CHAPTER 6

National Innovation Policies: Governments as innovation agents of higher education and research

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GLOBALIZATION AND INNOVATION

There is widespread agreement among economists that international forces have changed the nature of economic development (Soete, 2006). National markets have become increasingly interrelated, and goods, services, capital, labour, as well as knowledge, flow around the world seeking the most favourable economic conditions. Natural resources no longer provide a comparative advantage in economic growth. Instead, in internationally competitive markets, industrial innovation, defined as "the ability for firms and workers to move rapidly into new activities or to improve production processes" (Aghion, 2006, 2), becomes the principal means of sustaining economic growth and productivity.

Promoting innovation has in fact now become the principal means of economic growth in the leading nations. To better compete in a globalised economy, these countries focus increasingly on knowledge, creativity and technical innovation. In this new economic context, higher education and research organizations are becoming crucial objects of national policy. They form an

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essential component of the knowledge economy and therefore are increasingly addressed by newly adopted national innovation policies.

Governmental actors in many countries appear to have comparable motives for developing and implementing national innovation policies. National policy-makers refer to the growth and importance of the "knowledge society" (Santiago, *et al.*, 2008) in which knowledge is *the* crucial production factor. The creation, transfer and application of knowledge are now perceived by policy-makers to be the primary factor influencing further social and economic development. Policy-makers also refer to the processes of globalization and increasing international competition in which the capacity to make use of new knowledge provides important strategic benefits. The creation, dissemination and application of knowledge have now come to be regarded as the essential conditions for the international competitiveness of regions, nations and even whole continents. Therefore they have become the focus of policies at sub-national, national and supranational levels (World Bank, 2007).

As a consequence, over the last several decades many governments have adopted national innovation policies designed to strengthen the innovative capacity of universities and research organizations. These institutions, which are primarily funded by public sources, are now perceived by policy-makers to be one of the few remaining mechanisms government can employ to influence international competitiveness.

NATIONAL INNOVATION SYSTEMS

During the 1980s, a new approach to the economics of innovation emerged that has become known as the National Innovation Systems (NIS) perspective. This perspective emphasises the interactive character of the generation of ideas, scientific research and the development and introduction of new products and processes. The NIS approach adopts an explicit policy orientation, and has been internationally promoted by organizations such as the OECD, the World Bank and the European Commission (Balzat, 2006). The NIS perspective now informs the national policies of many developed nations and has altered their traditional higher education and research policies.

Economic research has discovered that academic institutions play a critical role in NIS and, if anything, their influence on technical innovation has grown over time (Mowery & Sampat, 2004). However, the NIS research emphasised that while the "hard" outputs of academic research — publications and patents — are important for innovation, equally significant are "softer" knowledge transfer processes, including the hiring of new science and engineering Ph.D. graduates, whose added expertise is a primary means of transferring academic knowledge to industry (Cohen, Nelson & Walsh, 2002). In direct contrast to the linear assumptions of the traditional "science-

push model", the NIS perspective emphasizes the influential role of linkages among the various actors and organizations that participate in the overall innovation process (Edquist, 1997; Nelson, 1993). While these linkages do include formal knowledge transfer arrangements between universities and industry, such as science parks and joint university-industry research ventures, they also include the many channels of communication such as meetings and consulting by which knowledge is exchanged. Finally, a critical difference between the NIS perspective and traditional higher education and research policy is the NIS perspective's emphasis on the importance of framework conditions: the governance processes, regulations, incentives and underlying beliefs that shape innovative behaviour (Balzat, 2006).

Over the last 20 years, the NIS perspective has influenced national reforms in higher education and research policy in many nations (Laredo & Mustar, 2001; Lundvall & Borrás 2004; Rammer, 2006). One version of the NIS perspective aims at promoting innovation within the existing institutional context of higher education through national and state-level incentive programs for basic research in fields deemed critical to future industrial innovation, such as biotechnology, information and communication technology (ICT), medical technology, nanotechnology, new materials and environmental technologies. A second, more systemic and laissez faire version of the perspective, focuses on changing the framework conditions of higher education institutions to promote innovation. This latter approach involves changes in higher education governance processes and legal frameworks; the development of new yardsticks for the evaluation of academic research activity; and the adoption of new incentives to promote the transfer of academic research to society, an issue not traditionally considered part of higher education policy. Examples of this approach include changes in the laws governing IPR (intellectual property rights) and academic labour markets; the introduction of competitive market forces into higher education systems; the transformation of institutional financing of research into competitive research funding; the deregulation of university management; the evaluation of academic research ex post, utilizing new performance indicators; novel initiatives to strengthen and reform doctoral research education; as well as a number of incentive schemes designed to encourage more effective university-industry linkages.

