Abstract:
Emanating from the Anglo-American sphere, the enthusiasm for clusters has grasped firm hold of politicians and policymakers in Germany. Despite this apparent policy diffusion across time and space, the universal applicability of the concept or its otherwise necessary adaptation to national, regional and local peculiarities are rarely questioned. This paper adopts an institutional perspective and draws on the varieties of capitalism approach to compare the cluster policies of North Carolina and Bavaria, situated in a multi-level governance framework in which the state level interacts with federal and local policies. 60 semi-standardised interviews have been conducted with practitioners, consultants and knowledgeable but independent experts in both states. Contrasting North Carolina and Bavaria, we attempt to link the differences in the design and implementation of cluster policies to characteristics of the national institutional environment, as well as to regional specifics and path dependencies. Our findings allow some tentative judgment on the transferability of the cluster approach to economic development and point towards unsolved issues to advance the fledgling field of comparative cluster policy research.

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Cluster Policy in Co-ordinated vs. Liberal Market Economies: A Tale of Two High-Tech States
1 Cluster Policy and Varieties of Capitalism: The Challenge of Multilevel Governance

Almost two decades after PORTER’S (1990) *Competitive Advantage of Nations*, the cluster concept has apparently not lost its appeal to academics, policymakers and practitioners thinking about the promotion of innovative capabilities and economic growth. Defined by PORTER himself (1998: 197 f.) as “geographic concentrations of interconnected companies, specialized suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate”, clusters are widely regarded as a panacea for national, regional and local competitiveness. Starting with its conceptual fuzziness, the cluster concept received a fair share of academic criticism (cf. MARTIN/SUNLEY 2003). However, academic dissatisfaction has as yet failed to undermine the widespread cluster enthusiasm of consultants, politicians and economic development practitioners.

With the ongoing popularity of cluster promotion, it is often overlooked that the most shining cases of successful clusters emerged and grew without explicit government intention. Of over 800 clusters identified by the Harvard Business School’s Cluster Meta Study, only one emerged through a public initiative, while the emergence of a further 40 was influenced by public action - but not through cluster policies, but rather through wars and expulsions (VAN DER LINDE 2005: 28). Therefore, it is now widely accepted that governments can only create favourable conditions for cluster emergence and facilitate their growth and restructuring once they have emerged. Such cluster policies can be defined as “efforts of government to develop and support clusters in a particular region” (HOSPER/BEUGELSDIJK 2002: 382). Their high degree of public agency sets them apart from business-led cluster initiatives in which firms assume centre stage, while government and/or the research community only play a supportive role (SÖLVELL ET AL. 2003: 31).

Despite significant forces of policy convergence such as globalisation, intensified locational competition and the shift towards the knowledge-based economy, structural and institutional differences between nations and regions make a one-size-fits-all cluster policy look hardly feasible. Furthermore, cumulative and path-dependent learning by doing in policy and practice contributes to persisting variety not only in the interpretation and application of the concept, but also in the rationales and targets of cluster promotion. Cluster policies emerged at the convergent interfaces of formerly isolated policies, especially science and technology, industrial, and regional policy. A first source of international variety is thus the policy area which embraces the cluster notion first and most forcefully. Further institutional variety may be expected from the role attributed to public vis-à-vis private action, which is captured by the institutionalist concept of varieties of capitalism (VoC) that places market economies on a spectrum from liberal to co-ordinated (HALL/SOSKICE 2001). Their core argument is that national VoC persist
through a co-evolution of the institutional environment and corporate strategies, which are mutually reinforcing. This persistence is strengthened by the inertia and rather incremental evolution of institutions (cf. NORTH 1990). While the United States are commonly regarded as the archetypal liberal market economy (LME), co-ordinated market economies (CMEs) are epitomised by continental European countries, with Germany as a pivotal case (cf. BUSCH 2005). According to SOSKICE (1999: 222), the institutional distance between these two countries has even widened since the 1970s through deregulation in the U.S. while attempts at mutual institution copying failed. From an evolutionary perspective, BATHELT/GERTLER (2005) discuss a broad set of facets of the “German variety of capitalism”, ranging from the national system of innovation, finance and corporate government via labour market regulation and industrial relations to education and vocational training. However, they did not include issues as specific as cluster policy.

Gathering data on 713 cluster initiatives from 71 countries, KETELS ET AL. (2006: 22) found systematic differences between LMEs and CMEs. In LMEs, cluster initiatives are more often initiated by the business sector and tend to focus on export promotion. By contrast, their peers in CMEs are more strongly influenced by (national) government policies and tend to employ more staff. They can leverage on higher levels of trust across groups of actors and tend to emphasise the upgrading of innovation. CASPER (2007) uses the case of biotechnology to illustrate the institutional barriers to transferring the Silicon Valley model of venture capital-led, radical regional innovation to continental Europe. The burst of the new economy bubble revealed Germany’s failure to establish a sustainable venture capital industry, lacking vital ingredients of the Anglo-American model such as pension funds. The consequent impact of VoC on regional high-tech clustering is supported by a recent comparison of the UK and Austria (COOKE ET AL. 2007).

