

- *Innovativeness – Regional specificities – Impact assessment – Regional systems*

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**Economic Crisis and Innovativeness –
Exploring Geographies of Impact**

*Wirtschaftskrise und Innovativität –
zur Geographie der Wirkungszusammenhänge*

With 2 Figures

The paper explores, mainly from a conceptual angle, regional differences in interdependencies between the recent economic crisis and innovativeness in advanced economies. It addresses two directions of causal relationships between these process fields: In which respects are regional economies more vulnerable or resistant in the face of the crisis, due to their specific constellations of innovativeness? And how does the crisis, in turn, affect regional innovativeness, which may be subject to both hampering and encouraging forces? Arguments that ‘geography matters’ are elaborated by referring to two perspectives, one taking account of regional structure in terms of industry composition, and another one considering region-specific systemic qualities.

1. Introduction

While financial markets, banks and real estate have received major attention both as key drivers or culprits and, simultaneously, as victims of the worldwide economic crisis that started in 2008 (*Krugman 2008; Soros 2009*), implications for other facets of economic development have rarely been explored from an academic viewpoint so far. The media have extensively reported on swelling bankruptcies and contracting industrial production, trade and GDP in many

advanced economies. Yet, important mechanisms behind such dynamics deserve more scholarly attention. This calls for research approaches that reach beyond the aggregate view of economics on the crisis and its outcomes. The perspective of economic geography suits well to add necessary dimensions of assessment, looking at place-specific implications (*Aalbers 2009; Wuttke 2009*). Interdependencies between economic, political, social, and technological aspects of crisis-driven development must be regarded, including different scales of activ-

ity from the corporate to the regional and up to the national and international levels.

In this context the question of how the recent crisis intervenes with innovativeness seems to be of particular interest, with innovations understood as “a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations” (OECD and Eurostat 2005: 46). This holds true both for academic reasoning and political considerations. First, innovativeness is shaped by factors that do not follow simple logics of ‘shrinking economy = shrinking R&D’, but is formed by a set of various, sometimes contradicting forces that challenge academic debate. Second, innovativeness is internationally acknowledged as playing a major role in allowing economic actors to overcome the downturn (OECD 2009a) and may, in fact, be seen as the reason why several economies, notably Germany, have managed to already recover from the recession. This is why we need to know more about the complex relationship between economic depression and innovativeness, and its determinants. The regional level plays a crucial role in this regard: Different companies react differently to the crisis in terms of innovation behaviour, which translates into spatial variations of impact.

The topic bears additional appeal as causalities between innovativeness and crisis can be regarded from opposite directions: Not only is it worthwhile to examine the impact of the crisis on innovativeness, but also to consider the role of innovativeness in determining the affectedness of firms and regions by the crisis (see *Fig. 1*). No matter which perspective is employed, the answer always implies contrasting options. The economic crisis may both hamper and inspire innovativeness. Highly innovative firms can be more vulnerable to the economic downturn or more robust and flexible than less innovative ones. The detailed nature of such relationships, their positive or neg-

ative twist, seems to depend on a combination of factors that reflect, among others, sector- and region-specific settings.

This paper explores relevant interdependencies. After broadly discussing links between economic depression and innovativeness drawing on research literature, it develops a conceptual framework that highlights which factors shape place-specific relationships of crisis and innovativeness, mainly referring to the situation of advanced European economies. These considerations are underscored by some anecdotal evidence from recent studies and media reports. Altogether, the paper cannot avoid being more conceptual and predictive than analytical, due to the unfinished state of evolving processes and limited availability of current data on innovation indicators.

2. Economic Depression and Innovativeness – an Underconceptualised Topic

While there is a rich tradition of research on the impact of longer-term industrial downturns on regional development in a broader perspective, the interplay of recession and corporate or regional innovativeness has rarely been explored. Phenomena of economic decline due to structural imbalances and the loss of competitive edge against competitors in the globalising economy have been subject to investigations especially with respect to regions in Germany, the United Kingdom and the USA for quite some time (see, for instance, *Barnes and Gertler 2002; Bluestone and Harrison 1982; Meyer and Muschwitz 2008; Mounfield 1984; Norcliff et al. 1986; Plahuta and Halder 2006*). Innovation has entered this debate mainly as a means to overcome structural problems, hence as a major ingredient to be incorporated in regional development policies. This applies also to the recently revitalised debate on ‘regional resilience’, which sees innovation as one element