The NIS perspective and its proposed reforms clearly challenge a number of the traditional academic beliefs regarding the necessary unity of teaching and research and the essential incompatibility of basic and socially useful research (Martin, 2003). Not surprisingly, the NIS perspective has provoked controversy within the academic community. However, it appears that many governments (and supranational systems like the European Union) are developing "policy strategies" that are clearly based on this perspective. We will address these "policy strategies" in the next section.

POLICY STRATEGIES

In the present international context, governments are seeking to redesign their systems of higher education and research and to adapt them to the new demands of globalisation and competitiveness. For this they employ certain "policy strategies", i.e., processes in which policies are related to policy-objectives with the intention to realize these objectives. Generally speaking these policy strategies appear to consist of some combination of the basic notions of market coordination and central governmental planning.

The coordinative capacity of the market mechanism is well known. In a free market with perfect competition, prices carry the information on the basis of which decisions are made with respect to demand and supply. However, the model of the perfectly competitive free market often is not realistic. In reality one has to allow for transaction costs, scale effects, less than perfectly informed actors, less than perfectly mobile production factors, and non-homogeneous goods. In addition, high barriers to entry to a market may provide existing organizations with monopoly power, or competition may take place by means of mechanisms other than prices (e.g., quality or reputation). In short the perfectly competitive free-market mechanism seldom is a realistic option for policy-makers (Teixeira *et al.*, 2004; Weimer & Vining, 2005).

But central governmental planning clearly also has its drawbacks. Central governmental planning is an approach to public-sector steering in which the knowledge of the object of steering is assumed to be firm; the control over this object is presumed to be complete; and the decision-making process regarding the object is completely centralized. In reality governmental actors are unable to form comprehensive and accurate assessments of policy problems and to select and design completely effective strategies. In addition, governments are unable to monitor and totally control the activities of other societal actors involved in a policy field and run the risk of non-compliance, inefficiency and nepotism (Lindblom, 1959; Van Vught, 1989).

A "third way" thus has to be found and this is what governments in many nations appear to be seeking. These third ways are specific combinations of the two basic notions of the free market on the one hand, and of central planning on the other. They are "policy strategies" that show a set of "policy characteristics", i.e., a number of features that are the result of the relative emphasis on market coordination and central planning, and that create the specific appearance of these policies. A recent comparative study on national innovation policies shows that in general terms two major categories of policy strategies can be distinguished (Dill & Van Vught, 2009).

Prioritization Strategies

The first and largest category of policy strategies is formed by those policies that can be described as *prioritization strategies*. These policies show characteristics like foresight analyses in the science and technology sectors, priority allocation and concentration of resources, and quality assessments of research outputs. In doing so, they reflect continuation of the notions of central planning.

For example, in Australia both the Commonwealth and the state governments have engaged in research priority setting, emphasizing areas of science that will enhance economic competitiveness. In Canada the governments have attempted to define and fund Centres of Excellence in areas deemed strategic to the country's prosperity. In Finland the national technology agency TEKES explicitly funds university research programs in a number of technology fields that are assumed to be priorities of the Finnish policy of industrial development. In the Netherlands the national Innovation Platform has selected a limited set of "national key-areas" in which both fundamental research and knowledge transfer should be increased. The Foresight Assessments begun in the U.K. in the early 1990s were one of the earliest prioritization strategies in research funding. Even in the U.S., the president's National Science and Technology Council has recently defined a number of interagency research programs in areas of strategic importance to the national economy, and a number of the states are now identifying and funding academic research in specific technical fields with the expectation of stimulating economic growth.

