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Application possibilities of the micro-meso-macro framework in economic geography

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Summary

The micro-meso-macro approach is an analytical framework to study processes of economic evolution. In economic geography it has been hardly taken up so far. Using the example of spatial implications of corporate processes of adaption and renewal after structural interruptions, this paper shows at a conceptual level how the framework could be applied to topics in economic geography. Compared to other approaches, the micro-meso-macro framework has several advantages: It allows to analyse the coevolution between different forms of knowledge in an economic system and the context in which companies operate. By integrating mechanism rules, it also considers the ability of firms to adapt to a changing environment. Furthermore, it is possible to explain the interplay between enterprises and higher levels of analysis like industry sectors or regions through the analytical unit of the rule trajectory. In this paper it is argued not to assign any spatial dimension to the different levels of analysis per se, but to examine the mechanism rules along trajectories of operational rules under a spatial perspective.

JEL: B52, O18, R11

Keywords: Evolutionary Economic Geography, analytical framework, rules, coevolution, meso level, corporate processes of renewal, structural interruptions

1 Introduction

One of the central purposes of economic geography is to comprehend and explain spatially situated economic activities in their dynamics. For that, an evolutionary perspective is fundamentally suitable. Evolutionary economics studies historical processes of economic change and economic development (MacKinnon et al. 2009, 131, Herrmann-Pillath 2002, 204, Boschma/Martin 2007, 537). Economic geography papers, too, have been increasingly based on ideas of evolutionary economics in recent years in order to understand changes in the spatial organization of economy (Grabher 2009, Boschma/Frenken 2006). Often, however, the lack of a consistent theoretical basis and a clear analytical framework is criticized. Thus, there would be the tendency to focus on evolutionary metaphors and concepts without

integrating these into an overall context or a coherent theoretical framework (Essletzbichler/Rigby 2007, 554, Martin/Sunley 2006, 396).

The following paper introduces the micro-meso-macro approach (Dopfer et al. 2004, Dopfer 2005, Dopfer/Potts 2008) as an analytical framework which constitutes a relatively closed evolutionary economic construct of ideas. It has been developed in economics and hardly taken up in economic geography so far. Moreover, it has not yet been applied to a specific issue or operationalized for an empirical investigation. The aim of this paper is to demonstrate that the micro-meso-macro-approach is appropriate for putting evolutionary economic geography studies theoretically-conceptually on a broader basis. Furthermore, it can be utilized for empirical research in this field.

This is illustrated using the example of a question that has attracted relatively little attention in evolutionary economic geography so far: Which spatial implications do corporate processes of renewal after structural interruptions have? Thereby, the applicability of the micro-meso-macro approach to path-breaking changes in enterprises resulting from change in the economic, political and social context is illustrated. This very noticeably reveals differences in efficiency and adaptability of companies that can also be reflected spatially. Nevertheless, the focus of economic geography papers in recent years was more on aspects of continuity and incremental, path-bound change.

This paper is structured as follows: In section 2, first the analytical foundations and levels of analysis of the micro-meso-macro approach are introduced and discussed. The third section discusses how a spatial dimension can be integrated into this approach. Then, in section 4 it is demonstrated how the micro-meso-macro approach can be applied to analyze spatial implications of corporate processes of renewal. In the fifth section, finally a summary follows the preceding remarks.

2 The micro-meso-macro approach

2.1 Analytical foundations

The micro-meso-macro approach has been developed by Kurt Dopfer, Jason Potts and John Foster (2004) and constitutes an analytical framework for the study of economic evolution. It is based on the assumption that modern economic systems evolve if there is a growth of knowledge. As knowledge grows continuously, economic systems evolve continuously as well (Dopfer/Potts 2008, XII). Analyses using the micro-meso-macro approach, therefore, focus on the knowledge basis of economic activities and hence are called generic analyses. These have to be distinguished from operational analyses which only study economic

processes per se and assume the underlying knowledge basis to be invariant (Dopfer 2005, 30).

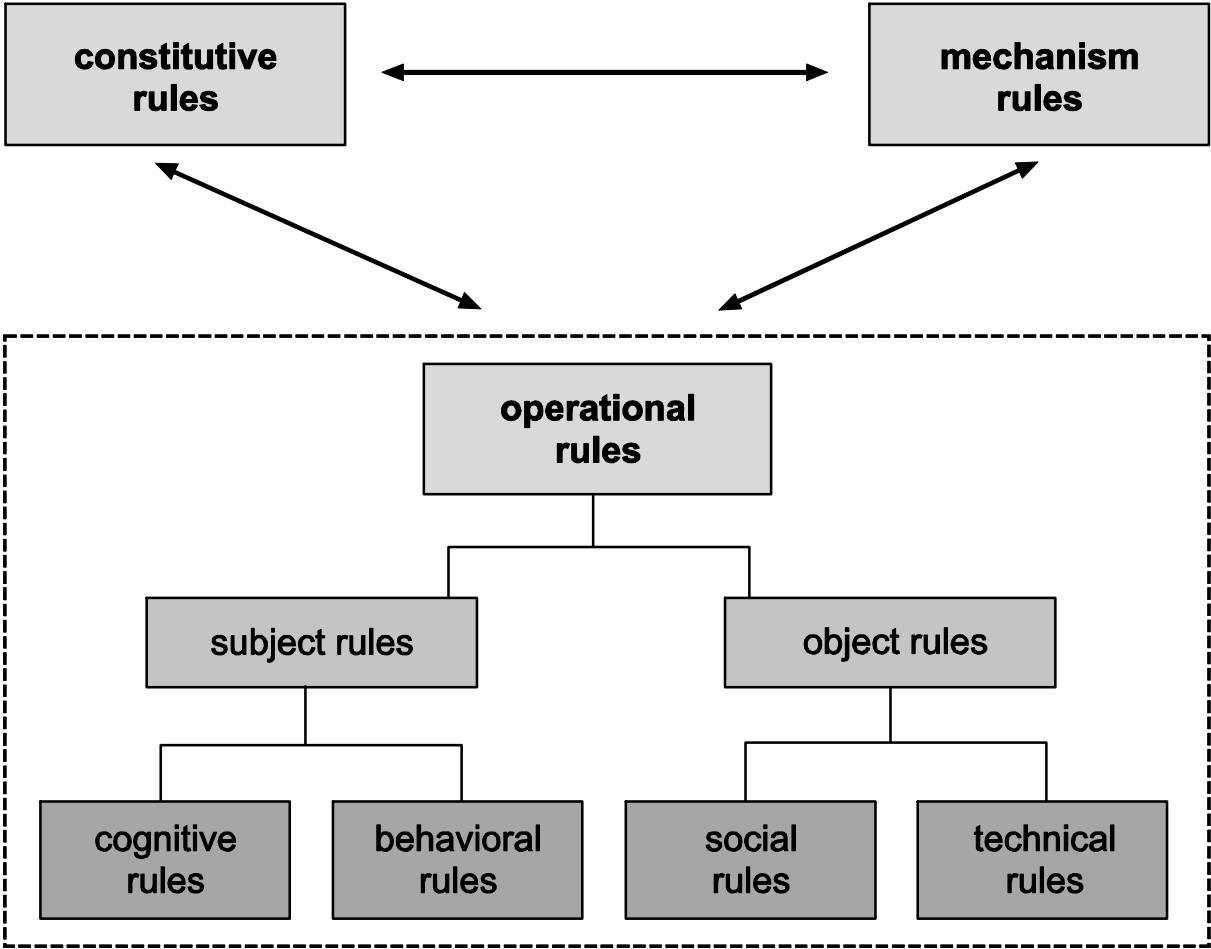
The key role of knowledge for economic growth and economic change is also recognized in many other evolutionary economic papers (e.g. Herrmann-Pillath 2002, Boschma/Martin 2007, Potts 2000, Maskell/Malmberg 2007, Metcalfe 1998, Metcalfe/Foster 2004). In this context often further terms like competences, habits, routines, technologies or institutions are emphasized as relevant without clearly differentiating one from another (Dopfer/Potts 2008, XII). The micro-meso-macro approach, by contrast, introduces the term rule as a new general term for these different terminologies and carries out a separate systematization into several subcategories which is explained in a subsequent passage of this section. Rules altogether are defined as deductive schemata that allow the occurrence of economic activities (Dopfer 2005, 22f.). Accordingly, various forms of knowledge or different rules form the basis of situation-specific actions of enterprises by influencing and leading those. How the single rules emerge, how they develop over time and how they are coordinated among each other are the main issues of the micro-meso-macro approach.

