Danish Research Council, which was itself established on recommendation of the OECD. The OECD evaluation and the report from the Research Council were framed as both the most reasonable way forward and a necessary policy to maintain and strengthen Danish competitiveness.

With the passing of the Act on Inventions, universities were obliged to develop rules of remuneration for inventors, to enter contracts with external patent advisors and to develop standardized procedures for reporting and handling inventions (The Act on Inventions 1999). This was to meet a third central objective: to make it easier for industry as well as researchers to engage in joint commercial activities, an ambition directly inspired by the Bayh-Dole model in the US and partially encouraged by the OECD as an additional central metric in the international comparisons.

The recommendations from the OECD, which explicitly pointed out that Denmark was performing unsatisfactorily compared to other countries thus came to serve as uncontested facts in the Danish political debate. This led to an uncontroversial decision on research patenting. We have found no traces in the political discussions at the time that any attention has been devoted to the particular traits of the existing Danish innovation system, with its dominance of small and medium-size enterprises, many of which have more informal collaborations with institutions of research and higher education (Asheim and Coenen 2005). Because of the OECD recommendations and the notion of a well-functioning American model, patenting came to be seen as synonymous with innovation. However, a key point to notice here is that while for the OECD 'number of patents' was used as the best available indicator of innovative capacity, in Danish political

⁷ "The purpose of this bill reflects the need to enhance knowledge-based growth in Danish society. Public research institutions are substantial sources of production of new knowledge and knowledge transfer between science and industry is of uttermost importance to maintain and develop the Danish position as a modern welfare state" (Bill on Inventions at Public Research Institutions 1998, own translation)

discourse the relatively low number of patents (compared to other countries) was perceived as a problem in itself, irrespective of how the economy was faring in general and the fact that there was a lot of informal interaction between Danish universities and businesses, which may facilitate knowledge transfer in other ways (Langford, Hall et al. 2006; Rossi and Rosli 2015). We can thus observe an incipient goal displacement from increasing the commercial impact of public research investments to the much more simple ambition of producing more patents.

Implementing the Act on Innovations

When the bill was passed, the Ministry and Parliament expected several effects. One desired and expected effect was simply the filing of more patents. As mentioned above, patents were framed as an uncontroversial indicator of research output and knowledge transfer, which was assumed, in effect, to lead to higher productivity in the private sector. A second expected effect was that universities would gain an additional source of income from patent royalties. A four-year period where patenting was subsidized was expected to kick-start the development of patenting activities. After this initial period, the universities were expected to receive substantial revenue from their patent- and licensing activities for the innovation system to be self-sustaining and even rewarding for the institutions. (Act on Inventions, 1st reading 1998).

An important step in institutionalizing the Act was made with the introduction of Performance Contracts between the Ministry and all eight Danish universities in 2000. The contracts are 'co-developed objectives' on a variety of parameters to enable the Ministry of Education and Research to keep track of university performance. These contracts are renegotiated every 3 years with shifting goals. Since the very first set of performance contracts in 2000, it was a recommended focus area to focus on research *output*, such as a more traditional increase of publications, but also new considerations such as building competencies in commercialization, e.g., by establishing patent units. (Ministry of Research 2000). Basically, it became an objective in itself for universities to produce more patents.

We interpret this unanimous alignment of Danish science policy with the dominant international science policy agenda as an indication that Denmark has been structured into an organizational field constructed in particular through the OECD. According to Powell and DiMaggio, the process of structuration has four parts, which are all evident in this case. First, it consisted of an increase in interactions among organizations as seen by the significant increased attention to the OECD analyses. A second element was the emergence of inter-organizational structures of domination, which becomes evident when a country is considered superior based on the dominant parameters in institutional life – in this case the parameters measured by governments, reports and organizations operating within the logic of global competition. In the science policy field, the US (and to some extent the UK) held dominant position(s) as these countries were considered successful within R&D on the determined parameters (in particular as 'number of patents per inhabitant' and 'number of filed patents per inhabitant'). Hence, the US came to be seen as a model to imitate and aspire to match in performance. Thirdly, structuration is more likely to occur during an increased information flow among organizations, which is exactly what the OECD facilitated, as it operated as a clearing house for science policy statistics. Finally, the structuration occurs when a mutual awareness among organizational participants that they are involved in the same area of interest emerges. The

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notion of international competition as well as the increasing number of, e.g., OECD R&D indicators and publications was active in constituting this awareness, as it was seen in the influence of the 1987 and 1994 evaluations.