The VoC approach may thus serve as a useful concept for a comparative analysis of national cluster policies. However, it is increasingly challenged on several accounts, one being its exclusive focus on the national level. Although the nation state is once again seen as setting important parameters, technological and economic development is increasingly governed at various spatial and administrative levels. This becomes especially evident in the EU where governance issues like cluster policy are organised on different levels from the supra-national via nations and sub-national regions all the way down to the economic development efforts of cities and municipalities (cf. CONZELMANN/SMITH 2008). Hence, national varieties must be analysed in the wider context of multilevel governance (cf. CALLAGHAN 2008). Further to this methodological nationalism, PECK/THEODORE (2007) criticise the VoC approach for its essentially static analysis, its latent institutional functionalism, and for its failure to balance national specificity and path-dependency on the one hand with convergent forces of capitalist restructuring on the other.
The first criticism calls for an international comparison of cluster policies across all levels of governance, using the archetypal representatives of an LME and a CME as examples. It is thus our aim to compare and contrast the way cluster development is promoted in the United States and Germany. In both countries, we will focus on case studies at the state and sub-state level, but the multilevel governance framework requires accounting for the national (federal) level as well. In the case of Germany, the supranational EU level also plays a role for cluster promotion through structural funds and cross-border networking, but is excluded in this paper since it does not have any direct impact on the regional cases presented here. To control for the type of region, we chose the states of North Carolina and Bavaria, which have both experienced remarkable high-tech industrialisation during the past decades. We will cover both countries individually by level of governance, before contrasting them to distil commonalities and differences. However, our research methodology and the choice of our cases require a brief introduction to start with.

2 Methodology and Choice of Case Studies

Cluster policy is a relatively young, complex and theoretically poorly structured phenomenon that still evades quantitative research by and large. Hence, cluster policy research still needs to rely on a qualitative research design. The varying interpretation and application of the cluster idea in different models of capitalism and spatial contexts were central objects of a research project including semi-standardised interviews with 87 cluster policy experts, which were conducted between August 2006 and August 2007 in Germany and between April and May 2008 in the United States. The sample of interviewees comprised 46 practitioners in ministries, departments and economic development agencies, seven policy advisors and 34 independent observers (cf. Table 1). The interview transcripts were complemented by academic literature where available, brochures, political documents such as parliamentary and council notes, as well as unpublished concepts, expertises and evaluations to form the basis for a comparative case study-based survey of cluster policy.

The choice of the U.S. and Germany as national case studies for comparative cluster policy research is obvious as they represent archetypes of LMEs and CMEs within the VoC approach. However, the multilevel nature of cluster policy requires zooming into the state, regional and local levels as well. To control for the broad type of region, we chose to compare North Carolina and Bavaria in this paper as these two states are commonly classified as ‘high-tech’ economies though their internal spatial pattern is more diverse. More specifically, it is North Carolina’s Research Triangle and the Greater Munich area (Upper Bavaria) in Bavaria that experienced rapid growth driven by high-tech industries over the past decades. This choice allows us to isolate national specificities within the VoC framework more clearly than a mix of e.g. high-tech, old industrialised and peripheral rural areas. On the sub-state level, we allowed for more diversity
when choosing the more rural Piedmont Triad which is dominated by declining industries to complement North Carolina’s shining Research Triangle. In Bavaria, Upper Bavaria is the high-tech engine of a booming state, but does not exhibit any cluster policy efforts at the sub-state level. As a substitute, we selected Bavaria’s fifth-largest city of Regensburg which may be seen as a small-scale model of Bavaria’s late and high-tech industrialisation. Our second sub-state case study Central Franconia, the region surrounding Bavaria’s second city of Nuremberg, is rather atypical for Bavaria in that it suffered from a crisis of large-scale Fordist manufacturing in the early 1990s, which led local actors to engage in an important case of cluster policy in response.

At all relevant spatial scales, we ask for the institutional foundations of cluster policy, the motivation for pursuing such a policy, as well as its evolution and impact. In the next two sections, we work our way from top to bottom through the cluster policy landscape of the U.S. and Germany, using North Carolina and Bavaria as case studies.

3 North Carolina

3.1 National Setting: United States

In the U.S. governmental system, the vertical division of labour between the federal government and the fifty partly sovereign states is institutionally appointed. The division of political power was streamlined in response to the Great Depression when President Roosevelt initiated a bundle of economic and social reforms framed in the National Recovery Act and the New Deal, reducing the power of the federal states (cf. HÜBNER 2007: 44). This led to the evolution of an increasingly co-operative federalism, as two administrations exert their governmental power in terms of a dual federalism on the same territory. This dual federalism forms the institutional context for cluster policy in the U.S.: Due to the autonomy of the federal states, there is no immediate federal governance influence in this policy field.

The LME of the U.S. provides a conducive environment for radical innovation and new high-growth industries (cf. CASPER 2007: 15 ff.). The U.S. benefit from the scale of their internal market and a high mobility of capital, labour and knowledge compared to e.g. Western Europe. The resulting agility allows factor combinations which enable flexible responses to changing markets and technologies. This flexibility facilitates the development of innovative clusters, an argument reminiscent of the flexible specialisation hypothesis (PIORE/SABEL 1984, cf. CRESCENZI/RODRIGUEZ-POSE/STORPER 2007: 673 ff.).

In the U.S., there is a widely-held perception within the business community and the general public that the state should refrain from intervention in the economy, based on a strong confidence in the self-regulating ability of markets (cf. LISSKE 1995: 14). As a result, federal government refrains from direct intervention in the economy and focuses its efforts on macroeconomic variables through tax and monetary policy to create a favourable business climate (cf. DICKEN 2007: 210). Federal economic policy merely sets the
framework for regional and local cluster policy. Nevertheless, the federal administration considers clusters as a potential answer to the challenges of global competition and the knowledge-based economy, and as a suitable device for strengthening competitiveness. In an LME, federal government responds to market signals. Hence influencing the market only succeeds with a heavy allocation of resources (SOSKICE 1999: 208). In this context, the traditional arm’s length relationship between government and business is at best bridged by public authorities that deliver financial support which can be used for cluster promotion.