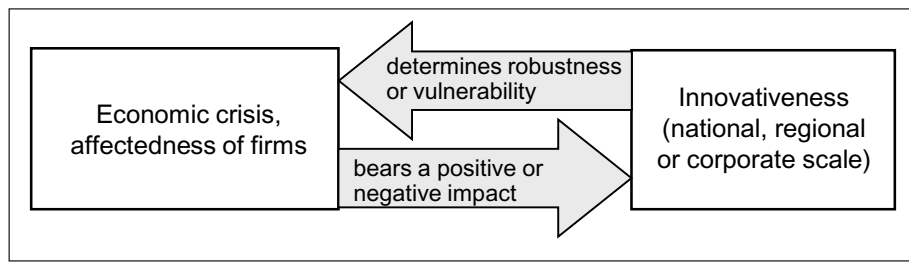


Fig. 1 Reciprocal causal relationships between economic crisis and innovativeness
Wechselseitige Kausalbeziehungen zwischen Wirtschaftskrise und Innovativität

within a portfolio of activities that allow for regional adaptability in the face of economic shocks (Pike et al. 2010). Yet, the direct interdependencies between short- to medium- term forces of recession and the innovation behaviour of regional sets of companies has not been addressed in these works.

In fact, surprisingly little has been written by academic scholars on the impact of economic decline on innovativeness; there is no consistent theory so far. Even Nobel laureate *Krugman's* book (2008), which promises to deliver the latest on 'depression economics', remains silent on the issue, just as recently published monographs on the economics of innovation (Swann 2009). Only a few studies have explicitly focused on this issue so far (Archibugi and Filipetti 2011; Kanerva and Hollanders 2009). A reason is probably that hitherto the notion of innovativeness has so firmly been connected with a paradigm of industrial growth and business expansion that hardly anybody considered opposite logics ever to matter. The research gap may also be explained by the fact that, before the recent crisis, the world has rarely seen 'top innovative' Western economies suffer as badly as now. This is why suddenly the 'club' of leading economies, the OECD, has churned out several writings on the topic (OECD 2009a, 2009b, 2009c). Nevertheless, scientific discourse offers but a small set of arguments so far that spotlight how economic downturn and innovativeness essentially relate to each other.

We can draw on earlier debates in economics about the long-term cyclic nature of innovativeness itself, in terms of Kondratieff or Schumpeterian waves (Kleinknecht 1987). Accordingly, every few decades a bundle of radical innovations set off an economic boom that is based on the implementation, proliferating economic exploitation and incremental improvement of those innovations. The upswing is followed by phases of stagnation and downturn until another cluster of radical innovations instigates a new cycle start. There is statistical evidence that basic innovations actually tend to emerge in waves, entailing economic acceleration (Kleinknecht 1990). In our context it is even more interesting to think about what happens at the dusk of a technological-economic cycle (leaving open whether the end of the still young '5th Kondratieff' has really already been reached). It may be hypothesised that this provides just the right 'depression trigger' needed for stimulating increased investments into innovation bases that, subsequently, carry businesses out of the deceleration (Kleinknecht 1987). Many firms are born or upgraded in the 'creative destruction' of downturns; new business models and technologies arise, particularly when allowing cost reductions (OECD 2009a). This supports, for instance, technologies that substitute business travels by modern communication devices. In conclusion, economic depressions appear to positively influence inno-

vativeness, being the midwives of serious thinking and the start of revolutionary innovations. Firms cut cost also by entering new ventures.

This, however, is countered by a second set of arguments, which tell that mainly a thriving economy allows firms to increase investment in R&D ('demand pull' hypothesis; Swann 2009). A rise in innovation activities relates positively especially to the growth of employment, export intensity and profits, overall to growing demand in the main sectors of operation (Brower and Kleinknecht 1999). In turn, economic depression and demand reduction diminish and hamper corporate innovativeness and R&D. The escalating scarcity of finance from banks and (venture capital) investors, who become more risk-averse, aggravates the trend (The Economist 2009b; OECD 2009a). Consequently, economic depression, apart from stimulating innovativeness, at the same time also obstructs it. Some data relating to the current crisis confirm the paradoxical co-existence of counter-moving dynamics: Many corporate reports for the fourth quarter of 2008 show a decline or slower growth in R&D spending, with similar trends forecasted for 2009. Yet, a recent McKinsey survey of 500 large businesses world-wide indicated that 34 % expect to spend less on R&D in 2009, whereas 21 % forecast an increase (OECD 2009a: 6). Below we suggest how a geographer's view helps to understand such contradicting evidence.

Before, we briefly look at implications of preceding economic downturns for innovativeness. Learning from these examples, however, is not easy since each earlier crisis bears specific features which distinguish it from the most recent one. The Asian currency crisis of 1998-99, for instance, hit mostly less developed economies with low levels of innovativeness and inferior positions in globalised production networks. Affected firms searched rescue by lowering costs rather than boosting R&D (Wohlmuth 2001). Still, some evidence

shows that this crisis created some positive influence on technological innovation: An empirical study of manufacturing firms in Thailand showed that it raised their awareness to respond to change through innovation (Virasa and Tangjitpi boon 2000). But only a few were able to actually react, due to weaknesses of the innovation system like lack of capital, capable human resources, technological infrastructure, technical consulting and good management practices. Research on South Korea confirms that the crisis made firms perceive increased innovation requirements, but that regional systemic support is necessary in order to put them into practice (Jo 2005). In Hongkong and China, needs to encourage creativity and knowledge orientation were perceived, too (Kamoche 2003; Wei et al. 2007).