The approach is based on three empirically observable principles or axioms. As first principle bimodality is mentioned which more aptly can be called multimodality. Multimodality means that economy consists of many rules which each can have multiple carriers and thereby different realizations, too. The second principle (association) states that there are associations between the various rules and rule carriers of an economic system that result in a certain structure. The third principle is the process axiom which implies that an economic system has a dimension of time and that all its entities have a temporal existence. The rules and carriers also develop over time, so they have to be regarded as processes. From these axioms one can derive four analytical units: 1. generic rules, 2. rule carriers, 3. economic operations and 4. rule trajectories (Dopfer/Potts 2008, 2ff., Dopfer 2005, 18).

The micro-meso-macro approach distinguishes between the three domains of operational, constitutive and mechanism rules¹ (see fig. 1). Operational rules form the knowledge base of economic activities which generate value added. They can be subdivided into two classes: subject rules and object rules. Subject rules refer to individual rule carriers, whereas object rules organize groups of people or physical things. Subject rules on the one hand comprise cognitive rules that are operative in the mind of an individual rule carrier and influence its perception of the outside world. On the other hand behavioral rules are part of subject rules. They control the actions of an actor in an external environment, for example interaction with other actors. Object rules can also be subdivided into two different types, firstly social rules

and secondly technical rules. Social rules serve to organize people in social institutions as enterprises, for example. In contrast to behavioral rules, they constitute rules shared or rules to be shared by several persons which control the interaction with each other. Technical rules, however, organize material resources and are better known as technology (Potts 2007, 344ff., Dopfer/Potts 2008, 7ff.).

Figure 1: Systematization of the analytical unit rule



Source: Author’s own illustration based on Potts 2007, 344-346 and Dopfer/Potts 2008, 7-10.

The second domain of an economy’s rule-system are the constitutive rules which constitute the conditions or principles in which economic actors are embedded. This involves the cultural, legal, political and social rules that compose the possibility space of operational rules. They don’t create a direct value, but rather define which activities are possible or allowed in the economic system and what they are worth. Even though constitutive rules can concern the economic system, they are no economic rules since they mainly develop by political mechanisms.

Mechanism rules, the third domain of the rule system, involve rules about the changing of rules. That means they shall enable companies or individual economic actors to develop new operational rules and thereby they provide the mechanisms for the growth of knowledge. Economic evolution, therefore, is no random process, but is formed and regulated by rules about the restructuring of operational rules (Potts 2007, 344ff., Dopfer/Potts 2008, 7ff.). Mechanism rules – according to definition – more or less correspond to the concept of dynamic capabilities which is more common in literature (e.g. Teece et al. 1997, Helfat/Peteraf 2009, Helfat et al. 2007, Winter 2003, Zollo/Winter 2002, Eisenhardt/Martin 2000, Cepeda/Vera 2007). Competitive advantages of companies, however, do not arise from dynamic capabilities or mechanism rules per se, but from resource configurations and operational activities which are generated by them (Cepeda/Vera 2007, 426). Mechanism rules, therefore, are not a resource themselves, but merely form an architecture for solving problems (Meyer/Fuchs 2008, 3).

Even though economic evolution is defined as a process of change in operational rules, also constitutive rules as well as mechanism rules have to be taken into account for a comprehensive understanding of this process. Likewise, it is not sufficient to single out changes in particular types of operational rules, like e.g. technological change. Even if a rule change originally only occurs in a specific domain or class of rules the linkages between rules and rule carriers (axiom 2) will cause a change to other types of rules, too. The task of evolutionary economic analysis, therefore, is to reveal co-evolutionary processes between the different types of operational rules as well as between operational, constitutive and mechanism rules (Dopfer/Potts 2008, 8ff.).

Beside rules there are three further analytical units. Corresponding to the principle of multimodality, all rules have carriers (2. analytical unit) and one rule can have various of them. A rule carrier can be a subject (a so-called agent) or an object (an agency). Subject carriers are single persons, object carriers are socially organized rule carriers like, e.g., firms or households. Both constitute so-called micro units since they firstly are carriers of rules which they apply operationally and secondly can develop and adopt new rules. Micro units, therefore, can be regarded as processing units of knowledge (Dopfer/Potts 2008, 11, 28ff.).