The lead agency for federal economic policy is the U.S. Department of Commerce. The cluster approach is supported by the Department's Economic Development Administration (EDA) set up in 1965. The EDA provides individual grants for regions within the framework of the Economic Adjustment Assistance Program, which was also launched in 1965 and has been modified since, and the Grants for Public Works and Economic Development Facilities. These programmes comprise the implementation of cluster strategies as sub-goals (cf. STEWART/LUGER 2003: 1). Federal states, counties, cities and other administrative units may continuously apply for the grants. The cluster approach is viewed as a reaction to economic crises and structural adjustment needs, especially in rural regions, but not as an opportunity for regions. The EDA is anxious to promote cluster policy on the national level to boost the regional competitiveness, but it has hardly any influence on cluster policies at the state level. Another example for cluster-related federal government activities is the assignment of research funding by the National Science Foundation, which attempts to induce co-operation between actors of the innovation process and the commercialization of innovations through project funding. In sum, there are a few national programmes that affect regional cluster policies, but federal programs are to a lesser extent being adjusted towards the direct support of regional clusters (PORTER 2008: 41). Accordingly, there is no direct cluster policy on the federal level, which is consistent with the absence of any explicit strategy for economic development in general (SÖLVELL 2008: 17).

Nevertheless, there are some skills-based federal government programmes that have a stronger impact on regional cluster policies. To enhance workforce development, the Employment and Training Administration of the U.S. Department of Labour started programmes like the High Growth Job Training Initiative in 2003 to distribute grants by way of competition to pre-selected industries. In 2005, the Workforce Innovation in Regional Development (WIRED) programme was launched as another step in this direction. The WIRED programme can be seen as having the most direct impact on regional cluster policy, and on the interaction of public institutions. It combines the efforts of regional economic development institutions with the activities of regional workforce development institutions (BERKELEY POLICY ASSOCIATES 2008: 2). Economically distressed regions seeking revitalisation through a collaboration of public and private stakeholders were selected by way of competitions. The goal of the programme is to transform traditional approaches to regional policy into a more collaborative one. The grant includes 5 million
US$ p.a. for every region over a period of three years in the first phase starting 2006. 14 metropolitan areas and 25 larger regions have become part of the three-phase WIRED grant so far. The programme displays certain parallels to, and overlaps with cluster approaches. Thus numerous of the WIRED projects have evolved into regional cluster policies (MILLS ET AL. 2008: 25 f.).

In the course of this development, public workforce agencies try to use cluster-based strategies to support their regional labour markets. Referring to the cluster approach, they increasingly co-operate with economic development agencies (HARPER-ANDERSON 2008: 119). This can be assessed as an advance, because workforce development and economic development have traditionally been institutionally separated as the former focused on the supply side and the latter on the demand side of the labour market (ibid.: 120).

3.2 State-level Cluster Policies in North Carolina

During the 1990s, state-level economic development became increasingly influenced by the Porter’s work and started devising cluster strategies. The widespread success of the cluster approach can be explained by its more effective allocation of resources vis-à-vis the traditional industry-based promotion. Several federal states use the cluster concept both as an analytical instrument for the detection of competitive strengths, and an organizational device for the strategic implementation of supportive measures. The design of cluster approaches varies between the federal states, depending on their respective organisational, institutional and political contexts (MILLS ET AL. 2008: 19 f.). Hence GOLDSTEIN ET AL. conclude that “there are more differences than commonalities in how states go about implementing cluster strategies” (2008: iv).

In North Carolina, cluster policy evolved over a long period of time. As a reaction to serious job losses in dominant manufacturing industries such as textiles and apparel, furniture, and tobacco, the state government started early with extensive financial efforts to attract high-tech companies, and to convert North Carolina into a “State of Minds”. An early milestone within these sustained efforts was the foundation of the now internationally-renowned Research Triangle Park (RTP) in 1959 (cf. LUGER/GOLDSTEIN 1991). With the assistance of broad public investments, North Carolina changed – at least to some extent – to an economically powerful region within the U.S. In the mid-1990s, North Carolina led national rankings regarding investments in R&D. By the end of the decade, however, the state had already lost its leading role. This peculiar situation is both the background and the starting point for an explicit state-level cluster policy. The cluster concept was expected to focus an increasingly strained public budget by investing strategically and goal-oriented to stimulate the economy effectively and to create jobs in North Carolina.
The North Carolina Department of Commerce (NCDC) is the leading economic policy agency for the federal state with a focus on traditional duties like financial incentives to attract mobile investment, and supporting existing firms. In addition, there are seven Regional Partnerships organized as non-profit-organizations and commissioned with place marketing and economic development. These Partnerships were initiated in 1993 in response to a perceived vacuum of economic development policy outside the state capital, Raleigh. The dual economic development system is associated with coordination efforts among the stakeholders in the regions and the state government (cf. LUGER/STEWART 2003: 10). There are overlapping fields of duty between both institutions, but there is also formal collaboration in numerous areas. However, our interviews have shown that the co-operation of both institutions works only ostensibly well. To start with, they are not linked by a coherent common strategy. Misunderstandings result from the Department’s civil-service organisation, while the Partnerships are non-profit-organisations with a high degree of private involvement, which leads to a lack of trust between them. Another problem is that despite its representations in the Partnerships, the NCDC is not considered as the leading institution in the economic development process – even though there is demand for federal state leadership.

Cluster analyses were the subject of several publicly commissioned studies. As a continuation of these research activities, and in response to the general economic conditions at that time, Governor James B. Hunt, the North Carolina Board of Science and Technology, as well as leading business and policy individuals launched the Vision 2030 initiative in 1999 with a focus not only on manufacturing industries, but also on the economy as a whole (cf. LUGER ET AL. 2003: 31). Part of the Vision 2030 process was a cluster analysis of the seven Regional Partnerships in North Carolina (FESER/RENISKI 2000). Despite the results from the cluster analysis, the NCDC continued to pursue a traditional industry approach while the cluster concept remained in an initial phase. In 2002, the Secretary of Commerce installed so-called “Industry Sector Teams” to survey the needs of individual companies and to consult entrepreneurs. The focus of these teams overlaps with cluster policy, but it is rather focused on the needs of single companies. There are neither proactive instruments, nor is there a structured approach.