The burst of the internet bubble and dot.com crisis of 2000/01 hurt leading innovator economies, notably the US. This has induced changes that partly affected innovativeness; some leading technology firms amplified their R&D expenditure during and after the 'new economy' bust (OECD 2009a). Western Companies concentrated on top-end, high value adding activities, while high- to medium-level work experienced a major shift to economies offering qualified human capital at low cost, such as India (Fromhold-Eisebith and Eisebith 2003). This has eventually changed the international division of labour and interactive innovativeness in affected sectors, overall raising the knowledge content of conducted activities. The reach of this crisis, however, was limited and mainly concerned information technology companies. Dimensions were quite different from what the global and European economies go through now. This crisis impinges on a broad range of different sectors and relates to banking and finance, production, services, knowledge flows and other processes, shaped by intricate international interdependencies of economies.

3. Crisis, Innovation and Regional Characteristics – a Conceptual Approach

This paper advocates that a geographical view can substantially contribute to a convincing analysis of interacting dynamics of the current crisis and innovativeness. It explains how differentiated pictures of innovation-related affectedness emerge (similar to *Aalbers* 2009 on the financial crisis and real estate). This view is rooted in well-established assumptions on the crucial importance of regional contexts and systemic dynamics for innovativeness (*Boschma* 2005; *Feldman* 1994; *Fromhold-Eisebith* 2009; *Simmie* 2003 and 2005). It is even shared by some economists, who point out the innovation-enhancing powers of regional clusters and networks (*Dolfsma* 2008; *Swann* 2009). The notions of national and regional innovation systems corroborate our understanding of innovation-driven development as the result of place-specific interdependencies of institutional, economic, social and political features (*Blätzel-Mink* 2009).

Before we conceptualise relations between the economic crisis and innovativeness from a geographical angle, we must concede that reasoning cannot reach beyond a certain level of differentiation here. It will hardly be possible, for instance, to specify assumptions for various types of innovations, distinguishing crisis-related impacts for product versus process innovations, management and market innovations; the same applies to distinctions between basic and applied research. Nor can individual sectors be addressed in detail, only groups of industries that bear pertinent similarities. Relevant distinctions, however, will be taken into account as far as possible when tackling central questions: Why do we expect the recent economic crisis to interact differently with innovativeness in different regions? And which factors determine whether a region and the companies locating there react positively to the crisis in terms of innovativeness, whereas

others are largely negatively affected? In this context, a region is understood according to both its structural and functional definitions, hence as a spatial unit below the national level that is marked by some homogeneity of industrial structure and/or a space of dense functional links between economy-related actors (*Wolf* 2002).

In support of the assumption that ‘geography matters’, two main arguments are put forward, representing a structure- and a system-based perspective. First, since the link between economic depression and innovativeness varies between different types of firms, the structural composition of regional economies and the prevalence of certain categories of companies lead to region-specific patterns of impact. Second, regions are home to particular systemic connections between various actor groups and institutional features, based on advantages of proximity, which cause innovation-related developments to be individually shaped in each regional case (*Boschma* 2005; *Fromhold-Eisebith* 2009; *Simmie* 2003). These two perspectives form the basic scaffolding of our concept (see *Fig. 2*). Additionally, influences from other spatial scales must be accounted for. This refers to the integration of regional firms in wide-reaching business connections which subjects them to forces of globalisation. Aspects of structure (some types of firms are more internationalised than others) and system play a role here (relating to the interplay of ‘local buzz and global pipelines’ in knowledge creation; *Bathelt et al.* 2004). The national policy framework matters, too (for some countries, such as Germany, this is combined with the influential level of the federal states).

3.1 Relevance of regional structure

Addressing aspects of industrial structure, various dimensions can be named that determine, on the one hand, whether a company’s innovation behaviour make it robust and flexible or vulnera-