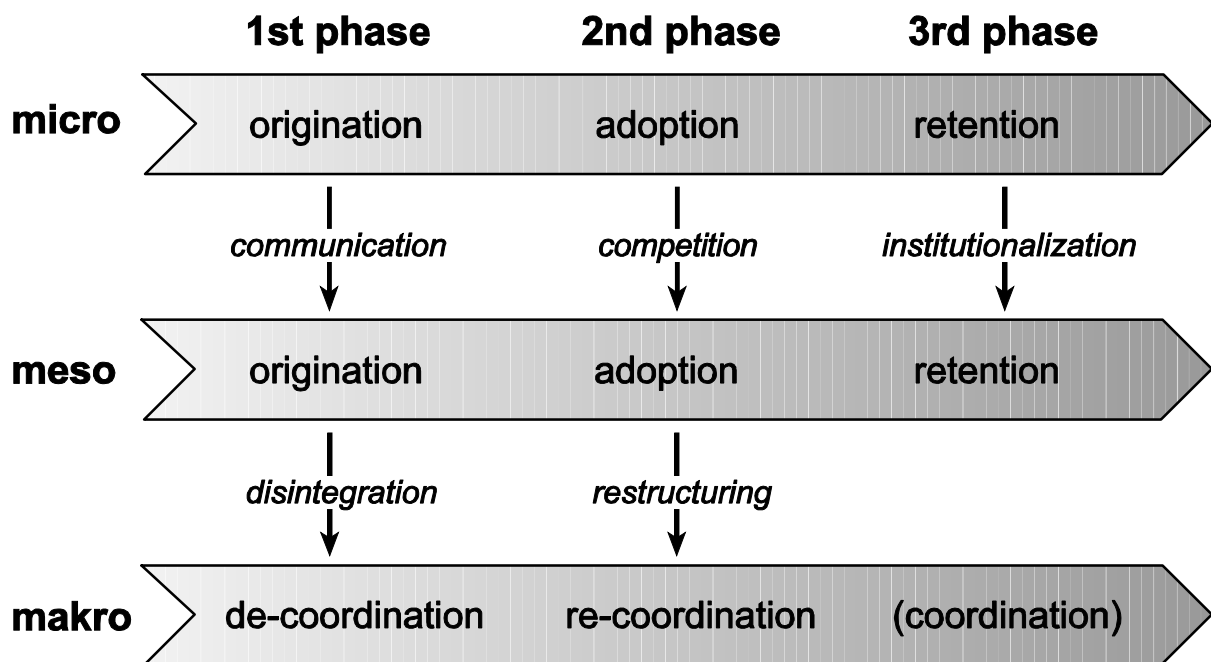
The third analytical unit of the micro-meso-macro approach are economic operations which are implemented by means of operational rules by the rule carriers. The value of a new rule does not automatically result from its mere existence, but from the economic activities that it enables (Dopfer/Potts 2008, 21).

A central concept for evolutionary economics is the fourth analytical unit, rule trajectory. It is the process unit of economic change (see axiom 3) and describes the developmental path of a rule. In most cases the trajectories of operational rules are examined. A rule trajectory can schematically be subdivided into three phases. Phase 1 comprises the creation of a new rule (origination), phase 2 the adoption or application of this rule and phase 3 comprises the retention of the rule (Dopfer/Potts 2008, 11f.). A rule trajectory, moreover, has to be analyzed at three analytical levels which are introduced in the following section.

2.2 Levels of analysis

According to Dopfer/Potts (2008, 15f.), evolutionary economics aims to examine processes of coordination and of change in knowledge in the entire economy. Corresponding to this perspective, it is a macroeconomic analysis ultimately. However, a complete theoretical explanation of dynamics always comprises the micro and meso level as well (see fig. 2).

Figure 2: Levels of analysis in the micro-meso-makro-approach



Source: Author's own illustration based on Dopfer et al. 2004, Dopfer/Potts 2008 and Dopfer 2005.

Micro level

Evolutionary microeconomics is concerned with the distinct change in knowledge bases of micro units. It analyzes processes of origination, adoption and retention of new operational rules in a carrier (agent or agency), so-called micro trajectories. The origination of a micro trajectory is regarded to be the creative capabilities and the individual curiosity of a micro unit that can result in the emergence of a new rule (Dopfer/Potts 2008, 21ff., 38, Dopfer et al. 2004, 269). The cause of the emergence of new rules, according to Dopfer et al. (2004, 269), is the restlessness of human mind and the circumstance that an actor continuously is preoccupied with the search for solutions to distinct problems. Elsner (2006, 3) criticizes this perspective since the new rule would come from an isolated Schumpeterian actor who would cause creative destruction by his restlessness and since it is left open which would be the distinct problem that he wants to solve by means of the new idea. In his opinion, the macro conditions that can drive and form such creative micro activities have to be considered more intensively. However, as will become apparent in the explanation of the interaction between meso and macro level, the micro-meso-macro approach certainly recognizes that the origination process of new rules is always influenced by ideas and behaviors of other actors.

The second phase of a micro trajectory (adoption) is about adapting a new rule to the internal environment, i.e. the knowledge basis of a carrier, and adopting it to economic activities. This phase is characterized by the carrier's experimenting with the new rule. If a new rule is not able to produce practicable operations it will not be adopted anymore and will be rejected by internal selection. A rule is adopted by an actor only if he expects that it will contribute to his capabilities and the operational results positively. Since this only involves assumptions about what the new knowledge will be worth in the future and since there are substantial uncertainties about its costs and benefits, the expectations of the rule carrier do not necessarily have to be identical with reality. Therefore, the adoption of rules is not synonymous with the concept of learning since learning can be regarded as a process of adaption to the environment and of stabilization of known progress. The result of the second phase of a micro trajectory is that a rule carrier thinks and behaves unlike before, be it only marginally or significantly (Dopfer/Potts 2008, 40ff., 46, Dopfer 2005, 31, Dopfer et al. 2004, 272).

During the third phase of a micro trajectory (retention) a rule carrier retains a new rule by memory, recall of information and repeated rule adoption for ongoing use. The rule is embedded in an existing rule complex. The phase of experimenting has now turned into a phase of normalization. Such a stabilized rule is called habit at the individual level. If it refers

to social organizations (agencies) it is called routine (Dopfer 2005, 31, 37, Dopfer/Potts 2008, 43, 46).

Meso level

According to the principle of bimodality or multimodality, a rule can have many carriers that actualize it differently. The different carriers of a rule are called population. A rule and its carriers constitute a meso unit, along with the meso trajectory they are called meso regime. The analysis of meso regimes belongs to the research field of evolutionary meso-economics (Dopfer/Potts 2008, 21, 45, 51).

The first phase of a meso trajectory (origination) constitutes a micro-meso process. It implies the boundary crossing of a rule from a micro unit to the external environment of the rule carrier. Therefore, a transformation of a rule from a purely private state to a public state takes place. Other agents or agencies acquire this rule and thereby establish a new rule population. A requirement for the implementation into the economic system is that the rule can be communicated (Dopfer/Potts 2008, 47, 58, Dopfer 2005, 32 f., Dopfer et al. 2004, 273).