These prioritization strategies also include national efforts to assess the quality of research outputs. The Research Assessment Exercises (RAE) have been a major driver of the significant changes in U.K. university behaviour. Similar, if less ambitious, efforts to link general university funding for research to government-determined output measures are also being experimented with in Australia, as part of the Institutional Grants Scheme, in Finland with performance-based contracts, and in the Netherlands with the so-called "Smart Mix" program.

Competition Strategies

The other category of innovation policies places an emphasis on market forces. These *competition strategies* show policy characteristics, such as emphasizing competitive allocation of research-related resources, encouraging entrepreneurial university behaviour, deregulating the university sector and encouraging multiple sources of funding for higher education and research. As such these strategies reflect a greater reliance on market coordination.

The pre-eminent example of this strategy is the U.S. federal science policy with its emphasis on a national market composed of rivalrous private and state-supported universities, its limited federal control, and its competitive allocation of funding through a set of overlapping research agencies. But many other gov-

ernments are also experimenting with competition strategies, for example, by allocating less money for research via institutional block grants or general university funds and providing more resources via research councils and competitive grant schemes. For example Australia, Canada, Finland, Germany, Japan and the Netherlands have adopted a competitive approach to strengthening research doctoral training, either through competitive national fellowships to support Ph.D. students or through competitive grants for the development of selected graduate or research schools, or both. Australia is also utilizing competitive funding for the allocation of university research facilities; Canada and Finland for the allocation of well-funded faculty chairs; and Germany for funds designed to identify and support university "excellence". The U.K. is attempting to further diversify the funding base of their universities by offering competitive "third sector" funding to promote greater knowledge transfer between universities and industry. Similarly, Canada and several of the U.S. states competitively award matching funds for research facilities and research projects as a means of inducing private industry to participate in and financially support university research.

The State Supervising Model

Although the prioritization and competition strategies that have developed as part of governmental innovation policies can be clearly distinguished, neither is a clear-cut specimen of the respective notions of market coordination or central planning. Rather, the two strategies are both examples of the "third way" mentioned previously. The two strategies in this sense can be interpreted as manifestations of the "state supervising policy model" (Van Vught, 1989). This model is a combination of market coordination, which emphasises decentralized decision-making by providers and clients; framework setting; and supervision by government. In the general policy model of state supervision, the influence by governmental actors is limited. Governments do not intrude into the detailed decisions and operations of other actors. Rather, a certain level of autonomy of these actors is respected and their self-regulating capacities are acknowledged. Governments in this policy model see themselves as the providers of the regulatory, financial and communicative frameworks within which other actors can operate, and as the supervisors of these frameworks.

However, the setting and supervision of governmental policy frameworks in this model can nevertheless have major impacts on the behaviour of other actors. By introducing certain general quality assessment instruments or financial allocation mechanisms into their national policy frameworks, governments are able to strongly steer higher education and research systems without introducing detailed regulation. The differences between the prioritization and competition strategies previously mentioned reflect the levels of impact governmental policy frameworks have on these systems. The policy

characteristics of the prioritization strategy clearly show a higher level of guidance and restriction than the competition strategy.

POLICY IMPACTS

The innovation policy strategies employed by national governments appear to have a number of direct effects on the behaviour of universities, thereby producing discernable changes in overall national higher education and research systems. International forces as well as the market competition introduced by these new policies have led to major reforms in the organization of publicly supported universities. Universities in many countries are now being encouraged by government to adopt a more corporate type of organization, with a stronger central administration, better ties to external stakeholders, and greater independence in the management of their internal affairs — a form well illustrated by Clark's (1998) concept of the "entrepreneurial university".

Research

The growing emphasis on competitive strategies for higher education and research has affected the internal research allocations of universities. The typical reaction of individual universities to the national innovation policies is to increase the quality and size of their successful research fields and hence to focus and concentrate their academic efforts in certain specialized areas. The outcomes of these institutional specialization and concentration processes, of course, differ according to the conditions of the various institutions. Previous academic performance, the affiliation of top-level researchers, and, in particular, the financial resources of a university are factors that are of crucial importance when developing an institutional research profile. But the general effect appears to be a trend within universities toward "focus and mass", toward specialization and concentration.