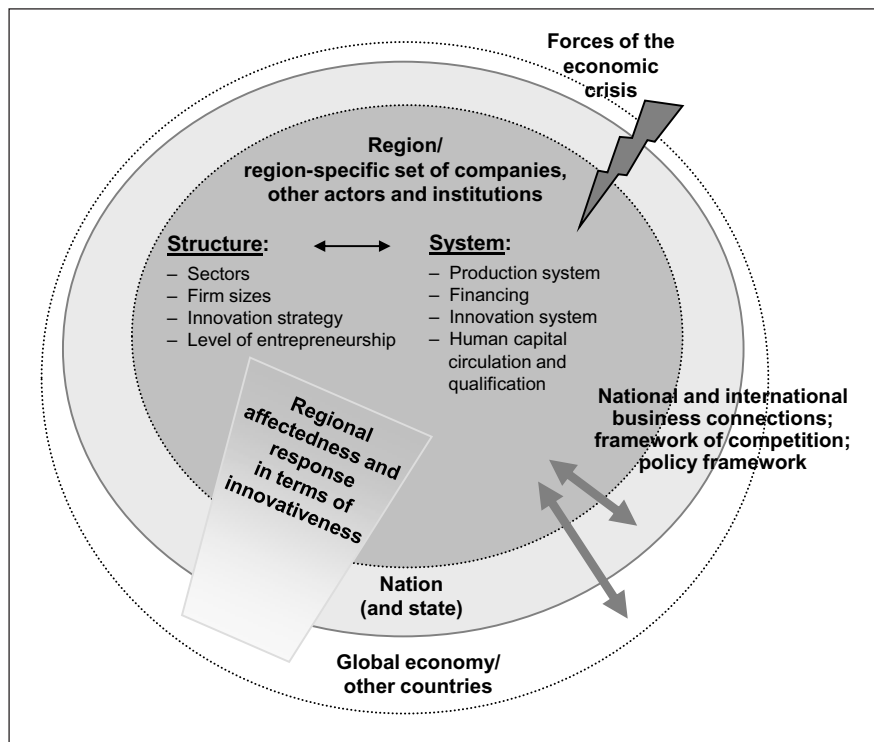


Fig. 2 Determinants of region- specific interaction between economic crisis and innovativeness
Determinanten der regionsspezifischen Interaktion zwischen Wirtschaftskrise und Innovativität

ble towards the recent crisis, and, on the other hand, whether its innovativeness is positively or negatively affected. Sectors appear to be quite important in this regard. Some types of industries have actually not felt much demand reduction during 2009, displaying a certain 'crisis resistance' that potentially translates also into robust innovation activities. This applies, at least for the case of this crisis, to the range of consumer goods industries, whereas investment goods producers – from trucks to machinery – experienced significant drops in sales (IWD 2010). Some studies suggest that high export dependencies add to a high vulnerability of those sectors against crisis effects which translates into regional effects (BBSR 2009). The latter, however, generally show higher R&D intensities than

the former (Eurostat 2009), and their innovativeness may therefore be specifically affected by the demand slump and share devaluation. Certain industries typically use crises as innovation stimulus, like leading information technology and electronics firms. For them business is like running a 'digital sashimi shop' – products must swiftly get to the market before they lose their freshness (The Economist 2010b: 56). Others are now virtually forced to innovate in order to stay alive, such as car producers who shift towards electric vehicle technologies.

Whether some sectors are more distressed than others and if this stimulates positive or negative outcomes depends on additional factors. Firm size is one: many small, innovative service

firms are hit particularly hard due to the intangible nature of their primary asset (an idea or a patent), which reduces their creditworthiness; a substantial reduction of venture capital availability enhances the problem (OECD 2009a). Accordingly, the credit crunch hits the innovation capacities of small firms the most (The Economist 2009b; *Kanerva and Hollanders* 2009). The stock of knowledge of these firms suffers early, too, when they must lay off highly qualified employees (they hardly have others) because of financial difficulties. Yet, there are exceptions to this, for instance, in the case of small, however world-leading service or goods providers that occupy highly specific market niches.

Medium- to large-sized firms, especially multinational companies, can, on average, withstand more easily crisis-related pressure by resorting to their capital reserves or balancing activities in their international network of branches. When they are forced to reduce employment, this probably hits lower qualified staff first, which tends to raise the firm's qualification level at locations in advanced economies. Valuable human capital is kept in the company (with the help of labour market policy schemes), because after the crisis, these people will be in high demand again. Now there is also more idle time for attending further education courses or for engaging in think tank activities. New ideas for tomorrow's innovations can be created which help to leave old trajectories (*Akgun et al.* 2006) and orient towards new challenges, such as 'greening' (OECD 2009d). Hence, there are good chances that these players take the crisis as an encouragement to innovativeness, an opportunity to gain in competitive advantage and market leadership.

Innovation strategies, which are often sector-specific, interfere with the above-mentioned aspects. Some companies plan innovation objectives and R&D expenditure many years ahead (e.g. in the pharmaceutical or biotechnology industries). Or competition has been so

hard for years that no player can afford any reduction in innovation efforts (like in the electronics industries). Here R&D spending is hardly affected by the crisis (*Kanerva and Hollanders* 2009), besides the possibility of a short-term statistical rise of R&D intensity (R&D spending as a share of turnover) in the case of shrinking corporate sales. In other sectors, efforts are being re-oriented towards short-term, low-risk innovations, while longer-term, high-risk projects are cut (OECD 2009a). In detail, developments depend a lot on individual corporate risk management. In general, we can expect innovation strategies to change in the crisis. A shift towards cost-saving collaborative activities of several firms seems possible (which links to the system perspective depicted below), or a trend towards open innovation, which uses inputs by customers (*Picot and Doebelin* 2009). Maybe there is even a transformation from 'opportunity' to 'necessity innovativeness', in analogy to drivers of entrepreneurship.