The impacts of the international field of science policy are thus quite evident, as Danish policy-makers began to seek legitimacy by adapting to the standards and improving on parameters that structured the field internationally. In the search for legitimacy within the field, the political decisions became intertwined with what we consider 'rational myths' regarding the benefits of patenting. The main arguments put forward during the negotiation of the Act on Inventions explicitly relied on the 1987 and 1994 OECD recommendations. These in turn relied on the fact that other countries had achieved higher numbers of patents per capita. In 1999, Denmark ranked in the lowest third in OECD rankings. At the time, the total number of countries included in the patent statistics were modest (9 in total). Even if the US was highly ranked, the decision to follow the American model was thus based on rather limited data. Since then, it has become clear that only few American universities actually profit substantially from their patenting activities (Winickoff 2013). However, at the time, the few star examples known in the international literature were – according to our interviewees – considered as role models to imitate, with little attention being paid to the structural difference between US and Danish universities. This compares well with the observation by Molas-Gallart and Castro-Martinez that "[s]uccessful cases form the basis of policy reports and presentations, and are often offered to and picked by the press as part of an ongoing policy debate. Case studies of successful examples play also an important symbolic role in policy arguments..." (Molas-Gallart and Castro-Martínez 2007: 324). Countries more similar to Denmark than the US, such as, e.g., Sweden, had twice as many patents per inhabitant as Denmark although they had retained the 'professor's privilege,' but – as far as we have been able to establish – other countries played no role as sources of inspiration. In our reading, the decision to implement patenting requirements as a core element of research policy was thus based more on imitation of perceived successful actors in the field than on a more in-depth analysis of Denmark's existing strengths and comparative advantages. Legitimacy of the enacted policy was established through benchmarking via (contested) performance criteria and incomplete data rather than in-depth analysis of the particular challenges facing the Danish innovation system, and without taking the particular structure of the whole innovation ecology in Denmark systematically into consideration.

In sum, the Danish 'Act on Inventions' can be seen as a text-book example of an isomorphic policy adaptation. However, in the implementation phase, the indicator (number of patents) of the goal to be achieved (successful commercialization of research results) became the goal itself. An incentive system was thus created for the universities where filing and obtaining more patents in effect became the primary objective of commercialization ambitions. In the next section we examine what consequences this had at the organizational level of universities and in the everyday practice of active researchers.

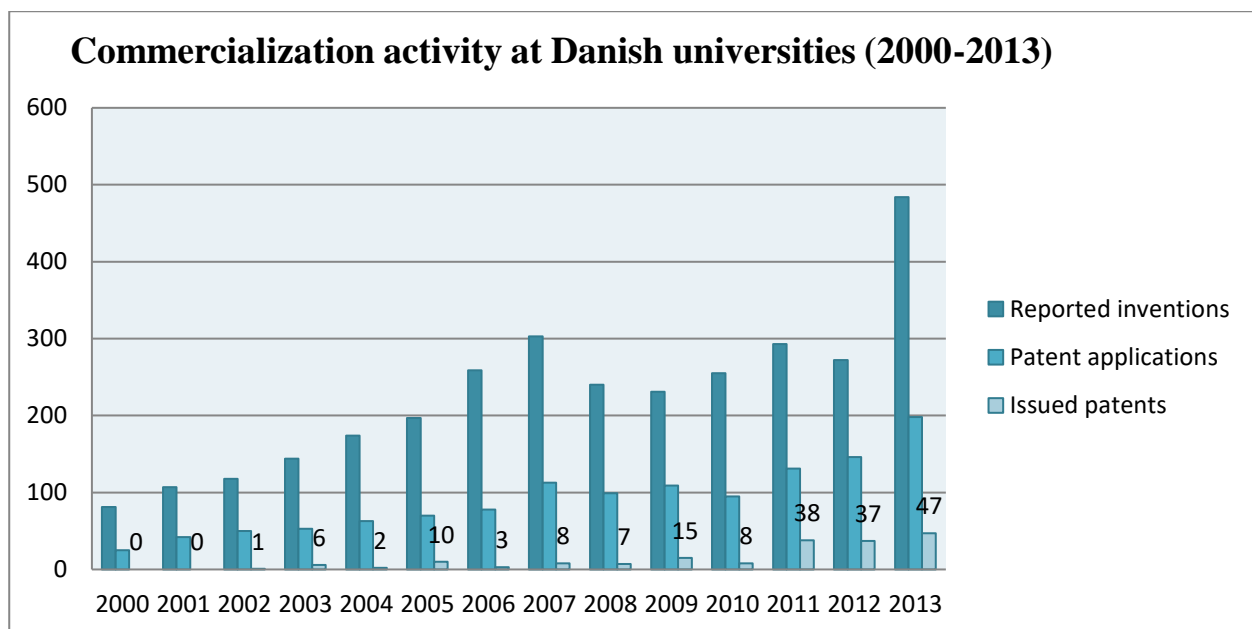
PART II: Effects of the Act on Inventions