So far, the NCDC used the cluster concept as a purely analytical tool, but hardly for the implementation of measures. Therefore a current systematic approach to support clusters is missing. Indeed, there are some successful highlights based on individual leadership and public investment, such as the North Carolina Biotechnology Center, but these are rather ad-hoc projects that did not emanate from any systematic or strategically coherent approach. In order to address this shortcoming, the NCDC’s rudimentary cluster promotion underwent a substantial modification led by its Policy, Research and Strategic Planning division. In January 2007, the Department engaged advisors from the University of North Carolina’s Department of City and Regional Planning at the as advisors to help designing a cluster policy for the state. The NCDC was presented with
a pool of clusters to choose from, and is now able to design a cluster policy accordingly (GOLDSTEIN ET AL. 2008: 37).

However, the prospects for implementation remain uncertain, because the prospective role of the restructured “Industry Sector Teams” is not yet defined. Furthermore, there is little communication and co-ordination within the Department. Most critically, the use of the cluster approach is not universally accepted. The dependence on a few clusters and the neglect of peripheral regions is met with criticism (NORTH CAROLINA DEPARTMENT OF COMMERCE 2008: 6). The election of a new Governor in November 2008 poses an additional obstacle to the implementation of cluster policy. During the transition period leading to the new Governor’s inauguration in January 2009, all pending projects were halted for inspection. Finally, the animosities between the NCDC and the relatively autonomous Regional Partnerships, as well as the competition between the seven Partnerships stand in the way of a coherent and holistic cluster policy for North Carolina.

3.3 Examples of Cluster Policies at the Sub-state level

The evolution of cluster policies at the sub-state level in North Carolina is illustrated by the Research Triangle Region and in the Piedmont Triad.

Figure 1: North Carolina and sub-state case studies

In the 1950s, the Research Triangle Region belonged to the areas with the lowest wages and occupational levels in North Carolina (LINK/SCOTT 2003: 16). Three excellent universities were insufficient to create regional prosperity, since brain drain was outstandingly strong (WEDDLE ET AL. 2006: 3). In this situation, policymaker, employers and
university representatives started a dialogue to leverage on the potential of the universities for structural change. These efforts led to the RTP founded in 1959, the basis of the region’s successful development as well as today’s cluster policy. Porter (2001a: 56) outlined the strategy for the Park’s creation with the statement “if we build it, they will come”, and pointed out that it would not have been possible without courageous public investment. In the late 1950s, Governor Luther H. Hodges supported economic change with public investment in the universities and infrastructure, as well as educational reforms. In addition, state authorities also contributed to the region’s turnaround through location decisions, e.g. for the Environmental Research Center (Porter 2001a: 48). Further regional incentives stimulated investments in the Microelectronics Center of North Carolina (1980) and the North Carolina Biotechnology Center (1984). The Research Triangle Region thus developed into a cutting-edge knowledge-based economy and the leading region in North Carolina (FESER/RENSKI 2000: 22).

Within the region, the Research Triangle Regional Partnership (RTRP) is the lead agency for cluster promotion. This public-private partnership is commissioned with place marketing to enhance regional competitiveness and to generate job growth. The RTRP receives one third of its funding from the federal state and thirteen counties, while the remainder is contributed by regional companies. However, the igniting spark for cluster promotion came from the Council on Competitiveness, a think tank established to support regional competitiveness which surveyed several U.S. regions as part of the “Cluster of Innovation Initiative” (Porter 2001a). Over the last decades of the 20th century, the regional economy developed quite successfully, but stagnated during the last years, and the lack of an adequate strategy for future growth gave cause for activities. The results of the study were willingly taken up by policy-makers, academics and businessmen. In 2002, the Regional Partnership teamed up with key individuals to form the “Cluster Competitiveness Task Force”, led by former Governor James B. Hunt (FESER/LANDWEHR 2006: 8). In 2004, these efforts led to the strategic five-year plan “Staying on Top: Winning the Job Wars of the Future” (Research Triangle Regional Partnership 2004), which includes a cluster identification process. As at the state level, this study uses clusters as an analytical tool, but only to a lesser extent as a strategy for economic development.

Cluster promotion of the RTRP critically depends on guidance by the organisation and networks of key individuals from cluster companies and universities (Stewart/Luger 2003: 3). Most recently, the prevalent marketing-driven cluster strategy went through an internal improvement process (e.g. concerning the promoted clusters), resulting in a new five-year plan “Staying on Top 2”. Meanwhile, the RTRP’s cluster policy serves as a best-practice model for other regions in North Carolina due to its broad coalition of decision-makers. As a result of this dynamism, regional economic development faces the challenge of an increasingly complex constellation of actors trying to shape the region’s future development to their favour.
Contrasting its dynamic eastern neighbour, the Piedmont Triad suffers from its long-term decline of low-tech and low-skill manufacturing industries like textiles and apparel, tobacco and furniture (FESER/RENISKI 2000: 18). The Piedmont Triad’s industry structure offers only few starting points for economic revitalisation. Since its central location and good transport infrastructure are recognised as some of the region’s few locational advantages, transportation and logistics are considered as perspective industries.

As in the Research Triangle, the leading economic development agency in the Piedmont Triad is the public-private Regional Partnership funded by the state, the Triad’s twelve counties and voluntary contributions from regional businesses. In recent years, the Partnership assumed more economic development tasks beyond pure place marketing. In the late 1990s, initial cluster studies recommending the use of clusters as a marketing tool did not lead to immediate action at the regional level. On the local level, the cluster concept was received more enthusiastically by the City of Greensboro, the Triad’s largest urban area. In 2004, findings from several studies were taken up by policy-makers in a strategic plan for the economic development of the city. The cluster concept facilitates the concentration of public funds from diverse organisations, but in essence this is a traditional industry approach wrapped in a modern ‘cluster’ disguise. The Partnership thus views the Greensboro efforts as reasonable but regards the local level as too small for efficient cluster promotion.