A last structural factor that determines region-specific patterns of innovativeness in the crisis is itself associated with levels of entrepreneurship. While new firm formation is essentially hampered by the recession, notably in manufacturing industries, those enterprises which manage to come up tend to be especially efficient. The changing behaviour of venture capitalists in the downturn has an influence, too. They now prefer to support firms that are already part of their investment portfolio, while neglecting new start-ups (OECD 2009a).

Pulling the strings together, the following conceptual assumptions with regard to advanced (European) economies can be stated: Regions whose industry structure is marked by high shares of consumer goods producers, locations of large multinationals, or sectors with long-term innovation strategies are expected to be fairly robust in the crisis, also in terms of R&D. Negative impacts of the recession on innovativeness will be particularly high in areas with many small

knowledge-intensive service companies, especially those servicing investment good producers, and concentrations of the latter ones themselves. Innovativeness is expected to be encouraged by the recession in regions that are home to various market-leading small or large (multinational) companies, and regions that rely on existing efficient young firms rather than on the founding of new enterprises.

3.2 Relevance of regional systemic qualities

From a geographical viewpoint, systemic features of regions play a major role for any aspect of economic dynamics, including innovativeness. Recent conceptual debates support assumptions that certain qualities inherent to regional collectives of agents and mechanisms of interaction allow some places to recover relatively fast from setbacks in terms of 'regional resilience', and to develop dynamic capabilities of continuing adaptability (Pike et al. 2010; Simmie and Martin 2010). This connects our reasoning to the broader tradition of evolutionary thought in economic geography. Another argument that feeds into this discussion is that spatial proximity matters in innovation dynamics. While this statement generally holds true, additional aspects need to be considered, like the interference of physical with organisational, social and institutional proximity, which determines if co-locating actors foster each other's innovation performance (Boschma 2005).

In our context, four main system arenas can be distinguished which relate to interdependencies of crisis and regional innovativeness: the production system that connects different firms along the value chain, the financial system of (venture) capital provision, the innovation system composed of actors and institutions that collectively bring about new products and processes, and the system of human capital provision and qualification (see Fig. 2). The systems view logically links to the structure-related view

explained above, since some industries and types of firms are particularly inclined to embed in (local) networks of relationships (like, for instance, knowledge-intensive business service providers or manufacturers of complex products like cars).

First, we get to the issue how innovation-related systemic assets of localities make them more vulnerable or robust with respect to the crisis. Disadvantages exist for regions that are marked by dense connections along the value chain, since entire local production systems can be affected when previous innovation trajectories prove to fail in the crisis (as in the case of large automotive locations). In some cases, however, local networks of firms may have collectively accumulated and concentrated so much competitive knowledge that this partly shields them against the recession (clusters of specialised engineering firms may serve as an example). This holds true especially for regions where the innovativeness of specialised, interconnected industries is supported by other agents of the innovation system, notably organisations of basic or applied R&D (like universities) and technology promotion agencies dedicated to those sectors. The situation improves even more when this is accompanied by a set of banks and other capital providers that are innovative themselves, inventing financing schemes that decouple the circulation of money from detrimental international influences. This can be done, for instance, by implementing regionalised corporate shareholder schemes that raise local private investment, also by corporate employees themselves, for nurturing local industrial development. Considering the role of human capital and qualification, large stocks of qualified people who sustain some connection to their (local) university of origin guarantee a substantial amount of flexibility in the crisis, since they provide a versatile knowledge base and skills that easily shift between tasks, as requested. It seems that industrially specialised metropolitan regions offer the best base for networking dynamics of these kinds (Brandt et al. 2009).

Second, when looking at the impact of the crisis on innovativeness, densely-knit local production systems may come out either as losers or winners. On the one hand, economic contraction reduces demand and R&D investment opportunities for wide parts of the regional economy in these cases (which sheds more criticism on the cluster orientation in regional development). Negative implications of proximity in terms of ‘lock-in’ inhibit flexible reactions (*Boschma* 2005). A restrictive behaviour of banks and venture capital actors further exacerbates the squeeze. When qualified staff are laid off, this further reduces firms’ capacities to innovate for some time.