The second part of our analysis investigates the implications of the isomorphic policy changes analyzed above. We explore this by mapping how patenting has been pursued as an organizational goal at Denmark's largest university, the University of Copenhagen (UCPH), as well as how patenting requirements

and expectations are experienced by active researchers at UCPH. We focus in particular on the unintended consequences of the reforms, which seem problematic from the point of view of the active researchers.

Organizational Changes

In response to policy changes, including the Act on Inventions and new governance instruments such as the Performance Contracts between Danish universities and the Ministry, all Danish universities have increased what has come to be known as 'commercialization activities' or 'technology transfer' since 2000. Figure 1 shows the aggregated number of reported inventions, patent applications and issued patents across all Danish universities in the period 2000 to 2014. In the period since the implementation of the Act on Inventions, the number of UCPH's patents has increased from 7 in 2001 to 24 in 2013 with the number of reported inventions being 77 in 2013 (Innovation 2014), thus following the general trend among Danish Universities.



Source (Public Research Commercialization Survey -2014)

Organizationally, the requirement to increase commercialization activities has required Danish universities to install new support functions. In 2000, the UCPH added a new division, 'Research and Innovation' referring directly to the vice-chancellor's office, indicating its perceived centrality to the (new) core business of the university⁸. The division is described as "the main entry point for both internal and external contacts who wish to explore the opportunities of collaboration. In order to support the collaboration, the division offers its expertise within business collaboration in a broad sense, including patenting and

⁸ During the writing of this paper, the division has been renamed to 'Business Collaboration,' signaling the changed demands on universities analyzed here even clearer.

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commercialisation, as well as external financing" (University of Copenhagen 2015). In 2003, UCPH established a Tech Trans Office (TTO), as a subunit within 'Research and Innovation,' which currently employs approximately 20 staff. The TTO's primary tasks include the identification of research results with commercial potential, protection of UCPHs IPR, management of the UCPH IPR portfolio, commercializing research results and facilitating collaboration agreements related to UCPH IP.

These organizational adaptations are manifestations of a political ambition to create a deep-seated transformation in the mission of Danish universities, where 'knowledge-transfer' is increasingly put on equal terms with the traditional missions of research and teaching. Judged by the growing number of reported inventions and patents the policy appears to have been reasonably successful. However, as our interviews with active researchers at UCPH indicated, there is reason to suspect that changes may have been superficial rather than substantial when it comes to research practices and making scientists more entrepreneurial.

Impacts on Research Practice

In order to examine the effects of the increased focus on patenting and commercialization of research results, we interviewed active researchers at the Faculty of Health and the Faculty of Science at the UCPH about whether and how the political ambitions and organizational changes at the University have influenced their research practices. We focused on three areas: 1) choice of research problems, 2) research objectives and 3) the communication of research results.

When queried about their choice of research problems, interviewees unanimously indicated that they were driven by curiosity and the desire to contribute to the advancement of their respective fields. As an example, the scientist below speaks of the pecuniary gain vs. other motivational factors. At the time of the interview, the research group behind an invention would receive 1/3 of financial value of the patent:

"One third? Is that the number these days, well then it's gotten better. But anyhow, the money is split between all the researchers who participated, unless you are working by yourself, so it's not really significant" (...) *"So, at the moment we do have some projects that could potentially turn commercial. But it is not something I aim for specifically (...)* *No, it's more the research itself. I mean, it's fun if patients or others can benefit (from the research, our addition) but it is not why (I conduct research, our addition.)"* (Scientist interview 1 2015)

Exterior motives may well play a role in reality, perhaps also a stronger role than in the past, but as we have no reliable ways to examine this issue based on our available data, we will not pursue it further in the present paper. However, it deserves mentioning that our interviewees were in no way hostile to the idea that their research could serve a commercial purpose, and some of them expressed a wish to engage in entrepreneurial activities in the future. It was clear, though, that our interviewees saw themselves motivated primarily by the prospect of advancing academic science and their own academic careers, while the possibility of creating commercial spin-offs was secondary to them. If the desire to create a commercial spin-off was present, which it was in two interviews, the underlying reason was to gain access to unlimited research funding through a commercial success rather than personal income.