During the second phase of a meso trajectory (adoption) the originally private idea is exposed to public examination, evaluation and change. This not only happens at generic level, but also at operational level. In contrast to neoclassical economics, evolutionary economics assumes a population of heterogeneous actors instead of a representative actor with representative behavior. Therefore, the single rule carriers adapt the rule to their respective environment under the influence of path dependencies according to their individual experiences, expectations and views. They operationally adopt the rules in different ways originating new products, production processes, strategies and co-operations, for instance. The enterprises belonging to the just formed meso unit constitute the supply side of a newly originated market by their different operational adoptions of a rule. At this market they meet with demand rules of consumers, so that the meso-2-phase is characterized by serious turbulence and high competition between the different carriers of a rule. Selection processes work on their economic activities. In contrast to phase 2 at micro level, at meso level there is no internal, but environmental selection. Due to varying success of the different actualizations of a rule some rule carriers will prosper and grow while others shrink or withdraw from competition. During this phase market capitalism operates in its entire creative and destructive way (Elsner 2006, 1, Dopfer et al. 2004, 274f., Dopfer/Potts 2008, 21, 46ff., Dopfer 2005, 47).

Competition during this phase of meso trajectory always pushes enterprises to develop further novelties and to innovate. It therefore is the power station of economic evolution. The generic

change at micro unit cannot be regarded as an evolutionary process yet because economic evolution – analogous to evolution in biology – can only take place at population level, not at individual level (Dopfer/Potts 2008, 27, 49f.). Only competition reveals differences in the process of growth of the single micro units so that the composition of the population changes and evolution takes place. Thus, evolutionary meso-economics is also regarded as conceptual core of evolutionary economic analysis (Dopfer et al. 2004, 269).

Most rules are rejected before reaching the third stage of the meso trajectory (retention). Large domains of economy are situated at stage 1 and 2 of meso trajectory in a capitalistic system. Meso-3 is only reached if the population of rule carriers has stabilized and if the single members retain and replicate the rule by ongoing adoption. Then the rule is embedded in their existing rule complexes and collective cognition has emerged. After a rule has gone over to this phase it can be called institution (Dopfer/Potts 2008, 50, Dopfer et al. 2004, 272ff.). According to Potts (2007, 345), in principle an institution refers to social rules, but as these are composed with reference to the other three kinds of operational rules an institution always constitutes a meso 3-complex which is comprised of subject and object rules. Despite the relative stability of institutions meso-3 constitutes just a meta-stable state that cannot be interpreted as a neoclassical equilibrium (Brette/Mehier 2005, 11 resp. 2008, 227f., Dopfer 2005, 44f.). Institutions can change over time (Pelikan 2003, 245) if economic actors recognize new opportunities (North 2005, 2ff., 59) or if change becomes necessary because of the emergence of new meso units. This is explained in the following.

Macro level

While a meso trajectory originates from the interaction of micro trajectories, several meso regimes constitute the components of macroeconomics (Dopfer 2005, 47). Macro usually refers to economy as a whole. However, Dopfer/Potts (2008, 16f.) also admit that the definition of macro is applied to units that are smaller than the entire economy. In this case, components of macroeconomics, like e.g. industrial sectors, are isolated and treated as if they were macro economy themselves. This is called partial evolutionary economic analysis.

Evolutionary macroeconomics examines how a new meso trajectory can result in a change of knowledge structure and sharing within economy as a whole or within considered components. Therefore, the coordination of the different meso units has to be examined because macro economy is not just a result of the sum of different meso units, but of their coordinated structure (Dopfer/Potts 2008, 60). Since a meso unit consists of a rule and its carriers, coordination on one side can refer to how the different rules in an economic system

fit together. On the other side it can refer to the relations between the carriers of the different rules (Dopfer 2005, 48).

The dynamics of the coordination process of macro economy can be examined by means of the three-phase macro trajectory. The first phase implies the de-coordination of macroeconomic order. It starts with the origination of a new meso trajectory that alerts all other meso units that something is changing. Depending on the rule its effects on the existing meso units of an economy can be differently strong. Both the relations between the different populations of a macro economy and the existing logic of relations between rules, and hence the knowledge basis of economy, can be disturbed. Thereby, a process of disintegration of previously stable structural components and the initial exploration of novel structural relations and linkages between rules and populations is initiated. The emergence of new operational activities changes the selection environment of other rules and carriers and opens up new operational possibilities. Depending on quality of their mechanism rules the rule carriers are variably capable of reacting on it. This produces different population dynamics which change the economic order (Dopfer/Potts 2008, 67ff., 45).

The second phase of macro trajectory, re-coordination, goes parallel to adoption at meso level. Existing macroeconomic structures continue to break up, but at the same time there is a continuous establishment of new relations between meso units (Dopfer 2005, 48) that fit to the newly emerged rule and population of rule carriers. Likewise, the economic activities of an economy's participants change, so that the operational economy is thrown into turbulence. Regarding economy as a whole as macro level, this can result in changes in e.g. prices, allocation of resources, the distribution of income and the level and distribution of wealth (Dopfer/Potts 2008, 69).

The authors of the micro-meso-macro approach furthermore include a third phase of macro trajectory, the coordination of a new macroeconomic order. According to that, a new meso unit would be embedded at all levels in economy as a whole and all implications of the new rule would be implemented. A state of coordination between all meso units can only be achieved and maintained if all rules of an economy are situated at the third stage of their meso trajectory at which rules are retained and replicated and the populations have become stable (Dopfer 2005, 48, Dopfer/Potts 2008, 62f., 70). In contrast to the authors of the micro-meso-macro approach, macro-3 is more regarded as a theoretical thought experiment in this paper since new rules emerge continuously and differ in success and velocity of their origination.

2.3 Assessment

The authors of the micro-meso-macro approach claim that their framework is more general and more comprehensive than existing evolutionary approaches (Dopfer/Potts 2008, XII) and that it can provide a unifying framework for all approaches basing on the idea that economic evolution is a process of knowledge growth (Dopfer et al. 2004, 268). Even though there might be a certain demand for discussion about single details of the approach (e.g. about macro-3), the explanatory potential altogether is regarded to be considerable. It is largely agreed to the self-assessment of the authors mainly for three reasons: Firstly the co-evolution of rules is analyzed, secondly institutions are integrated and thirdly the interaction of different analytical levels is taken into account and explained.

Many evolutionary papers focus on single forms of knowledge like technologies, institutions or individual behavior and try to explain economic evolution by means of their development. The micro-meso-macro approach, in contrast, includes all forms of operational knowledge due to the broad definition of rules and takes into account the interactions between them. Furthermore, not only operational rules are considered, but also constitutive rules as well as mechanism rules. This goes beyond most existing evolutionary works since with constitutive rules the political, legal and social environment of the single actors are included and with mechanism rules the capabilities of the actors to adapt to a changing environment are taken into account. Therefore, the micro-meso-macro framework allows a comprehensive analysis of changes in the economic rule system, even though, according to Potts (2007, 348f.), revealing the co-evolutionary processes between the different forms of rules has not been satisfactorily successful yet.