On the other hand, the recession can be expected to especially encourage R&D collaborations of firms in a localised production system which helps them to save costs and expediently combine their value chain specific competences. While the negative regional implications of cost cuts in terms of reduced employment, purchasing power and consumer spending should not be overlooked, this boosts the efficiency of firms’ innovation strategy and potentially also raises their willingness to integrate public partners from the regional innovation system. Anyway, organisations that constitute a well-established innovation system can be expected to eagerly take up the crisis challenge in order to join forces for the sake of regional recovery. Pre-existing links between included local actors form an important prerequisite for these co-operative efforts, since trust scores high in collective innovativeness (*Murphy* 2006). Manpower-intensive links that draw on qualification-based connections, like those that keep alumni of the same university united, can substantially promote such processes. Crisis-related unemployment even raises university enrolment (as proven for colleges in the USA; *The Economist* 2009a), which enriches the human capital base for sustaining future innovativeness. Some impact of academic unemployment on technology-based (spin-off) entrepreneurship could be instigated, too. In a crisis, new

firms face opportunities for filling niches as other players on the spot weaken and open space for new entrants (*OECD* 2009a). Co-locating firms that have previously not done business together may also profit from advantages of proximity, since the pressure under which all of them operate encourages cross-over innovativeness involving different sectors, possibly also supported by local R&D partners like a university.

Summing up, reasoning suggests that regions which possess well-developed systemic qualities based on personal networks interact positively with the crisis in terms of innovativeness, bearing high resilience and good response capacities. This reflects earlier writings on the favourable properties of a depression trigger, which sets a particular stimulus to firms and other actors to increase collaborative efforts for activating the regional ‘creative-innovative milieu’ (*Fromhold-Eisebith* 2004). Systemic cohesion, however, has to go in line with the willingness and capabilities of system actors to move ahead in evolutionary ways.

3.3 Regional implications of national and global frameworks

No region responds to the crisis independently of national or international influences. This refers foremost to the integration of resident companies, notably subsidiaries of multinational corporations, in national and global value chains, contexts of organisation and finance, and the international division of labour, all of which link to innovation processes. Policies at the national and, in some cases, federal state levels interfere with that. It is essentially globalisation which has caused the current crisis and injected it into national and regional economies via intricate international financial connections causing a widespread credit crunch. Just as the “understanding of the financial crisis is ultimately a spatialised understanding of the linkages between local and global” (*Aalbers* 2009: 34), the same applies to the understanding of inter-

dependencies between crisis and innovativeness. In some localities, actors react differently to global challenges with respect to innovation strategies than in others. Both structural and systemic features of regional economies explain why.

Many consider the global reach of the current crisis as an impediment to innovativeness. As the OECD (2009a) states, the sharp decline in trade, foreign direct investment and access to international financing poses a risk to the global supply chains that underpin innovation and are critical sources of new knowledge and learning. Companies no longer receive the technical expertise, market knowledge, critical business contacts and international partners as before, which could negatively affect knowledge transfer and innovation. Translated into geographical terms this insinuates that spatial concentrations of globally integrated firms suffer most (in some way supported by BBSR 2009). Rising international competition and takeover risks, however, drive established firms to test their own survival skills which encourages, rather than undermines, their innovativeness (The Economist 2010a: 12).

Whether the innovativeness of industrial agglomerations in advanced economies interacts positively or negatively with the crisis highly depends on their competitive situation in the global economy. If innovation processes previously located here can be substituted by cheaper R&D services elsewhere in the international value chain, for instance in Asia (like in the case of information technology or pharmaceutical sectors), this will imply a reduction of activities in the highly developed Western region (Fromhold-Eisebith and Eisebith 2003). This virtually affects all regional system arenas and potentially restricts localised innovation capabilities for long. The crisis thus accelerates structural changes which advancing industrial economies are experiencing anyway (OECD 2009b). Cost-sensitive activities become relocated in terms of nearshoring and offshoring, while industrial

leaders increasingly concentrate on higher-end steps in the innovation process. This means less amount of R&D on the spot, but possibly a higher sophistication of tasks. If resident firms possess superior highly specific knowledge that is firmly embedded in their organisation, employees, and local networks with partners, they will even be able to profit from the crisis. They can provide crucial inputs to firms in other countries, notably in emerging economies. Companies there need to build up and complement their own surging innovation activities (for instance, by buying essential patent licences) and have basically been much less distressed by the crisis than Western economies.

In this depression national frameworks of public finance and policy intervention have been more influential than in any international crisis before (Krugman 2008). Many public organisations and (partly) state-owned banks have incurred heavy investment losses themselves. Sizeable rescue packages had to be issued by authorities for saving major banks. This public money cannot be spent for other purposes, such as R&D or higher education. Ministries can therefore no longer foster technology-oriented entrepreneurship or (collaborative) innovation as before, mainly at the expense of regions where those activities have tended to concentrate. When support schemes were launched years ago, designated funds do not suddenly fade in the crisis. There may, however, be consequences of reduced innovation support budgets for coming periods now in the planning stage. Stimulus packages and programs to boost public investments in OECD countries have mainly targeted infrastructure projects and labour-intensive sectors (like construction), which bear little impact on innovativeness. There are, however, also targeted innovation-related efforts to modernise communication infrastructure, encourage science and R&D, augment human capital, promote green technologies and energy-efficiency, and support corporate innovation and entrepreneurship (BMBF 2009; OECD 2009a). Such programs tend to favour regions already well-endowed with R&D.