The new policies also appear to be making universities more productive in their output of publications and graduates, as well as in their patenting and licensing activities. In Australia and the U.K., this improvement has also occurred in universities newly designated after the abolition of the binary line, but the recent evidence from the U.K. suggests that any closing of the performance gap between the old and new universities brought about by these new policies has now slowed if not ended (Crespi & Geuna, 2004). This analysis also suggests that the adoption of performance-based research funding creates a one-time shock to the overall system, which initially motivates increased research productivity in all universities eligible for the funding, but over time is most likely to lead to an increased concentration of research in those institutions with richer resources, larger numbers of internationally recognized academic staff, and established reputations (Soo, 2008).

Marked improvements in the organization and management of higher education and research activities and programs are another impact of the national innovation strategies. It is likely that this improvement is due not only to the policies reviewed above, but also to the general reductions in funding for publicly supported universities that have occurred in conjunction with the massification and expansion of higher education in most countries (Williams, 2004). As a consequence, universities in a number of countries have necessarily become more highly motivated to pursue alternative sources of revenue for their research programs and, therefore, have been required to develop the internal management processes necessary to survive in this competitive market.

A possible negative impact of the new policies is the diminishment of research support in particular fields, often in unanticipated ways. Historically, the social sciences and humanities have received substantially lower levels of research support than have the basic sciences, medical sciences, and engineering. The current concern with national innovation and economic development, as well as the new policies of academic research, further disadvantage research in the "softer fields". Less obvious, however, is the potential negative impact that the strong emphasis on research programs in the applied sciences and technology along with performance-based funding can have on the support for research in some basic science subjects, such as chemistry, physics, and mathematics, which serve as the critical foundation for many technical and applied fields (Cohen, Nelson & Walsh, 2002). In the U.K. the concentration of research funding brought about by the RAE has led many universities to reduce or eliminate basic science departments that do not receive the highest rating. In the United States, despite a recent initiative by the National Science Foundation to increase funding for the basic sciences, shifts in research priorities by the large, mission-oriented agencies like the Department of Defense and NASA (the National Aeronautics and Space Administration), which fund significant amounts of academic basic research, may still result in reduced funding in foundational science fields. These concerns suggest that the more competitive and dynamic environment of higher education and research, which the new policy strategies helped create, may now require national governments to take more active steps to define particular subjects as in the national interest and to assure that these fields receive adequate support for research and (doctoral) education.

Knowledge Transfer

A major impact of the national innovation policies is that knowledge transfer has become an accepted and valued element of the general mission of most universities. Despite initial reluctance and even controversy in some institutions, significant changes in university culture have occurred over the last decades,

with the development of a more entrepreneurial and utilitarian orientation to both university education and research programs. Universities now increasingly focus on their potential role as regional partners in innovation "clusters"; they develop programs with business and industry; they open up technology transfer offices; they offer consultancy and training activities in order to assist entrepreneurs in making use of new knowledge; and some even adopt their innovative character as an institutional identity. In Europe a group of "entrepreneurial universities" have organized themselves into a cooperative network, the European Consortium of Innovative Universities (ECIU).

As with publications and doctoral students, there clearly are increases in knowledge transfer activity by higher education institutions, as indicated by the numbers of patents, licences, and industrial start-ups. A much debated topic in the context of knowledge transfer is policies on intellectual property rights (IPR). The original changes in the IPR legislation in the United States — the Bayh-Dole Act — were motivated by a desire to speed knowledge-to-market; therefore, patent and licensing rights were re-allocated to universities through new laws designed to increase university incentives for knowledge transfer. The policy was never expected to create a major new source of funding for higher education and research institutions. But with the growing competition for academic research funding, universities are now more aggressively seeking research revenues from other sources and, in many instances, have interpreted new IPR legislation as an exhortation to "cash in" their research outcomes. The available evidence, however, suggests that most universities are at best breaking even and many are suffering net losses from their investments in technology transfer offices and affiliated activities. While many universities see their technology transfer expenses as a necessary investment that they expect to bear significant fruit over time, Geiger's (2007) research in the United States suggests that over the longer term the institutions that do reap some financial benefit from patenting and licensing are the most highly ranked and best known research universities. But even in these institutions there tends to be a ceiling as to the amount of such revenue that can be earned.