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In terms of communication, it was clear that they all consider conventional academic publishing primary and patenting secondary to their practice. Although patenting in particular and commercialization of research in general has become politically desirable and an organizational priority, patenting has not achieved recognition as a scientific method of knowledge dissemination or as a 'badge of scientific achievement' among active researchers (Etzkowitz 2011) to any noteworthy extent. In our case study, conventional publishing is still undisputedly at the center of academic prestige and the primary goal of their research endeavors.

Our interviews suggest that the goal displacement really occurs between the policy ambition as manifested at the organizational level and the level of active research practice. While scientists indeed increasingly engage in filing and patenting the results of their research, this is not primarily motivated by an ambition to engage in commercial or entrepreneurial activities. Rather, registering inventions and submitting patent applications is mostly considered a means to please university management and research funders in a more ritualistic fashion; in our reading, it has become an organizational currency rather than it represents a changed mindset or a new academic ethos. Judging from our interviews, the change in academic culture toward a more entrepreneurial mind-set aimed for by policy-makers has not been achieved, at least not in relation to patenting.

The relative modest effect of policy ambitions in the mindset and practice of researchers may be ascribed to a strong scientific ethos. However, in the specific case of the UCPH it may also be an effect of how the changes were introduced into the organization. Our informants unanimously described how the initial start-up of commercial activities at the University of Copenhagen was quite challenging, as new competencies had to be built up in the organization (and to some extent even in the country). Our interviewees suggested that when initially established in 2003 the TTO office staff did not have the right skills for the task. As a consequence, researchers who were initially curious and fundamentally sympathetic to the new mission eventually got disillusioned with the way the new external expectations on universities were implemented. Not because they disagreed ideologically with the ambition to make their research socially and commercially useful, but because the organizational expectations were perceived as unrealistic and support was inadequate to match these expectations. As a result, a lack of trust in the TTO developed and according to the scientists, several promising inventions never made it to the patenting stage. Due to the challenges experienced during the first years, the UCPH spent significantly more from its own budget than the initial government subsidies received to build up capacities. The TTO has continued to generate a net deficit and patenting has certainly never become the golden goose for UCPH it was initially thought to be, even though numbers are slowly starting to improve over the past 1-3 years. However, at the organizational level the policy seems to have been successful, as commercialization of research has increasingly become integrated into the activities of the university's annual activities in relevant scientific areas, and the process of formally reporting on innovations and filing patents has, over time, become easily accessible to the researchers:

"You can patent anything. To file for a patent compared to getting your paper in one of the top journals... to file a patent is something you do between brushing your teeth and going to bed. That is, of course, because the effort has been done prior to this. But the effort to file the patent itself is very, very small."

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With an increased access to and an eased filing process, the number of *filed* patent applications has been increasing since 2000. This has been applauded by government and OECD rankings alike, but our analysis indicates that the key driver behind this development has not been quite what the policy-makers intended. Rather, our interviewees described patenting as a necessary "part of the game," something one has to do to fulfill organizational expectations exterior to the research process proper:

"We are not measured on the number of obtained patents. We are measured on how much we file to Tech Trans. It's like this 3-page form you ...you could just fill one out a week, if you wanted to. It's a figure each department reports back to the vice-chancellors office."

The filing of notifications to the Tech Trans office has thus become an organizational performance measure, experienced by researchers as no different from other new public management instruments. It is something researchers do to comply with organizational expectations, not something that either facilitates or enhances knowledge production. Somewhat to our surprise, though, it seems not to be perceived as much of a burden by the scientists we interviewed. In fact, when asked if they felt that commercialization activities had an impact on their everyday, they all responded negatively. Patenting is perceived as part of 'the game' they have to play, along with other duties associated with their role as university employees. From the researchers' perspective it is therefore considered rather insignificant, but also not adding any value to either research or external collaboration.