In addition, the micro-meso-macro approach goes beyond other evolutionary economic approaches as it provides a framework integrating institutions (Potts 2007, 341). This is done in two different ways. On the one hand, rules that are situated in the third phase of their meso trajectory constitute institutions following the terminology of the approach. Institutions, hence, are operational rules which have turned to habits or routines for many agents by ongoing adoption and about which exists collective cognition. Furthermore, the term institution, according to general understanding, comprises formal structures, too, like e.g. the constitutional framework or legislation (North 2005, 49-52, 57, Pelikan 2003, 240). This is assigned to the constitutive rules according to the rule systematization of the micro-meso-macro approach.

While evolutionary and institutional approaches had been linked with each other in classical economy, they took separate paths at the rise of neoclassical economics with few exceptions

(Nelson 2002, 17ff.). Until today institutional analysis is only loosely linked to theories of economic evolution in economics and economic geography (Essletzbichler/Rigby 2007, 558). Whether a merging of both strands is useful or not is discussed controversially (e.g. Boschma/Frenken 2006, 2009, MacKinnon et al. 2009, Essletzbichler 2009, Brette/Mehier 2008). Boschma/Frenken (2009, 152), for example, criticize those institutional approaches to economic geography that view institutions as durable, rather static structures and ascribe them to have a strong impact on firms' behavior and spatial economic structures while neglecting micro-foundation and dynamics. Nevertheless, Boschma/Frenken consider it useful to take into account the role of institutions in evolutionary studies.

The micro-meso-macro approach shows that institutions can be integrated in an evolutionary framework in a dynamic, co-evolutionary and non-deterministic way. It points out that economic evolution cannot be understood solely by one perspective or another, but that the diverse linkages and interactions that exist between the different forms of rules in an economy require an integrative perspective. In the course of this, neither the constitutive rules nor the operational rules at meso-3 are to be regarded deterministic for the respective corporate behavior. The constitutive rules merely constitute the possibility space for the operational rules. However, changes in this overriding framework can indeed result in change to the operational rules and their actualizations as is exemplarily explained in section 4. The other way round, also the constitutive framework can be changed by the influence of enterprises. Likewise, not only institutions in terms of operational rules at meso-3 have effects on the actions of their carriers since every firm has a variety of operational rules of which only very few develop into a coordinated and coordinating social structure.

By integrating the diverse forms of knowledge including institutions into a broad analysis framework the micro-meso-macro approach is not only more comprehensive than other evolutionary economic approaches, but more fertile than regulation theory works, too (e.g. Boyer 1990, Bathelt 1994, Boyer/Saillard 2002, Krätke 2000). These, like the micro-meso-macro approach, take the view that the long-term dynamics of economy can only be understood if also the relations to the entire socio-political system are considered (Boyer 1990, 27; see chapter 2.1). Regulation theory particularly stresses macro-institutional aspects. It focuses on e.g. institutions that steer social compromises between larger social groups as well as on institutions of education or finance. Corporate rules on which evolutionary economic approaches typically focus are disregarded for the most part, however (Boyer 1990, 37ff., Bathelt 1994, 68ff., Coriat/Dosi 2002, 203ff.). In contrast, the micro-meso-macro

approach integrates both perspectives by emphasizing co-evolution between the different rule orders.

A further essential reason why the bottom-up perspective of most evolutionary economic and the top-down perspective of regulation theory (Coriat/Dosi 2002, 108) are integrated into the micro-meso-macro approach is that this approach combines different analytical levels. In economics the macro level of the entire economy or certain summarizations like industrial sectors are conventionally regarded as an aggregation of micro units (usually enterprises). This practice, however, disregards the interactions between the different analytical levels and the complexity of economic systems. For example, economic actors always make their decisions within an overriding context that influences them in a certain way. Dynamics within an industrial sector or even within economy as a whole, therefore, cannot only be explained by a mere analysis of corporate development paths at micro level (Bergh/Gowdy 2003, 63, 76, Dopfer/Potts 2008, 22ff., Dopfer 2005, 40, Brette/Mehier 2008, 227ff., Weintraub 1977).

The explanation of the interaction between a firm at micro level and configurations at higher analytical levels constitutes one key aim of evolutionary thinking (Boschma/Martin 2007, 541). However, the strong focus on micro is not only dominant in neoclassical, but also in many evolutionary economic works (Schamp 2000, S. 22; Brette/Moriset 2009, S. 498). Some authors criticize that this applies to various evolutionary studies in economic geography as well (MacKinnon et al. 2009, 136, Brette/Moriset 2009, 498).

In recent years it has been certainly taken into account in economic geography that economic actors are not atomized actors that act unaffected by their environment, but that economic acting is embedded in persistent social relations. This is reflected in papers about industrial districts, innovative or creative milieus, interactive learning or the concept of relational economic geography, for instance (for an overview see Schamp 2000, Bathelt/Glückler 2003). These papers have in common that networks are regarded as an intermediary stage between micro and macro level. Networks can be described as consisting of actors interconnected by non-market exchange relationships, pursuing the strategic aim to strengthen the involved enterprises in competition, e.g. by allowing activities for which there are not enough in-house resources (Schamp 2000, 65). However, networks can also be viewed in a broader sense, as more general linkages.

The micro-meso-macro approach conceptualizes the intermediary stage, meso, in such a more comprehensive way. A meso unit is regarded as a group of economic actors that share a particular operational rule and actualize it in different ways. It does not only have to only comprise cooperating firms in terms of a network since a rule can diffuse by other

mechanisms like imitation as well. The other way round, a meso unit does not inevitably have to comprise all members of a network as these do not have to cooperate on all operational rules and their actualizations. Meso level and network, therefore, do not have to be identical since the micro-meso-macro approach uses the rule as analytical unit instead of the enterprise and links the analytical levels by means of rule trajectory.

The analytical unit of the rule, on one side, is smaller than the one of enterprise because a certain rule is only one component of a firm. The examination of the different rules of a firm thus allows to open the black box of the company to a certain degree. Simultaneously, the analytical unit of the rule is more comprehensive than the one of enterprise as the examination of a rule trajectory is not limited to one firm, but considers the relevant selection environment of every rule. In doing so, the population of carriers of the rule as well as the interaction with the entire rule system of macro level is examined. The focus of the micro-meso-macro approach is especially on competition between the different enterprises of a meso unit. This is regarded as the essential driving force of economic evolution. In economic geography in contrast, studies, e.g. cluster studies, often have a strong focus on cooperative structures and show how the integration of a firm into a network can increase its competitiveness. The role of competition is taken into account only marginally in most case.