One unintended impact of public policies emphasizing IPR as a means of stimulating academic knowledge transfer is their influence upon the core academic processes. By increasing incentives for universities to patent and license their discoveries as a means of raising revenues, some theoretical results and research tools that have traditionally been freely available to other scholars and researchers are now being restricted. This constriction of open science may in fact lessen the economically beneficial "spillovers" to society that are a primary rationale for the public support of basic academic research. Policies intended to provide incentives for knowledge transfer, therefore, have to be designed with particular care to maintain the benefits of open science.

Research on sources of innovation in industry raises additional questions regarding the emphasis of national knowledge transfer policies on the "hard" artifacts of academic research (Cohen, Nelson & Walsh, 2002). Patents and licences are influential on innovation and profits in a relatively small number of industries and technical fields, biotech being the most prominent example. This reality helps explain the natural ceiling on patenting and licensing revenues that Geiger (2007) discovered in leading U.S. universities. More influential for most industries are the "softer" knowledge transfer processes, such as publications, meetings, the use of consultants, and the hiring of new Ph.D. graduates (Cohen, Nelson & Walsh, 2002; Agarwal & Henderson, 2002). As Geiger (2007) notes, public policies that emphasise the "hard" outputs of academic research are, therefore, likely to undersupport knowledge transfer beneficial to society. In the policies implemented by the European Commission and by a number of the E.U. member states, the emphasis on patenting and licensing appears to be more limited than in the United States. Instead the knowledge transfer focus is largely on the exchange of people, the increased production of research doctorates, and the stimulation of start-up firms. This European approach to knowledge transfer is "softer" than the U.S. focus on licensing and patents, but, as a first comparative study shows (Van Vught, 2007), not necessarily less effective. Despite less effort in terms of invention disclosures and patent applications, the E.U. countries execute more licences and create more start-up firms (but have less patents granted) than the United States.

Institutional Diversity

Reviewing the policy impacts discussed before, an interesting question is whether there is an overall diversification effect at the level of the *system* of the higher education and research as a result of the various reactions by higher education and research institutions to their altered framework conditions. The introduction of market forces and greater competition into higher education should, according to economic theory, lead not only to greater productivity in research outputs, but also to greater allocative efficiency for society as universities are required to respond more effectively to the needs of their various research patrons.

Because of its distinctive national policies, the U.S. higher education and research system has long been considered a system with substantial diversity in quality, with highly ranked academic research concentrated in a minority of its universities. About a third of the U.S. universities conduct more than two-thirds of federal academic R&D in addition to graduating over two-thirds of research doctorates. In contrast, the national policies of many European countries were designed to achieve a certain homogeneity in performance among publicly supported universities. The general impact of the new policies is to concentrate academic research and Ph.D. training in a smaller number of

institutions, as well as in universities in economically advantaged regions. In Finland the government has made a public commitment to concentrate research and Ph.D. training in a few comprehensive universities. In Denmark the recent mergers in higher education and research intend to concentrate quality, volume and investment capacity. In a number of other countries national innovation policies have clearly been designed to create a group of "world-class universities". The RAEs in the U.K. and the Excellence Initiative in Germany are obvious examples.

Although there is clear evidence of increased research concentration, there is little empirical support for the view that the new policies are encouraging a diversity of university roles and missions. These policies certainly stimulate universities to engage in international competition, but they provide insufficient incentives for the development of true system diversity. While global market forces as well as government-designed prioritizing and competition strategies have been effective in helping differentiate a class of international research universities, the existing policies appear inadequate for steering the majority of a country's universities into constructive roles as part of a national higher education and research system. Academic autonomy is such that scholarly norms and values have become major drivers of institutional homogeneity. The forces of academic professionalism and the eagerness to increase individual and institutional academic reputations impel all universities in the new, more competitive environment to imitate one another rather than to diversify their missions and profiles.