On the regional level, the cluster issue was taken up by the Piedmont Triad Partnership’s Regional Vision Plan starting in 2004. Following the best-practice example of the RTRP, North Carolina’s remaining six Regional Partnerships were requested to draft strategic economic development plans. Co-funding the preparation of the concepts, the federal state required a cluster strategy as part of the concept. Following the preparation of the plan, however, the steering committee found that none of the regional organisations was able to leverage the financial and personal resources required for implementation. Without the intervention of key individuals like the President of the Partnership, the measures would not have been implemented. The Piedmont Triad was successfully selected in the first-phase of the federal WIRED programme to address the challenges of structural change, which allowed the region to employ four full time cluster managers in 2006 (BERKELEY POLICY ASSOCIATES 2008: 37).

Over the last decade, the communication between the numerous organisations and institutions in the Piedmont Triad was found to be dysfunctional. Traditionally, there is a tendency for the region’s counties and cities to compete rather than to collaborate, despite the common regional identity propagated by the Partnership. The process of preparing the Regional Vision Plan and the successful application for the WIRED programme helped the regional stakeholders to co-operate more intensively. The WIRED grant brought organisations from different fields together under the leadership of the Regional Partnership to jointly address issues of workforce development, economic development, education and start-up promotion (BERKELEY POLICY ASSOCIATES 2008: 22).
However, the variety of organisations dealing with cluster policy still remains an unsolved governance problem, reflecting a lack of leadership and strategic guidance.

4 Bavaria

4.1 The National Setting: German Federal Cluster Policies

To prevent a return to centralism after World War II, Germany was founded as a federal republic in 1949. As a consequence, all 16 federal states pursue some form of cluster policy today. Associated with its CME, Germany’s system of innovation is focused on incremental innovation and diffusion, but has comparative weaknesses in radical and breakthrough innovations. German policymakers praise the country’s research excellence, but lament that German inventions are often commercialised abroad. Clusters are hence seen as vehicles to bridge the perceived gap between science and industry to accelerate innovation. However, a too consequent spatial concentration of public resources is at odds with Germany’s traditionally redistributive regional policy, given that spatial equity is a constitutional goal. In 1990, unification suddenly increased spatial disparities in productivity and innovative capabilities. Technological and socio-economic convergence of the new Länder towards the West German level has since become a special priority of federal government, and a regionalised innovation policy including the promotion of cluster structures in the new Länder is one way of pursuing this aim.

Germany’s federal government joined the cluster bandwagon in the mid-1990s when trying to promote its fledgling biotechnology industry which was estimated to lag twenty years behind the U.S. and ten years behind the UK at that time (COOKE 2001: 267). The experience of those countries suggested that clusters were important sources of national competitiveness in biotech. To close this gap, the BioRegio contest was launched in 1995 to identify and promote Germany’s most promising potential biotech clusters (cf. DOHSE 2001, 2007). 17 regions entered the contest, and in November 1996, Munich, the Rhineland and the Rhine-Neckar area emerged as winners, with a special vote awarded to Jena in the new federal state of Thuringia. The three winners received around 25 million € each over five years, plus privileged access to R&D funding from the federal Biotechnology 2000 programme. However, it is worth pointing out that the contest mobilised actors in most other applicant regions, too, with the effect that by the mid-2000s, there were 25 regional networks and cluster initiatives and five state-level associations in charge of regional biotech promotion (BMBF 2005: 5). Some of them received support from subsequent programmes like BioFuture, BioChance and BioProfile (DOHSE 2007: 77 f.), but it remains questionable if the almost ubiquitous promotion of biotech networks is the most efficient way of growing internationally competitive clusters. However, the BioRegio contest is now regarded as an important vehicle to jump-start the biotech industry in Germany which scored spectacular growth in the second half of the 1990s, although this was helped by legislative changes, a favourable business cycle and a temporarily ample supply of venture capital.
In the mid-1990s, the initial convergence of the new Länder vis-à-vis West Germany had come to a halt. The federal Ministry of Education and Research thus adapted its tested BioRegio model to the specific needs of the new Länder. While BioRegio strove for national competitiveness, the InnoRegio contest was designed to narrow the gap between the eastern and the western states. In contrast to BioRegio, the new contest was not only confined to the new Länder, but also open to all industries and technologies. In 1999, the initial call triggered 444 applications from diverse consortia of individuals and organisations such as businesses, research, education, politics, public administration and associations at the sub-state level (DOHSE 2007: 75 f.). From these applications, 25 projects were selected, and 23 ultimately qualified for funding. Their relatively equal distribution over the five new Länder and Berlin cast some doubts on whether the jury’s decision was led by the quality of the applications alone, or if spatial equity may have influenced the final choice. Convinced by the success of InnoRegio, the federal ministry differentiated the initial concept into a whole new family of programmes called Entrepreneurial Regions (Unternehmen Region) to support innovative networks in the new Länder.

In September 2006, Germany’s federal government for the first time announced an interministerial high-tech-strategy (BMBF 2006). Of 14.6 billion € earmarked for 2006-2009, 11.94 billion € are designated for a set of 17 industries and technologies, while the remaining 2.66 billion € are reserved for generic measures of innovation policy. Of the latter, 600 million € are earmarked for measures to join the forces of science and industry, of which the leading-edge cluster competition (Spitzenclusterwettbewerb) is the key thrust. The aim is to promote up to 15 already well-developed clusters irrespective of their technology or industry focus in three rounds over a period of five years. As for BioRegio, the aims are to identify and strategically promote clusters to achieve leading positions in international competition, to accelerate the commercialisation of new knowledge, to stabilise and create growth and employment, and to raise Germany’s profile as an attractive business location. Following the first call for applications in August 2007, 38 regional projects were submitted by the closing date in December. A dozen of those projects qualified for the final, before the five winners of the first round were disclosed in September 2008. They qualify for a total funding of up to 200 million € over a five-year period.