While the micro-meso-macro approach lays its main focus on the second stage of the meso trajectory of a rule at which market capitalism is especially effective, many economic geography papers emphasize the importance of the embedding of enterprises in a joint institutional framework, in particular. Hence, the focus is more on the third stage of meso trajectory at which a population of rule carriers has stabilized, collective cognition has developed and the relevant rule can be called institution. The micro-meso-macro approach, however, illustrates that only few rules in an economic system reach the third stage of meso trajectory, but large sectors of economy in a capitalistic system are situated at the first and second stage. Beside networks as a form of cooperation of micro units, therefore, also interdependencies between actors have to be taken into account between which there is no established cooperation. The micro-meso-macro approach considers both forms of interaction. It can be stated that the rule trajectory as analytical unit allows a better explanation of interdependencies between a firm and configurations at higher level than, e.g., the firm or the corporate development path as analytical unit. The originality of the approach by Dopfer, Foster and Potts first and foremost results from not only using the distinction between the three analytical levels micro, meso and macro classificatorily or taxonomically, but more ontologically and analytically. The authors, therefore, focus less on the identification of

different classes of economic phenomena than on the nature of relations between the different analytical levels (Brette/Mehier 2008, 227f.).

Altogether, the micro-meso-macro approach has a very high complexity which constitutes a challenge for its application. An empirical analysis that exhausts all possibilities which the approach provides is not feasible, but can only be limited to single aspects as is shown in section 4 exemplarily. However, it constitutes a relatively closed construct so that studies that analyze partial aspects of economic evolution by means of the micro-meso-macro approach can be well fit into an overall context.

3 Integration of a spatial perspective into the micro-meso-macro approach

So far, the micro-meso-macro approach is a pure economic concept for the examination of economic dynamics. In economic geography it has been hardly taken up and has not been applied in an empirical study either. Until now, Brette/Mehier (2005, 2008) and Brette/Moriset (2009) have tried most thoroughly to apply the analytical framework to a geographical question by situating the development paths of clusters in the approach. According to them, a cluster has to be regarded as a case of spatial institutionalization of an agglomeration rule within a population of firms so that the cluster lifecycle has to be analyzed as a meso trajectory. The causes of cluster evolution would be that firms regard a location to be advantageous for the achieving of their aims because of agglomeration advantages and, therefore, locate there. Spatial concentration processes, thus, would be regarded as a rule shared by the enterprises of a cluster.

Nevertheless, even this fundamental assumption is to be questioned. The advantages that may be caused by the spatial concentration of firms cannot be given as the reason for the existence of a cluster as they do not develop until there already is a concentration (Mossig 2008, 51) – if they develop at all (Boschma/Frenken 2001, 298). Only after a spatial concentration has consolidated, certain agglomeration advantages have developed and enterprises from the outside have located within the cluster because of that, one could talk about a “tendency to agglomeration”. Therefore, it is not purposeful to examine the trajectory of an “agglomeration rule” by means of the micro-meso-macro approach.

Apart from papers by Brette/Mehier (2005, 2008) and Brette/Moriset (2009), the micro-meso-macro approach is also mentioned by Martin/Sunley (2007). They think it has a considerable potential for economic geography research, but do not apply the approach to a concrete question. According to Martin/Sunley (2007, 292), papers about industrial districts, regional knowledge clusters, learning regions, inter-company organization, national innovation

systems etc. can be assigned to the concept of meso economy. A similar view is held by Rodríguez-Pose/Crescenzi (2008, 54) who examine the influence of innovations on regional economic performance in Europe. In their opinion, national innovation systems form the macro level and individual innovative actors the micro level, while the interposed meso level considers the local and regional variety of knowledge absorption, diffusion and generation. Rodríguez-Pose/Crescenzi also give regional configurations like industrial districts or learning regions as examples for meso units.

All named authors consequently share the opinion that the meso level has an explicit spatial dimension and is characterized by a spatial concentration of carriers of a rule respectively. This view is not shared unreservedly in this paper. In the micro-meso-macro approach a meso unit comprises all enterprises which carry and actualize a certain rule. However, these do not have to be located next to each other inevitably. The other way round, not all the firms at one location have to carry the same rules. Possibly, there are some rules that are only actualized by firms in a locally limited area, but this cannot be assumed to be given in principle. Otherwise one could call it a “fetishization of regions” which economic geography works are often criticized for. An examination of enterprises only in context of their particular location is not enough as this indeed constitutes an important benchmark for corporate acting, but firms usually have relations to companies from other regions, too (Bathelt et al. 2004, 32f., Bathelt 2005, 106f., Martin/Sunley 2006, 414). The diffusion processes of operational rules in the course of a meso trajectory, therefore, do not have to be limited to a certain region. Accordingly, regional units like clusters or industrial districts are not automatically to be equated with a meso unit.

Instead of attributing a spatial dimension to the single analytical levels of the micro-meso-macro approach the rule trajectory should be used as starting point for geographical examinations. This corresponds to the relational perspective of economic geography according to which the subject is not characterized by its research topic, but by its research perspective, that is the spatial perspective on economic phenomena (Bathelt/Glückler 2003, 33f.). Accordingly, also when applying the micro-meso-macro approach in economic geography rule trajectories as well as the coordination of rules and rule carriers with one another stay the key research topic. On this, specific economic geography questions and problems have to be expressed.

Which concrete questions are examined in economic geography is different from case to case. For example, it can be examined how rules differ spatially or which spatial differences exist at the single stages of a rule trajectory. Do enterprises develop new operational rules at certain

locations more often than at others (micro-1), e.g., and are there differences in their capabilities of finding practicable applications to economic activities (micro-2)? How does an operational rule spread spatially (meso-1 and meso-2) and are there differences between the different rules concerning this? Do differences in success of operational adoptions of rules between several locations exist (meso-2)? How does the coordination between existing meso units change from a spatial point of view when a new meso unit has come into existence (macro-1 and macro-2)?

Economic geography studies using the micro-meso-macro approach are not limited to present spatial structures, but also changes in this pattern as well as their causes can be analyzed. In doing so, the focus is on mechanism rules as these constitute the capability of companies to adapt their operational rules to current challenges and to develop new rules. In principle, it has to be assumed that enterprises have differently beneficial mechanism rules and that these cannot be adopted equally successful in every situation. Therefore, it has to be examined whether there are spatial differences in the usefulness of mechanism rules of firms, what causes this and which consequences this has for the spatial pattern of economic activities.

The analytical units of rule and rule trajectory allow a differentiated examination of the spatial dimension of corporate mechanism rules. This is because it can be identified exactly which components of corporate rule systems and which parts of the respective rule trajectories are influenced by, e.g., spatial proximity or regionally specific circumstances. In this respect, the micro-meso-macro approach constitutes an analytical framework that allows economic geography studies to give specify which economic activities have spatial effects or when and in what way localized facts can influence companies conversely.