4. Geographies of Crisis and Innovativeness – First Empirical Traces

Only anecdotal evidence of the depicted conceptual assumptions can be produced so far. There are studies that derive overarching insights on crisis-innovation interdependencies (Archibugi and Filipetti 2011), some of them using survey data (Kanerva and Hollanders 2009), but do not account for regional differentiation. Others discuss regional implications of the crisis (like BBSR 2009), but do not refer to the crucial role of innovation. A major hurdle for any attempt towards analysing relevant relationships is that data on innovation indicators suffer from a particularly long time lag to publication. The latest EU report on science, technology and innovation (Eurostat 2011) draws on 2008 data, with regional figures relating to no later than 2007. The youngest Regional Innovation Scoreboard for Europe issued in December 2010 uses data from up to 2006 (Hollanders et al. 2009). The Global Innovation Index 2009-2010 (INSEAD and CII 2010) only regards the national level, putting Iceland on a surprising top rank (apparently, recommended strategies have worked even before being published; OECD 2009c). It is therefore impossible to use these sources for systematically analysing correlations between crisis affectedness and innovativeness on the regional scale.

In principle, the question of how to actually measure impact and by which indicators is not easy to solve. Two examples may serve to illustrate this. For Germany, a slight reduction in overall patent applications of 4.5 % has been recorded for 2009, while the state of Saxony alone has seen a remarkable increase of 17 % (DPMA 2010). But do patenting changes actually represent innovation dynamics (as also assumed in OECD 2009a)? For Germany as a whole, reductions may mainly be caused by cost-reducing corporate behaviour (saving on expensive patent filings), while R&D efforts have remained unchanged or even grown (Stifterverband 2010). In Saxony the growth of

new locations of large multinational firms which generally submit the majority of patent applications may have caused the surge without any logical link to crisis implications. Data on changing R&D intensities are, in principle, equally difficult to evaluate, since the crisis can cause the paradoxical phenomenon of rising figures based on shrinking sales rather than increasing R&D expenditure.

Surveys conducted in 2008-2009 by industrial associations offer a first glimpse on actual crisis effects on innovativeness, returning to the German example. The apex of all Chambers of Commerce and Industry, DIHK, for instance, regularly captures aspects of companies' innovation behaviour (DIHK 2008 and 2009). According to both investigations, the crisis bears more constructive than destructive impact so far. The latest survey (summer 2009; DIHK 2009) tells that almost half of the responding 1,100 firms have been changing their innovation strategy in the face of the crisis. Among surveyed medium-sized firms (up to 1,000 employees), 30 % raise their innovation efforts (mostly the R&D intensive ones), while just 5 % reduce them. Many have now started to critically reflect on and reorient innovation strategies. This translates into a favourable situation especially for regions that host big shares of such companies. Locations of large firms (> 1,000 employees), in contrast, face more difficult times, since 18 % of respondents in this class postpone innovation projects and 15 % completely cancel them, while just 17 % report increasing engagement in R&D. Sector differences become obvious too, since some sectors are much more offensive (chemical industry) than others (automotive industry). For altogether 30 % of the respondents access to funds for innovation projects is bad or has diminished, predominantly affecting smaller companies. 17 %, however, have gained better access to finance.

Regional investigations that allow for assessing place-specific interdependencies of crisis and innovativeness are still scarce. A study by the

Chamber of Commerce of Cologne, Germany, for instance, reveals a comparatively favourable situation of this agglomeration in the German context (survey of 200 firms in summer 2009; IHK Köln 2009). Almost 60 % of respondents intend to raise innovation activities in order to cope with the crisis. This goes in line with a strengthening of collaborative links, first of all with customers, suppliers and – to a lesser extent – with universities and R&D institutes, mostly those locating in the Cologne region. Some geographical factors also show effect in recent figures by other organisations. They indicate growing advances of R&D activities in the southern states of Germany for 2009-2010 which have always been leading innovators due to their agglomerating automotive, engineering and electronics industries (Stifterverband 2010).

5. Conclusions

“Economic crises are historically times of industrial renewal. Less efficient firms fail while more dynamic ones emerge and expand. Creative destruction is an essential engine of long term efficiency in market economies, and it intensifies in downturns” (OECD 2009a: 7).

This statement inevitably hints at implications on a regional level: recessions make agglomerations of industries rise or fall. This paper argues that innovativeness significantly shapes the geography of crisis-induced dynamics, both as a factor that determines the affectedness of regional economies and as a process field that is itself influenced by the depression. The depicted concept attempts to clarify major transmission mechanisms (regional structure and systems) and aspects that matter in this regard. Yet, this only represents a first step towards gaining a more palpable picture of relevant place-specific interdependencies which should be based on sound empirical verifications of conceptual assumptions. In the end, we therefore need to point out the tasks ahead.