Another significant finding from our interviews is how commercialization of research results has been intertwined with the increasing competition for research funding. We were explained how having patents in your name can be helpful when applying for funding. It was noted that even some traditionally 'basic' research funds now have an increased focus on strategic and applied research for which patent ownership is considered a primary indication. When patenting becomes closely related to funding opportunities, we suggest that the impact on research practice moves from a mere administrative change, to an actual impact as it may potentially refocus research to areas and topics that may deliver patentable results. This suggests that the isomorphic policy adaptations we outlined earlier generate unintended effects at the organizational and individual levels. One informant articulated this and referred to this mechanism as a 'natural echo chamber,' which adds administrative layers to the university administration without adding value to the core activities:

"Around the table everybody is a winner. You're sitting with the Tech Trans people and the patent attorneys [who get employment, our addition]. We are boosting our resumes and the department manager, the chancellor, the dean...everybody wins. You have constructed a system that is a natural echo chamber."
(Scientist interview #2 2015)

The question, of course, remains if this 'echo chamber' – as it is perceived by the researchers – generated by policy changes in the societal requirements on universities in fact helps to generate more commercial

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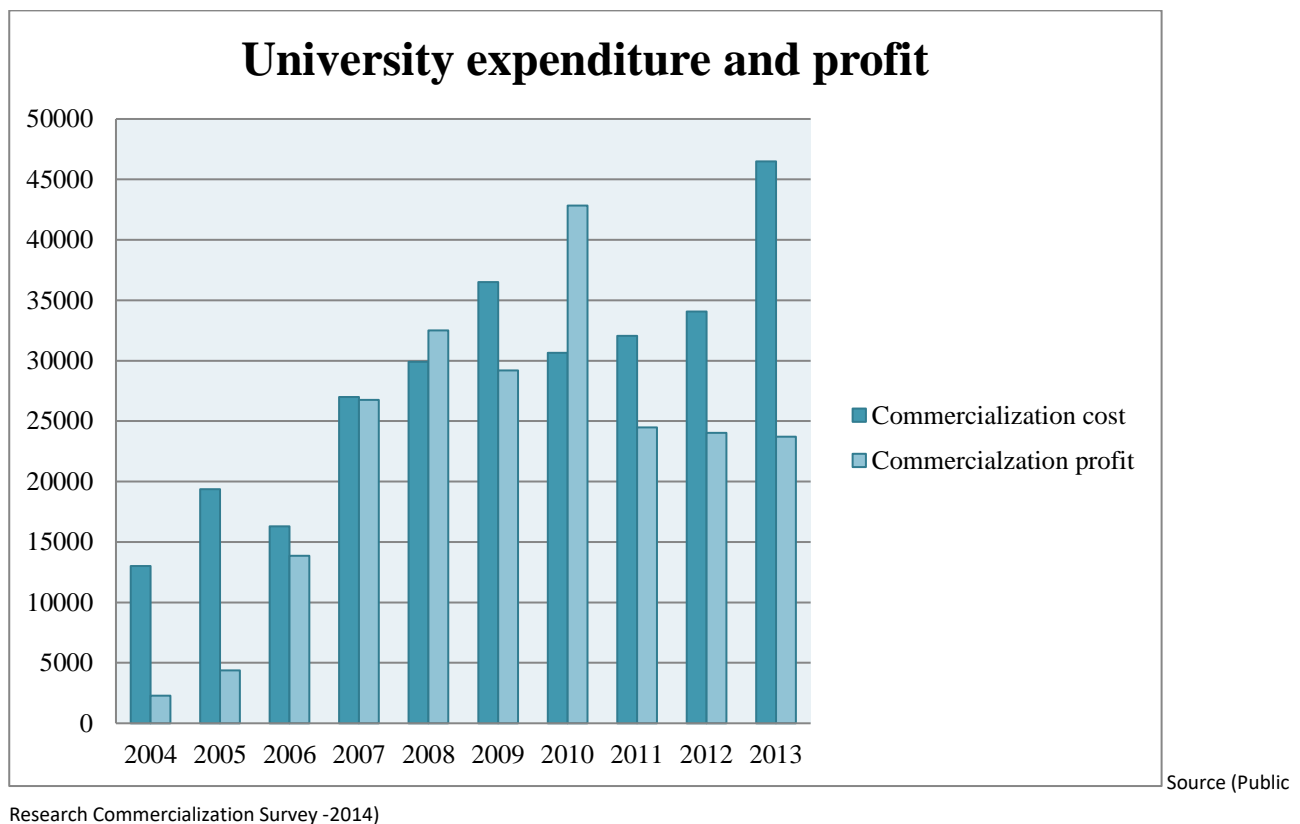
impact of publicly funded research. This is at least doubtful, and we now turn to a more general discussion of the implications of our findings.

Discussion

Living up to Expectations?

To what extent has the Act on Inventions fulfilled its ambitions?