4 Application of the micro-meso-macro approach in economic geography using the example of spatial implications of structural interruptions

After generally discussing how a spatial perspective can be integrated into the micro-meso-macro approach in the previous section its applicability in economic geography is illustrated using the example of a concrete question. This is: Which spatial implications do fundamental corporate processes of renewal in a particular industrial sector have after structural interruptions?

In evolutionary economic geography this issue has attracted relatively little attention so far. In recent years the focus of economic geography studies was especially on aspects of continuity and incremental change (on-path change) of corporate development paths or the blocking of change by lock-in processes (Hirsch/Gillespie 2001, 72, MacKinnon et al. 2009, 143,

Matuschewski 2005, 167). This is reflected by the prominence of certain evolutionary concepts like path dependency which states that present actions and decisions are based on previous events and experiences (Martin/Sunley 2006, Martin 2010).

The incremental, path-bound change, however, only constitutes one form of economic change. There may also be situations in which smaller changes to existing products and business processes no longer result in a firm's success. Then the necessity for more profound processes of renewal arises that can change the direction of existing development paths fundamentally and relatively fast (path-breaking change). So far, economic geography first and foremost has concentrated on technological breakthroughs as driving force for path-breaking change (e.g. Storper/Walker 1989, Dosi et al. 1988, Boschma/Lambooy 1999, Holmén/McKelvey 2005).

Since the performance of organizations is always influenced by the economic, political and social context, however, it can change when there is a change in this setting (Grabher/Stark 1997, 535). Therefore, it has to be assumed that also externally caused crises with a certain efficacy have the potential to break through existing development paths (MacKinnon et al. 2009, 143, Bassanini/Dosi 2001, 50, Bathelt/Boggs 2003, 256f.). Such events are called structural interruptions in the following. An especially succinct example for such a structural interruption is the collapse of the GDR and the ensuing German reunification (Crouch/Farrell 2004, 28).

It has to be assumed that differences in performance and adaptability of firms are especially distinct in such situations. This is directly relevant for economic geography as different corporate processes of renewal can also be reflected spatially. If enterprises renew themselves more successfully at certain locations than at others this can result in changes of locational structures of industrial sectors. By means of the micro-meso-macro approach it consequently has to be possible to explain which capabilities of companies or which further conditions are beneficial for a successful process of renewal after structural interruptions and whether or why these are allocated spatially dissimilar.

According to the rule systematization of the micro-meso-macro approach, structural interruptions can be conceptualized in a way that they result in an abrupt change in the constitutive rules of an economic system. The consequence is that the operational rules of enterprises abruptly become inappropriate for this new framework. This can be illustrated using the already mentioned example of the collapse of the GDR and the German reunification. With the GDR joining the federal republic of Germany the political and economic context changed abruptly for the East German companies. The transition to social

market economy resulted in a devaluation of many operational rules as, e.g., corporate decisions had to be made on the basis of customers' needs and efficiency considerations for the first time, the former market broke down or the companies were in direct competition with West German firms compared to which they had partly significant technological gaps (Wulf 2000, 12, 17, Matuschewski 2005, 168f., Roesler 2003, 67, Koch/Thomas 2006, 245).

In order to answer the question how enterprises succeed in inducing the required processes of renewal after a structural interruption first those operational rules of companies have to be identified that have been devaluated by a structural interruption since they did not go with the new overriding framework of constitutive rules. The next step is detecting rule complexes that have turned out to be important to overcome the adaption requirements. If, like in this example, the focus is on consequences of crises of only one industrial sector the trajectories of the new rules have to be examined using a partial economic analysis. Single companies of the examined industrial sector constitute the micro units then and the sector as a whole the macro unit. Meso units are groups of firms within the examined sector that share certain rules and rule complexes. These groups can be composed differently considering each rule.

If a firm does not succeed in renewing a devaluated operational rule or if a certain actualization of a rule cannot gain acceptance in the selection process this does not inevitably mean that the concerned company withdraws from the market completely. The reason is that an enterprise has a variety of operational rules which can have different selection environments. It is decisive that the general capabilities of a firm to adapt to a changing environment are so strong that the renewal of the majority of the devaluated rules is successful. The reasons for dissimilar processes of renewal of corporate development paths, therefore, are to be found in the different mechanism rules of firms.

Due to the key role that is ascribed to the origination, adoption and diffusion of new knowledge or new rules in the micro-meso-macro approach, mechanism rules can be regarded as the capabilities of enterprises to manage relevant processes of knowledge. For a successful adaption of operational rules to a new corporate context different mechanism rules are important at the single stages from origination of a new rule to its implementation in competition. The respectively relevant mechanism rules, therefore, are identified best by consideration of each rule trajectory.

Regarding the question whether and why the renewal of corporate development paths at different locations is varyingly successful, it has to be examined first for which operational rules spatial differences can be observed at all. Possibly, the renewal of certain rules succeeds more or less globally, whereas others are only successful at particular locations. In order to

discover the reasons for these differences, the mechanism rules have to be considered along the respective rule trajectory under a spatial perspective. It, therefore, has to be examined empirically which capabilities of knowledge management differ in companies at different locations and whether certain spatially localized processes or other circumstances like location-specific constitutive rules are important.

For an empirical implementation, predominantly qualitative methods like guided or narrative interviews are suited as only in this way one can operate with rules and rule trajectories as analytical units and relevant mechanism rules can be comprehended. In order to analyze spatially dissimilar corporate renewal processes, a comparative survey at various locations which have a divergent development after a structural interruption is required. Interviews with enterprises at these locations allow tracing the origination and adoption of new operational rules in single rule carriers and hence cover the micro level.

However, the micro-meso-macro approach claims to explain the interaction between enterprises and configurations at higher level. Following the proceeding of a qualitative multilevel analysis, this can be done by collecting data in an appropriate way for each examined level, carrying out independent analyses of these and relating these independently reconstructed patterns of meaning to each other (Helsper et al. 2010, 128f.). Nevertheless, multilevel analysis so far has been mainly used in quantitative research as an advanced regression analysis that considers the social context (Hox 2002, Schwetz/Subramanian 2005), so that qualitative multilevel analysis is not yet elaborated and tested extensively. Both forms constitute a method to comprehend links between different analytical levels. They are not based on an theoretically-conceptual construct however, so that the single levels are defined differently in different analyses according to the theoretical foundation. The proceeding of qualitative multilevel analysis, therefore, has to be coordinated with the focus on the rule in the micro-meso-macro approach.