All universities try to recruit and employ the best scientists, i.e., those scholars with the highest recognition and rewards, the highest citation impact scores, and the largest numbers of publications. In order to be able to do so, they need to increase their research expenditures (since the research context attracts scholars), creating a continuous need for extra resources. Given their wish to increase their reputation, universities also try to attract the most talented students. They use selection procedures to find them, but they also offer grants and other facilities in order to recruit them, again leading to a continuing need for additional resources. The major dynamic driving all universities is therefore an increasingly costly "reputation race" (Van Vught, 2008) in which universities are constantly trying to show their best possible academic performance and in which they have a permanent hunger for financial revenues. In this sense Bowen's famous law of higher education still holds "… in quest of excellence, reputation and influence… each institution raises all the money it can… [and] spends all it raises" (Bowen, 1980, 20).

The result of these forces is that the new policies for higher education and research have not yet engendered the allocative efficiency for society that they were expected to achieve. In the concluding section a strategy will be suggested for addressing this problem.

A NEW INNOVATION POLICY STRATEGY

The national innovation policies adopted by many nations have positively affected the productivity of higher education and research in most countries and have encouraged a more entrepreneurial culture within universities, particularly in the development of active processes of knowledge transfer. At the same time these policies also reveal a number of limitations. The apparent positive relationship between adoption of elements of the competition strategy and academic research performance may not be linear, and the actual impact of the increased research outputs on technical innovation and economic development has yet to be fully established. Furthermore, the new policies may be encouraging a costly race for world-class reputations among higher education institutions, a race that relatively few can win and that diminishes the diversity in higher education and research missions most beneficial to society.

We would suggest that these weaknesses of current public policies appear to be symptoms of market and government failures associated with inadequate information on the performance of both universities and related public policies. In the more competitive political environment now shaping higher education and research, what is needed in our view is a new innovation policy strategy. Such a strategy would focus less on the identification and prioritization of promising technology fields (i.e., the prioritization strategy) or on stimulating competition between higher education and research institutions (i.e., the competition strategy), but would focus more on the provision of information to enhance university performance. It would be a strategy of policy learning.

In our view, policy learning consists of three elements: a continuous search for better/new policies, a process of trial and error, and the gaining of experience and results under real-world conditions. Policy learning, in this sense, is the "deliberate attempt to adjust the goals and techniques of policy in response to past experience and new information" (Hall, 1993, 278). It implies the search for more effective policies through the application of existing policies. It combines application with analysis and, thus, focuses on learning.

A policy learning strategy underscores the necessity of providing valid, publicly accessible information on the performance of higher education and research organizations. Learning can only take place if the access to knowledge is a public good, open to all participants in the process and if no specific ownership of information exists. The policy learning strategy is therefore clearly related to the concept of "open innovation" (Chesbrough, 2003) and the Open Source approaches to software and information, in which ownership and protection of information are seen as restricting the circulation of knowledge and the consequent social benefits for society. A learning policy strategy, therefore, would stress the importance of public provision of information

about higher education and research performance and about the effectiveness of public policies to stakeholders in order to stimulate learning and change.

A traditional role of government is to provide information in strategically important policy areas to help the public evaluate socially beneficial behaviour (Majone, 1997). However, the increased economic value of academic research, higher education graduates, and university reputation has motivated development of a worldwide industry of publications designed to provide information on university rankings and program quality. The *U.S. News and World Report* pioneered the publication of university quality rankings for students in 1983. But more recent rankings, such as the Shanghai Jiao Tong University rankings (commenced in 2003), the *Times Higher Education Supplement* rankings (commenced in 2004), and Ph.D. rankings by the commercial firm Academic Analytics in the United States (commenced in 2005), have focused more explicitly on institutional research performance and worldwide university reputation. These rankings provide extra stimuli for universities and governments to clamber up the global ladder of university reputation. The measures employed in these league tables represent the private interests of those who design them, and the validity and reliability of their indicators of research performance are highly debatable (Dill & Soo, 2005; Van der Wende & Westerheijden, 2009). In the new worldwide competitive market that confronts higher education and research, there is a need for more valid "signals" of higher education and research performance, i.e., information-oriented public policies designed to assure a more efficient rivalry among universities as they vie to better serve society (Dill, 1999). The recent, E.U.-funded project to develop a mechanism to "map" the higher education landscape by providing a multi-dimensional classification of higher education institutions is a first answer to this need (Van Vught, 2009a).