Federal innovation policy in Germany has firmly embraced the notion that national competitiveness depends on localised assets. To unleash the hitherto underutilised potential of competitive federalism, the federal government employs contests as a device for discovery and mobilisation, and shows signs of cumulative policy learning when differentiating initial concepts like BioRegio and InnoRegio into entire programme families. Owing to the power of the Länder in Germany’s federal set-up, federal government acts as a facilitator, but does not intervene in state policies, nor is it actively involved in programme management which is left to the federal states or to independent agencies. However, it may be criticised that the prevailing approach promotes intraregional net-
works at the expense of interregional and international networking, and that the InnoRegio family to promote innovation networks in the new Länder is intrinsically trapped between the conflicting aims of growth and competitiveness on the one hand, and spatial equity on the other.

4.2 State-level Cluster Policies in Bavaria

With 12.5 million inhabitants, Bavaria is Germany’s second-largest federal state and started as a rural backwater after World War II, largely free from any heavy industrial legacy. Following decades of rapid high-tech industrialisation, it is now one of the country’s most prosperous and technologically advanced states. Especially the Greater Munich area as Bavaria’s economic powerhouse continues to draw migrants from other parts of the country, as well as from abroad. However, the capital region’s dynamism threatens to widen regional disparities, as the more rural and peripheral areas continue to lag behind. Politically, the state’s impressive economic progress was accompanied by a stable government led by the conservative Christian-Socialist Union since 1957.

In late 1993, the newly-elected Prime Minister Edmund Stoiber embarked on a ambitious privatisations effort, generating € 4 billion over repeated rounds of divestment in utilities. These revenues were invested in the state’s R&D infrastructure, including new research institutes and incubators in various Bavarian regions. In 1995, some of these funds were used to establish Bayern Innovativ as the state’s lead agency for technology transfer. To foster co-operation, this agency not only organises large-scale networking events, newsletters and online platforms for the exchange of innovation, but also manages industry networks like the Bavarian Innovation and Cooperation Initiative for the Automotive Suppliers Industry BAIKA. Founded in 1997, it now connects 1,800 automotive suppliers, half of which are located outside Bavaria. By investing half of its € 1.35 billion volume in the development of world-level high-tech centres, the state’s high-tech initiative HTO (High-Tech Offensive) launched in 1999 was cluster policy par excellence, though it did not explicitly refer to the cluster concept. For instance, this state-level technology policy catalysed the rapid growth of the Munich suburb of Martinsried into Germany’s leading biotech cluster (cf. ZELLER 2001: 128-130, KAISER 2003: 847).

When the HTO expired and privatisation revenues gave way to austerity, the state government launched its most recent cluster initiative in February 2006. Following years of massive investment in public R&D ‘hardware’, the new cluster policy Allianz Bayern Innovativ was equipped with a modest € 50 m to establish and fund managed platforms for 19 clusters. These clusters were defined top-down but after unpublicised consultations with representatives from businesses and industry associations, an approach reflecting an intimate relationship between politicians and business leaders which is quite characteristic for Bavaria (cf. BERTHOLD ET AL. 2005: 74). The state government defines ‘clusters’ as state-wide networks of firms and research institutes, which are to integrate...
the various sub-regional cluster initiatives that already existed. Each of the 19 cluster management units typically consists of a full-time manager, an unsalaried speaker for representation, and a secretary. Public funding is announced to decrease over five years to put pressure on cluster managements to eventually become self-sustaining through services and membership fees. Further to this network management, the 19 clusters are also employed for place marketing by the state’s investment promotion agency *Invest in Bavaria*. Despite the definition of ‘clusters’ as state-wide platforms for networking, it is evident that most of the 19 clusters are not evenly spread across Bavaria. To counteract this inherent regional imbalance, the 19 clusters were soon complemented by an offer to install regional management units in all regions to promote inter-industry networking and regional development projects more generally (cf. StMWIVT 2006).

As at the federal level, Bavarian cluster policy is motivated by globalisation and the shift towards more knowledge-based manufacturing and services (StMWIVT 2006: 6). The 19 cluster platforms are thus designed to stimulate more and closer interaction among companies and especially between science and industry to accelerate the commercialisation of technological inventions - and to prevent them from being commercialised elsewhere, as famously happened to the MP3 standard developed by a Fraunhofer Institute in Erlangen, Central Franconia. Besides innovation, Bavarian cluster policy targets the productivity gains commonly associated with localisation economies such as specialised suppliers, a dedicated labour pool, as well as co-operation along the value chain and in pre-competitive R&D, aided by spatial proximity and a good understanding of mutual needs. Thirdly, state-wide networking aims at retaining value-added that might otherwise move to less expensive parts of the world (IBID.: 11 f.).

The Bavarian state government sees its *Allianz Bayern Innovativ* as a successor of the previous, privatisation-led phases of its technology policy. While these earlier phases focused on ‘hardware’ by investing heavily in public R&D infrastructure, the new austerity-driven thrust uses much less public money to develop networks as ‘software’ of the state’s innovation system. However, it remains doubtful if the funding will be sufficiently high and lasting to initiate self-sustaining networks as envisaged in all 19 target areas. Two particular features of the Bavarian case are not untypical for the cluster policies of German states in general. The first is the state government’s concern with spatial equity which has led not only to the establishment of regional management to countervail the centripetal tendencies of most of the 19 clusters, but also the inclusion of clusters like forestry and food whose potential is scattered throughout the more peripheral parts of Bavaria. The second feature is the rather inflationary length of the Bavarian cluster list and the way it has been ‘assembled’ in a political process behind closed doors with certain hints at lobbyism at work. A reconstruction of the state government’s explicit cluster policy shows that the term itself first entered official communication following the 2003 state election. The first three clusters were singled out for promotion in July 2004, before the list successively grew to 19 by October 2005. After the first two years of opera-
tion, the state government commissioned an interim evaluation to inform its decision on further funding from 2009 onwards. The evaluation by BÜHRER ET AL. (2008) is rather positive in that almost one third of the surveyed firms reported a positive impact on their contacts and co-operations. It recommends the continued funding of all 19 clusters to allow best practices to emerge from the competition of as many cluster platforms at possible, and to maximise the potential for inter-cluster co-operation. Acknowledging the original five-year timeframe is rather tight, the report suggests an extension of funding by a further two years.