Since official statistics will provide us with crisis-related data on regional innovation indicators only in a few years, original empirical research will be needed that targets crucial facets of the individual and collective innovation behaviour of regional organisations. Some guiding questions are: How do industrial sectors and firms of different size classes actually differ in their innovation response to the crisis, comparing the situation in different regions? Which systemic constellations of collocating companies, R&D organisations, finance and human capital providers in detail prove to produce collective innovativeness that helps to withstand negative crisis effects and generate positive reactions? In which respects does the crisis trigger the emergence of new radical innovations, hence actually the start of a new Kondratieff wave? And, finally, how does the shift of innovation activities towards emerging (Asian) economies intervene with regional innovativeness in advanced Western economies? Only collective research can succeed in tackling all these crucial issues.

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Summary: Economic Crisis and Innovativeness – Exploring Geographies of Impact

In contrast to financial and production-related implications of the recent economic crisis, interdependencies of depression and innovativeness have received little attention by academic scholars so far. Since innovation is increasingly perceived as a place-specific and context-dependent process, a geographical view offers good explanations why some regions are expected to gain in the crisis in terms of innovativeness while others rather lose. The paper explores, mainly from a conceptual angle, regional differences in interdependencies between the crisis and innovativeness in advanced economies. It addresses two directions of causal relations: In which respects are regional economies vulnerable or resistant in the face of the crisis, due

to their specific constellations of innovativeness? And how does the crisis, in turn, affect regional innovativeness, which may be subject to both hampering and encouraging forces? Arguments that ‘geography matters’ are elaborated by referring to two perspectives, one taking account of regional structure in terms of industry composition, and another one considering region-specific systemic qualities. Conceptual assumptions are supported by anecdotal evidence and recent studies on new trends in corporate innovation behaviour.

Zusammenfassung: Wirtschaftskrise und Innovativität – zur Geographie der Wirkungszusammenhänge

Im Gegensatz zu finanz- und produktionsbezogenen Implikationen der aktuellen Wirtschaftskrise haben Zusammenhänge von Depression und Innovativität bislang in akademischen Kreisen wenig Aufmerksamkeit erfahren. Da Innovation zunehmend als ortsspezifischer und kontextabhängiger Prozess verstanden wird, bietet eine geographische Sicht gute Erklärungsansätze dafür, warum einige Regionen voraussichtlich in der Krise an Innovativität gewinnen, während andere eher verlieren. Dieser Beitrag exploriert mit vorwiegend konzeptionellem Fokus regionale Unterschiede des Zusammenhangs von Krise und Innovativität in Industriestaaten. Zwei Richtungen von Kausalbeziehungen werden angesprochen: Inwiefern sind Wirtschaftsräume verwundbar oder widerstandsfähig in Anbetracht der Krise, gemäß ihrer spezifischen Konstellationen von Innovativität? Und wie beeinflusst im Gegenzug die Krise die regionale Innovativität, die sowohl hemmenden als auch anspornenden Kräften ausgesetzt ist? Die Annahme, dass geographische Aspekte bedeutsam sind, wird gestützt auf zwei Perspektiven erläutert, zum einen in Bezug auf regionale Strukturmerkmale und Branchenzusammensetzung und zum anderen hinsichtlich regionsspezifischer systemischer Eigenheiten. Konzeptionelle Überlegungen werden untermauert durch Einzelberichte und jüngere Studien zu aktuellen Trends des unternehmerischen Innovationsverhaltens.

Résumé: La crise économique et l'innovativité – sur la géographie des impacts

Contrairement aux implications financières et production-connexées de la crise économique récente, les interdépendances de la dépression et l'innovation ont suscité peu d'attention par les disciples scolaires jusqu'ici. Puisque l'innovation est de plus en plus perçue comme processus endroit-spécifique et contexte-dépendant, une vue géographique offre de bonnes explications pourquoi on s'attend à ce que quelques régions gagnent dans la crise en termes d'innovation tandis que d'autres perdent plutôt. Ce papier explore, principalement d'un angle conceptuel, des différences régionales dans les interdépendances entre la crise et l'innovation dans des économies avancées. Il adresse deux directions des relations causales: Dans quels respects les économies régionales sont-elles vulnérables ou résistantes face à la crise, à base de leurs constellations spécifiques d'innovation? Et comment la crise, à l'inverse, affecte-t-elle l'innovation régionale, qui peut être sujette à tous les deux qui entravent et à des forces d'une manière encourageante? Arguments que 'la géographie importe' sont élaborés en se rapportant à deux perspectives, une qui prend en compte de la structure

régionale en termes de composition industrielle, et une autre vu des qualités systémiques région-spécifiques. Des prétentions conceptuelles sont soutenues par la preuve anecdotique et les études récentes sur de nouvelles tendances dans le comportement de corporation d'innovation.

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