The Open Method of Coordination (OMC), as it is being applied in the innovation policy of the European Union (the "Lisbon Strategy"), offers another creative example of an information-based policy. The OMC assumes that coordination of national policies can be achieved without the transfer of legal competences or financial resources to the European level. It works through the setting of common goals; translating these into national policies; defining explicit, related performance indicators; and measuring and comparing the performance of these policies. With regard to national innovation, performance measurement takes place by using standardized indicators for benchmarking processes and progress monitoring as well as by means of peer reviews of the outcomes (European Commission, 2000; Bruno, Jacquot & Mandin, 2006; Gornitzka, 2007).

The OMC clearly is an arrangement that promotes policy learning among the E.U. member states. Its basic idea is to create, in a two-level structure of jurisdictions, systemically organized mutual-learning processes. At the level of

the E.U., the member states evaluate their various policy performances according to the joint objectives set and the indicators agreed upon. In the variety of experiences, "good practices" are identified and their diffusion is supported. The coordination of the process is largely in the hands of the European Commission, which analyses the progress reports of the member states, identifies good practices, suggests recommendations for each member state and drafts an overall report that must be approved by the European Council (the heads of state or government of the member states and the president of the European Commission). Though the European Commission cannot make mandatory recommendations, it nevertheless plays a crucial role in organizing the process by suggesting common goals, collecting and analysing information, and drafting recommendations. The OMC stimulates the member states to experiment with different policies, evaluate their outcomes, and then identify good practices. It is a process of mutual learning, coordinated at the level of the European Commission, but with substantial flexibility and openness for the national governments (Van Vught, 2009b).

The E.U. experience with the OMC is usefully compared with the lack of comparable information-oriented policies to promote mutual learning among the U.S. states. The National Science Foundation provides extensive data on science and technology in the U.S. system and federal science agencies subsidize the research doctoral rankings conducted by the National Academies of Science. But the federal government has not formally supported the provision of systematic comparative data on the innovation performance of the 50 states similar to the European Innovation Scoreboard (latest version: European Commission, 2008a) or provided comparative data on the performance of U.S. universities similar to the European "progress toward the Lisbon objectives" reports on research and higher education (E.C., 2008b, 2008c). Nor has it provided related indicators or incentives for policy learning that would help guide the rapidly increasing investments in academic science and technology by many U.S. states. In order to prevent inefficient university regulation at the state level and promote mutual learning about effective innovation practices among states, the European approach to innovation policy learning deserves serious attention in the U.S., as well as in other federal systems of higher education.

In summary, the policy strategy of policy learning provides a potentially valuable and important supplement to the policy strategies of prioritization and competition, the two strategies that are so far still dominant in national innovation policies. The policy learning strategy assumes a minimal level of policy heterogeneity and therefore is particularly appropriate for multi-level political systems, like federal states and the European Union. But as suggested in Finland, with its emphasis on regional diversification, mutual learning is applicable in unitary nation states as well. Finally, the heterogeneity of policy contexts also offers a new and interesting means of addressing the issues of

university autonomy in different higher education and research systems, and the inequalities regarding global academic competition. In diversifying their policy contexts in order to stimulate policy learning, national governments may create different conditions for different categories of universities and hence allow some of these institutions to really compete at the international platform of academic reputation, while other institutions are stimulated to develop more national or regional profiles. National governments that take global competition processes seriously and accept the fact that the capacity to create, disseminate and apply knowledge is of crucial importance in these processes may, in this sense, find important extra strategic advantages in developing their ability to learn.

Public policies designed to strengthen national innovation and its contributions to economic development need to focus on promoting mutual learning among universities, their various patrons, and policy-makers in the different strata of multi-level governance. For this to occur, governments need to invest in information-based policies that provide to the many stakeholders of the universities valid and reliable information on higher education and research performance as well as comparably objective information on the social costs and benefits of public policies intended to enhance academic research, improve the quality of graduates, and boost knowledge transfer.

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