4.3 Examples of Cluster Policies at the Sub-state level

The evolution of cluster policies at the sub-state level in Bavaria is illustrated by the cases of Central Franconia and the city of Regensburg.
At the sub-state level, the district of Central Franconia is the most active and experienced when it comes to cluster policy. As a response to the structural decline of its dominant electrical engineering industry, the region around Bavaria’s second-largest city Nuremberg developed its first cluster strategy in the early 1990s. It became part of the Nuremberg Programme in 1994, which was followed by a consensual perspective report originally signed in 1998, and renewed in 2005 (cf. NEUMANN 1996, IHK NÜRNBERG 2005). These documents contained a set of fields of competence defined as clusters, which are promoted through autonomous competence initiatives. The two oldest initiatives, the Nuremberg association for the ICT sector and the CNA Center for Transportation and Logistics were established as early as 1994 and 1996, respectively (cf. HEIDENREICH 2005: 752-754).

The initial selection of five fields of competence was the result of a classic bargaining process between the main stakeholders (cf. NEUMANN 1996: 755). In a four-year process initiated and moderated by the regional chamber of commerce, the trade unions were primarily interested in the promotion of transport and logistics, as well as energy and environmental technologies since these fields represented large numbers of manufacturing employment, a high level of union representation, and a path-dependent approach to regional renewal. Local government, on the other hand, was favouring a path of neo-industrialisation that led to the inclusion of ICT, medical technologies, pharmaceuticals and health services. Finally, the Bavarian state government wanted to see new materials being promoted in Central Franconia. When the consensual multi-stakeholder concept was revised in 2005, automation and process technologies were added, as well as the rather amorphous field of innovative services (IHK NÜRNBERG 2005).

In 2004, a qualitative academic appraisal based on interviews found that cluster policy improved the linkages between regional firms significantly, leading to interfirm cooperation, joint R&D projects, new intra-regional supply chains and new firm formation (cf. HEIDENREICH 2005). Furthermore, the lengthy process of consensus-building helped the region’s local governments overcome their territorial egoism to develop a regional identity and governance structure that ultimately led to the formation of the European Metropolitan Region of Nuremberg in 2005. Including not only local government, but also the trade unions and the business sector, the process increased the region’s organising capacity which is seen as a crucial ‘soft’ driver of urban and regional competitiveness (cf. VAN DEN BERG ET AL. 1997, VAN DEN BERG/BRAUN 1999). Organising capacity may be approximated by the ability to draw funding from higher levels of government into the region. On this account, Central Franconia managed to capitalise on its cluster focus by attracting around 380 million € of the state government’s HTO funding for some 70 projects. However, regional co-operation between industry and regional institutes for research and higher education is still rather weak, owing to the universities’ strong focus on humanities at the expense of technical subjects. The most recent chal-
Challenges to cluster policies in Central Franconia include its alignment with the Allianz Bayern Innovativ that is seen as a prerequisite for luring further state funding into the region.

Contrasting the structural change experienced by Central Franconia, the city of Regensburg witnessed a rather exceptional late industrialisation from the 1980s following the attraction of large manufacturing establishments like BMW or Siemens in what was previously a rural backwater. In Regensburg, municipal cluster policy did not emerge in response to some perceived crisis, but to federal government contests such as BioRegio. Supported by businesses and the two local universities, the city’s application led to the formation of the BioRegio Regensburg in 1996. Although Regensburg’s proposal was not successful at that time, local government continued to pursue its vision and set up the BioPark incubator in 1999, which was completed in 2001 and further extended in 2005 with the help of HTO funding. Within a decade, the BioRegio Regensburg grew into Bavaria’s second largest biotech cluster including around 30 core biotech firms with roughly 700 employees and a dozen of further life sciences firms with about 1,000 staff dealing with pharmaceuticals, medical technology, and analytic devices in 2006. During its first ten years, the cluster attracted more than 100 million € of funding from federal, state and local government (DIEFENTHAL 2007: 1).

A similar top-down stimulus triggered the establishment of the Strategic Partnership for Sensor Technology in 2003 when Regensburg was chosen by the Federal Ministry for the Economy and Labour for a research project to pioneer strategic partnerships between firms and municipalities. The award came in the form of professional management advice that helped prepare a memorandum of understanding between local government, the two universities and initially nine local firms that was signed in June 2003. Following the establishment of an online portal and a steering group, as well as a company survey, the Partnership was later institutionalised as a club which grew to 30 firms with a total employment of 15,000, of which 1,000 were directly associated with sensor technology (MEIXNER 2006: 7). The 2003 memorandum stated Regensburg’s aim of becoming Germany’s leading location for sensor technology by 2010, increasing employment by half and doubling R&D staff in sensor technologies along the way (STADTREGENSBURG 2003: 3). In March 2006, the city transferred the strategic partnership approach to the field of IT security. Under the management of the city’s IT incubator, the Strategic Partnership for IT Security manages a network of 33 firms and three universities which co-operate on selected topics (IT-SPEICHER 2008).