The intentions of the Act were to boost the collaboration between universities and industry in Denmark and to generate new sources of income for the universities through commercializing their research results. Increasing the number of patents and licenses was considered an important means to achieve this goal. In 2004, an official evaluation of the Act was conducted for the Danish Parliament to examine the patenting system, benchmark its results against other countries and map central actors' assessment of the legislative framework and its effects. The evaluation concluded that Denmark, unlike other countries with similar legal frameworks, had not succeeded in creating an effective infrastructure for commercialization which was mainly measured by the fact that less patented inventions had been commercialized and that the Danish universities obtained far less license agreements than comparable countries (Inside Consulting 2004). In particular, it was criticized that the administrative burden of the researchers was too comprehensive and that the administrative and legal competencies needed was not present in the university system. In 2013, a similar evaluation was conducted by a private think tank, showing roughly similar results (DEA 2013). The universities did not benefit from the initiatives, rather keeping up commercialization activities had become an administrative and financial burden as indicated by figure 2:



Despite the lack of achievement documented in the two evaluations, patenting continues to be considered an indicator of research success and commercial impact of research. However, our analysis suggests that through the implementation of policies aimed at advancing commercialization there has been a goal displacement, making patenting as such a goal in itself, whereas commercialization – including the creation of new streams of revenue for the universities – has been lost from sight, at least for the active researchers if not for university management.

Not only does patenting appear to have become a goal in itself. It has also become so embedded in organizational life that it is difficult to abandon even in the light of disappointed expectations. As policy-makers and universities have gradually realized that patents did not produce new streams of income for the universities, but rather significant expenses, the purpose of patenting has been redefined rather than abandoned. The official purpose of pursuing patents at the University in our case has thus become that “The University will take a more flexible approach to collaboration agreements and intellectual property rights (IPR), and will focus primarily on knowledge sharing, rather than income” (University of Copenhagen 2012). Rather than leading directly to commercial successes, knowledge transfer is now increasingly understood as a necessary but not sufficient condition of an innovative economy. And while other instruments are increasingly also used to facilitate this transfer between universities and industry, patenting and licensing remains a key indicator of research outcome at both the organizational level of universities and at the political level in Denmark. Patenting has proliferated via normative isomorphism to become the self-evidently right thing for universities to do – independently of any evidence that it fulfills its

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larger goals. And although the scientists we interviewed do not consider it much of a burden, it is still worth asking if patenting requirements come at a cost, in particular in an innovation ecology like the Danish, which is dominated by small and medium-sized enterprises that may better benefit from more direct collaboration with research institutions rather than managing patent portfolios.⁹

Unintended Effects?

We have demonstrated how patenting as a metric has become institutionalized and embedded to such an extent that it has become an uncritically integrated part of Danish science policy. What are the consequences of patenting in practice having become an end in itself rather than a means?

As our interviews indicated, researchers now make use of patents or patent applications when applying for funding. Patenting has become part of a standardized system of evaluation, internally at universities, as well as externally between the universities and the political system and even internationally, for instance, through university rankings. Politically, the Ministry of Research and Higher Education uses the reported numbers to keep performance records of the universities through the development contracts. Patenting has come to serve as a key indicator of science output, a benchmark tool according to which university performance can be ranked.

In the political-organizational field of science policy, commercial parameters are being used to show success and attain legitimacy. Success in commercialization of public research has come to serve as a measure of attractiveness in the 'knowledge-based economy.' Not performing on these parameters can thus cause Danish science to be considered less legitimate through the lens of the global competition discourse. This is, after all, one of the reasons why the metric was introduced in the first place. However, in retrospect, it seems that patenting as a performance measure may be unreliable or even counterproductive in regard to the original policy goals, namely, to foster a more innovative economy with closer collaboration between universities and industry. Researchers now see patenting requirements as a management instrument rather than an intrinsic part of producing and communicating new knowledge or a tool to promote university-business collaboration.

One may speculate that the dissemination and further development of such metrics to more areas of science is likely to reproduce and reinforce the organizational and normative structures that make it 'rational' for academics and university administrators to engage in patenting despite the uncertain commercial effects (Langford, Hall et al. 2006). One consequence that is seen locally today is that of the *natural echo chamber* as described in the research practice analysis. The scientists make use of the system in new ways to live up to new expectations caused by the performance measurements, so does the department management to meet politically set objectives and so on. This emphasizes that critical examinations of norms and institutions are needed as they otherwise, being considered legitimate, can go

⁹ One may speculate that the continued focus on patenting may also suggest a disproportionate policy influence of a few very large Danish pharmaceutical and bio-tech companies for whom patenting is important compared to other industries. This, however, falls outside the scope of the present inquiry.

unquestioned for prolonged periods of time without contributing positively to the core missions of organizations (DiMaggio and Powell 1983).