The result of this is that surveys at meso and macro level, in contrast to micro level, are rather indirect. These two analytical levels comprise a group or several groups of enterprises differentiated by their rule stock which cannot be interviewed as independent units. In a partial economic analysis, an approach to macro level can be made by interviews with non-corporate actors like political actors or representatives of associations and educational institutions which have insights into the examined industrial sector as a whole or represent it. At a level overriding the one of an individual firm, they can give information about how the market conditions, inter-corporate relations and knowledge stocks in the examined sector have been restructured after the existing operational rules were devaluated in consequence of

a structural interruption and new rules and rule populations emerged. Likewise, these actors are informed about sector-relevant external activities and development strategies, e.g. from politics, that constitute a part of the (locally or regionally specific) constitutive framework.

The meso level, in contrast, is difficult to comprehend since surveys can only be carried out directly in individual cases if the carriers of a rule are joined together to firmly institutionalized networks. In most cases however, a meso unit has no representative that could be interviewed as an authority overriding the associated enterprises. As shown in section 3, interviews with local external actors usually do not cover the meso level as this does not per se have a regional dimension. These can only serve to complement the examination in order to work out the local context and thus the spatially specific influencing factors on the mechanism rules of enterprises. Nevertheless, plenty of information (e.g. about the competitive situation regarding the operational realization of certain rules or about cooperative relations) is generated by an extensive company survey at micro level and by interviews with representatives of the macro level. This can provide various junctions to meso level and allow its indirect consideration.

A qualitative study as outlined above can be accompanied by an analysis of secondary data. Foster (2011) gives a proposal how to put an evolutionary macro economics into practice by using longitudinal data and relating this data to meso-rules. The identification of those meso-rules that are central to evolutionary processes should be done in an “historical study” (Foster 2011, 24 f.). At this point, it is not specified how such a historical study could look like but it becomes evident that this can't be done by the analysis of secondary data. Data, whether aggregate macroeconomic data or micro data on the individual level, may reflect some effects of a conjunction of rules. However, in order to understand the reasons for these effects the relevant rules and the interplay of the different levels of analysis have to be examined. This is the task of qualitative research.

Despite the difficult and partly only indirectly possible operationalization of the micro-meso-macro approach, promising results of economic geography studies using this analytical framework are to be expected. Regarding the question discussed in this section about the spatial implications of crises, the focus of the micro-meso-macro approach on rules and rule trajectories can provide the following additional value compared with conventional analyses. Firstly, more details of the interactions between a changed corporate environment (constitutive rules) and the economic activities of enterprises can be learnt by examining which parts of the knowledge stock of companies (operational rules) underlying the operational activities have been devaluated and renewed. Secondly, the examination of

mechanism rules along rule trajectories of new operational rules allows a differentiated assessment of the reasons for success or failure of corporate renewal efforts after a structural interruption. It becomes apparent which parts of the knowledge management processes succeed in the course of adaption to a new environment or not. This allows, thirdly, a systematic analysis of the spatial implications of these processes since instead of examining these for corporate renewal processes as a whole they can be examined for each mechanism rule individually. This results in more detailed information about the interdependencies between spatiality and corporate knowledge processes and thus allows a better understanding of the reasons of changes in spatial patterns of economic activities.

5 Conclusion

In the preceding sections, the micro-meso-macro approach that has been hardly taken up in economic geography so far has been introduced as an analytical framework for the examination of economic evolution. Doing so, it has been illustrated how a spatial perspective can be added to the approach. Furthermore, by means of an exemplary question about the spatial implications of structural interruptions it has been illustrated how this approach can be applied to economic geography issues.

In the micro-meso-macro approach based on Dopfer et al. (2004), a key role for economic growth and economic change is ascribed to the origination, adoption and diffusion of knowledge. The different terms which can be found in connection with knowledge in literature are summarized under the term of rules which can be differentiated in different forms of operational rules as well as in constitutive and mechanism rules. This way of proceeding also allows an integration of institutions into the evolutionary economic approach. In contrast to many other evolutionary economic works which single out individual forms of knowledge or rules, the micro-meso-macro approach constitutes a framework for the study of co-evolution between different rules. Using the selected example this can be illustrated as follows: A structural interruption causes abrupt changes in the constitutive rules of an economic system with the result that the operational rules of enterprises do not go with the new framework. In order to renew the operational rules, mechanism rules are needed that influence the way in which the enterprise adapts to a changing environment.

It is to be expected that not every enterprise succeeds in renewing its operational rules equally and that these differences also reflect spatially in changes to existing location structures of industrial sectors. Therefore, it is questioned which corporate capabilities and further

conditions are beneficial to successful renewal of operational rules of companies after structural interruptions and whether and why these are distributed spatially unequal.

Starting point of a study of these questions using the micro-meso-macro approach is the rule trajectory by which the development of a new operational rule can be traced. For a complete explanation of economic dynamics rule trajectories have to be examined at three analytical levels, namely micro, meso and macro. While the origination, adoption and retention of a new rule is analyzed in a single rule carrier at micro level, the meso level describes the interaction and the competition between the different carriers of a rule. At macro level the consequences of the origination of new meso units for the highest analytical level are illustrated.

The exemplary question how an enterprise succeeds in renewing its operational rules after a structural interruption can be answered more adequately by using the analytical unit of a rule or rule trajectory rather than the company or the corporate development path. That is because an enterprise has a variety of rules and each single rule has to be examined in its respective relevant selection environment. Using the rule trajectory as analytical unit allows to explain the transmission mechanisms of a rule and the interdependencies between a firm and configurations at higher level. Along the single rule trajectories, then, mechanism rules can be identified that affect the achievement of the next stage of the path and thus the success or failure of the implementation of new rules.

Furthermore, these mechanism rules have to be considered under a spatial perspective for answering the second exemplary question on the causes for possible spatial differences at the renewal of corporate development paths. In contrast to some economic geography works in which the meso level is equated with spatial concentrations like clusters or industrial districts, this paper takes the view that enterprises which share a joint rule do not automatically have to be located in proximity to each other and that the single analytical levels cannot per se be assigned to a certain spatial dimension.

Altogether, the micro-meso-macro approach constitutes a framework that is more comprehensive than existing concepts for the study of economic dynamics. Its high complexity constitutes a challenge for the empirical application of the approach to a concrete question, but it allows the integration of single works into a relatively closed construct as well as a better understanding of the interaction of different levels of analyses in economic evolution.

¹ These three parts are called rule orders in Dopfer/Potts (2008) and Potts (2007). According to them, operational rules constitute 1st order rules, constitutive rules are 0th order rules and mechanism rules 2nd order rules. The term of order, however, is avoided in this paper as it suggests that operational, constitutive and mechanism rules are in a hierarchical order. Actually the links between them are mutual and manifold. Therefore, they rather have to be considered as equal parts of an economy's rule system despite their different functions.

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