Among local cluster policies in Germany, Regensburg stands out as it was not triggered by severe structural crises and adjustment, but rather as a response to top-down stimuli in the form of federal government contests. These stimuli led to policy learning by doing and strengthened an organising capacity that was evolving since the acquisition of large manufacturing plants from the mid-1980s. The city government initiates and moderates the processes of cluster formation, but they are purposefully designed in an open fash-
ion allowing all interested partners to join in, no matter if they are based in the city or elsewhere. Regensburg’s approach is also unusual through its rather ‘soft’ and flexible institutionalisation through clubs, and through the associated absence of an overarching ‘grand’ cluster strategy connecting biotech, sensor technology and IT security.

5 Comparison & Conclusion

This paper compares and contrasts cluster policies as multi-level governance between the U.S. and Germany that represent archetypal models of LMEs and CMEs, respectively. Despite certain conceptual weaknesses, the VoC framework serves well as a framework for comparative cluster policy research as it highlights a series of systematic variations between the U.S. and Germany that are evident at all levels of governance. In a competition-driven LME like the U.S., government generally has a hands-off attitude and maintains an arm’s length relationship with industry while trying to provide a conducive business environment. In a consensus-driven CME like Germany, collective action is more prevalent through tripartist relationships between the state, associations and chambers representing the business sector, and trade unions. There is a higher level of trust that is best evidenced by Bavarian cluster policy drawing on networks between government and the business sector for consultation. At the sub-state and local level, the U.S. system provides a more flexible framework for collective action to promote clusters, but it lacks strategic coherence and concrete action critically hinges on individual leadership and an involvement of the business sector that is generally stronger than in Germany. Lacking strong regional representation and a well-developed “associational economy” (COOKE/MORGAN 1998), cluster initiatives in the U.S. provide a voluntary option for the provision of collective goods including lobbying. In Germany, this collective action is more strongly formalised through associations and chambers of commerce, reducing the incentive of businesses to engage in further collective action such as cluster initiatives. Consequently, cluster promotion in Germany is more public sector-driven, with stronger top-down impetus and more strategic coherence, especially at the state level. Cluster policies can potentially leverage on a higher level of social capital and collective action, but public initiative often fails to mobilise the private sector to join in.

As a further consequence of VoC, the two countries provide contrasting environments for innovation. The U.S. are home of the Silicon Valley model of venture capital-driven commercialisation of new technological knowledge, with associated strengths in radical innovation and new high-tech industries. However, it does have problems with the diffusion side of innovation, particularly the absorptive capacity of its workforce - hence the concern with skills development that feeds into cluster policy, together with a focus on distressed regions suffering from a declining manufacturing sector. Germany does not have a skills problem of such scale due to its unique dual system of vocational training. However, as a CME it has a strong focus on incremental innovation while the commercialisation of new knowledge is lagging behind. Clusters are thus welcomed and inter-
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Interpreted as platforms to accelerate technology transfer between science and industry, but rather based on an interactive triple-helix model of university-industry-government relations (ETZKOWITZ/LEYDESDORFF 2000) than on an outdated linear understanding of innovation. At the local scale, however, cluster policy often emerged in response to structural crises of Fordist manufacturing as in the U.S., which is illustrated by the case of Central Franconia.

Despite representing opposite poles on the VoC spectrum, the U.S. and Germany are both federalist state and thus well-suited for a conceptualisation of cluster policy as multilevel governance. In the U.S., federal government generally welcomes cluster promotion, but does not intervene except for unspecific project funding. Cluster policies are instead devised (but still much more rarely implemented) at the state and sub-state level (cf. FESER 2005: 144). The case of Germany is complicated by its integration into the supranational EU level, though this has no direct impact on the cases presented in this paper. As in the U.S., cluster policies are devised but mostly also implemented by state, regional and local/municipal governments. Federal government basically adheres to the governing principle of subsidiarity, restricting its intervention to BioRegio-style contests as top-down stimuli to mobilise regional efforts. Unification in 1990 led to an exception of course when the reconstruction of the new federal states (Aufbau Ost) became a special federal task which included a family of cluster-based programmes. In Germany, cluster policies are generally troubled by the traditional orientation of regional policy towards the goal of spatial equity, which is fundamentally at odds with the growth and competitiveness focus of cluster policy. This trade-off is best evidenced by the cases of InnoRegio for East Germany, and Bavaria’s Allianz Bayern Innovativ.

In the U.S., state-level economic development traditionally focuses on the attraction of mobile investment. Consequently, cluster concepts are primarily used as a device for place marketing to showcase a region’s economic profile. Using Porter’s diamond as a framework, clusters are primarily used as an analytic device, but subsequent policy action beyond place marketing is often missing. This is quite different in Germany where clusters are usually not identified through academic mapping exercises, but rather through top-down political decisions, open bargaining or negotiations among stakeholders behind closed doors. Clusters are also used for place marketing, but economic development agencies are commonly equipped with larger funds to pursue a more holistic cluster promotion that includes not only attraction (which has limited potential in Germany), but more prominently start-up promotion and the growth of established firms.

As far as the impact of cluster promotion is concerned, cluster policies are clearly helpful by integrating previously separate fields of policy. At the sub-state level, they increase a region’s organising capacity by overcoming intraregional competition to create multi-stakeholder alliances and to lay the foundations of a stronger regional identity, as evident from the Piedmont Trail and Central Franconia. However, more independent evaluation of such processes is clearly needed. While the infant nature of cluster pro-
motion has served as an excuse for non-evaluation for a while, some initiatives have meanwhile matured and are subject to commissioned evaluations as in the Bavarian case. However, these are guided by politics and administration and hence no substitute for a more critical academic appraisal that provides regional scientists with an excellent opportunity to underscore their societal relevance. Having demonstrated the fertility of VoC thinking, this framework certainly offers ample opportunities to further engage in comparative cluster policy research.

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