Conclusion

Existing studies on research commercialization tend to focus either on 'what works best' in promoting patenting and commercialization or critically assess the implications of commercialization ambitions for academic freedom, choice of research problems etc. Adding to this, we have examined how and why patenting has become a key objective in science policy, as well as its implications for research practice. A key finding pertains to the political context around the adoption of 1999 Act on Inventions. The legislation and its rather uncritical, isomorphic adoption of an internationally legitimized metric paved the way for patenting as an indicator of university performance with quantifiable targets. However, while patenting was originally seen as a *means to achieve* and in turn an *indicator* of commercialization, it eventually developed into a goal in itself. And as the initial ambition to generate revenue for universities through patents was not realized, patenting was nonetheless maintained as a policy objective now redefined as part of the universities' general obligation to put knowledge at the disposal of the surrounding society. We ascribe this to the fact that patenting has become so entrenched in the organizational structure of the universities that it was more convenient to redefine the purpose of patenting activities rather than abandon it. However, our research suggests that as the obtainment of patents was pushed to the foreground by policy-makers and university management, it actually displaced rather than promoted commercial and societal benefits from the purview of active researchers.

To answer our research question about the consequences and pitfalls for academic research of patenting developing from a means to an end, we can now conclude that despite its demonstrated meagre results, patenting has been maintained as the legitimate metric for measuring 'innovation' at universities. In-depth interviews with experts and researchers indicated that although commercialization of research results is not acknowledged as an *academic achievement*, being able to display results in terms of intellectual property rights is increasingly considered necessary independently of either its actual scientific merits or any commercial outcomes; firstly, as it contributes positively to the Ministry of Education's performance measurement of the research institution, and secondly and related, as researchers now perceive patenting as a means to attract research funding. As the researchers interviewed have developed their own understanding and use, patenting and its role have been transformed. The Danish government has equally transformed its reasoning behind 'commercialization' as an objective for the Danish universities; from a source of income and a means to increase collaboration between universities, industry and society, to a performance management tool for the Ministry of Science and Education and a way to ensure a flow of new, 'free' ideas to society, in particular to industry. In effect, a system has been created where the success of universities, departments and individual researchers to an increasing degree depends on metrics, which neither measures scientific merit nor actual commercial success or documented innovation. While our study is set in a Danish context, we expect our results to have wider implications. The kind of isomorphic policy change and process of goal displacement we have documented are likely observable in other settings as well. This, however, deserves to be explored further through comparative research that includes more institutions and more countries.

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References

- Arrow, Kenneth. 1962. *Economic Welfare and the Allocation of Resources for Invention. The Rate and Direction of Inventive Activity: Economic and Social Factors*, National Bureau of Economic Research, Inc: 609-626.
- Asheim, Bjorn Terje, and Lars Coenen. 2005. Knowledge bases and regional innovation systems: Comparing Nordic clusters. *Research Policy* 34(8): 1173-1190.
- Baldini, Nicola. 2009. Implementing Bayh–Dole-like laws: Faculty problems and their impact on university patenting activity. *Research Policy* 38(8): 1217-1224.
- Beckert, Jens. 2010. Institutional Isomorphism Revisited: Convergence and Divergence in Institutional Change. *Sociological Theory* 28(2): 150-166.
- DEA. 2013. Fra forskning til faktura – hvad kan vi lære af ti års forsøg på at tjene penge på forskning? Copenhagen. https://dea.nu/sites/dea.nu/files/Web_Fra%20forskning%20til%20faktura%202_0.pdf. Assessed May 2015.
- DiMaggio, Paul, and Walter Powell. 1983. The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review* 48(2): 147-160.
- Edgerton, David. 2004. 'The linear model' did not exist: Reflections on the history and historiography of science and research in industry in the twentieth century. In *The Science–Industry Nexus: History, Policy, Implications*, eds. Karl Grandin, and Nina Wormbs, New York: Watson. 2004.
- Etzkowitz, Henry. 2011. The triple helix: science, technology and the entrepreneurial spirit. *Journal of Knowledge-based Innovation in China* 3(2): 76-90.
- Frickel, Scott, and Kelly Moore. 2006. *The New Political Sociology of Science Institutions, Networks, and Power*. Wisconsin: University of Wisconsin Press.
- Geuna, Aldo, and Lionel J. J. Nesta. 2006. University patenting and its effects on academic research: The emerging European evidence. *Research Policy* 35(6): 790-807.
- Geuna, Aldo, and Federica Rossi. 2011. Changes to university IPR regulations in Europe and the impact on academic patenting. *Research Policy* 40(8): 1068-1076.
- Godin, Benoît. 2009. *The making of science, technology and innovation policy: Conceptual frameworks as narratives 1945-2005*. Montreal: Centre Urbanisation Culture Société.
- Grimaldi, Rosa, Martin Kenney, Donald Siegel, and Mike Wright. 2011. 30 years after Bayh–Dole: Reassessing academic entrepreneurship. *Research Policy* 40(8): 1045-1057.
- Gulbrandsen, Magnus, and Jens-Christian Smeby. 2005. Industry funding and university professors' research performance. *Research Policy* 34(6): 932-950.
- Innovation, S. f. F. o.. 2014. Kommercialisering af forskningsresultater 2014 - og kortlægning af vidensamspil i bredere perspektiv. Copenhagen, Styrelsen for Forskning og Innovation. <file:///Users/christian/Desktop/DE-Vidensamarbejde-under-lup-2014.pdf>. Assessed May 1 2015.
- Jones, Mark Peter. 2009. Entrepreneurial Science: The Rules of the Game. *Social Studies of Science* 39(6): 821-851
- Kenney, Martin, and Donald Patton. 2009. Reconsidering the Bayh-Dole Act and the Current University Invention Ownership Model. *Research Policy* 38(9): 1407-1422.
- Langford, Cooper Harald, Jeremy Hall, Peter Josty, Stelvia Matos, and Astrid Jacobson. 2006. Indicators and outcomes of Canadian university research: Proxies becoming goals? *Research Policy* 35(10): 1586-1598.
- Lissoni, Francesco. 2012. Academic patenting in Europe: An overview of recent research and new perspectives. *World Patent Information* 34(3): 197-205.

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- Mejlgaard, Niels, and Kaare Aagaard. 2009. Hvilken slags politik er forskningspolitik - nu? *Økonomi og Politik* 82(2): 50-66.
- Meyer, John Wilfred, and Brian Rowan. 1977. Institutionalized Organizations: Formal Structure as Myth and Ceremony. *American Journal of Sociology* 83(2): 340-363.
- Molas-Gallart, Jordi, and Elena Castro-Martínez. 2007. Ambiguity and conflict in the development of 'Third Mission' indicators. *Research Evaluation* 16(4): 321-330.
- Pedersen, Ove Kaj. 2006. Corporatism and Beyond: The negotiated Economy. National Identity and the Varieties of Capitalism. In *The Danish Experience*, eds. John Campbell, John Hall, and Ove Kaj Pedersen, 245-270. Copenhagen: DJØF Publishing.
- Pielke Jr., Roger. 2012. Basic Research as a Political Symbol. *Minerva* 50(3): 339-361.
- Powell, Walter, Jason Owen-Smith, and Jeannette Anastasia Colyvas. 2007. Innovation and Emulation: Lessons from American Universities in Selling Private Rights to Public Knowledge. *Minerva* 45(2): 121-142.
- Rossi, Federica, and Ainurul Rosli. 2015. Indicators of university–industry knowledge transfer performance and their implications for universities: Evidence from the United Kingdom. *Studies in Higher Education* 40(10): 1970-1991.
- Sarewitz, Daniel. 2016. Saving Science. *The New Atlantis* (Spring/Summer 2016): 5-40.
- Soerensen, Henning. 1999. Demands on and Expectations from Research Evaluations, from the Macro to the Micro level. In *Science Evaluation and Its Management*, eds. Václav Pačes, Ladislav Pivec, Albert H. Teich, 51-59. Amsterdam: IOS Press.
- Thursby, Jerry, and Marie Thursby. 2011. Has the Bayh-Dole act compromised basic research? *Research Policy* 40(8): 1077-1083.
- University of Copenhagen. 2012. Strengthening Collaboration Worldwide
http://rektorat.ku.dk/strategi/KU_strategy_collaboration_private_enterpriseMAY12_1_.pdf/ Assessed May 2015
- Valdivia, Walter. D. 2011. The Stakes in Bayh-Dole: Public Values Beyond the Pace of Innovation. *Minerva* 49(1): 25-46.
- Vallas, Steven Peter, and Daniel Lee Kleinman. 2007. Contradiction, convergence and the knowledge economy: The confluence of academic and commercial biotechnology. *Socio-Economic Review*. doi:10.1093/ser/mwl035
- Winickoff, David. 2013. Private Assets, Public Mission: The Politics of Technology Transfer and the New American University. *Jurimetrics* 54(1): 42.