Innovative Milieux and Regional Competitiveness: The Role of Associations and Chambers of Commerce and Industry in Germany (formerly: "Third sector, innovative milieux, and regional competitiveness")

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Abstract: Innovation is regarded as a spatially embedded process, in which the social and economic interactive relationships of the actors are an important factor for success. This paper is one of the first to empirically examine the role of organizations such as associations, clubs, societies and chambers of commerce and industry in innovative milieux. We find a limited effect of these actors on the regional competitiveness of the 60 largest German cities.

Abstract: Innovation wird als ein räumlich eingebetteter Prozess verstanden, wobei interaktive soziale und ökonomische Beziehungen der Akteure ein wichtiger Erfolgsfaktor sind. Dieser Beitrag ist dabei einer der ersten, der die Rolle von Organisationen wie Vereinen oder Industrie- und Handelskammern im innovativen Milieu empirisch untersucht. Wir kommen zu dem Ergebnis, dass die untersuchten Akteure teilweise einen Einfluss auf die regionale Wettbewerbsfähigkeit der 60 größten Städte in Deutschland haben.

Keywords: innovation, innovative milieux, organizations, social capital, regional competitiveness.

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1 Introduction

Improved understanding of the innovation process, with an associated disclosure of innovation potentials, and the determination of factors for success in regional innovation systems are of central importance for the development of regional competitiveness (FAGERBERG, 2005; FROMHOLD-EISEBITH, 2004; SIMMIE, 2003). Although MARSHALL (1890) already recognized that there is "something in the air" (KITSON et al., 2004) beyond the economic dimension based on growth theories, the socio-cultural dimension has attracted growing attention in economic research only in recent decades. Regarding innovation as a spatially embedded process leads to the emergence of territorial innovation models such as industrial districts, learning regions, or innovative milieux (MOULAERT and SEKIA, 2003). Most of these territorial innovation models include the social dimension by focusing on the interaction between the actors as a factor for success. In particular, the concept of innovative milieux highlights that the quality of relational capital within a milieu determines its success. This milieu-specific relational capital is closely related to social capital, which share similar difficulties with regard to analysis in empirical models. Thus, the measurement of relational capital requires appropriate indicators.

This contribution examines the role of associations and chambers of commerce and industry in innovative milieux through the building and maintaining of this relational capital. It should be noted that in the following the term "associations" additionally includes clubs, societies, and unions both incorporated and unincorporated.

SIEVERS and MAENNIG (2006) found no significant influence of associations, taken as a proxy variable for innovative milieux, on regional competitiveness in the 50 largest German cities. Compared with this study, we use an improved dataset for associations. Furthermore, we analyse the effects of the volume of expenditure of chambers of

commerce and industry (CCI) on innovative milieux and consider additional potential factors influencing regional competitiveness.

In Section 2, the theoretical foundations of innovative milieux are described and transferred to the spatial context of the city. Next, the concepts of relational and social capital are described and compared, followed by discussion of the role of the above mentioned organizations in innovative milieux. In Section 3, the proxy variables used for competitiveness and innovative strength and the regressors are described. The empirical models and their results are presented in Section 4. Section 5 provides a detailed discussion of these results and the final Section 6 gives a closing summary.

2 Theoretical Background

2.1 Innovative and Urban Milieux

The concept of innovative milieux was introduced in the mid-1980s through the "Groupe de Recherche Européen sur les Milieux Innovateurs" (GREMI) (AYDALOT, 1986) and since then has been steadily advanced.[1] The innovative milieu emphasizes the social and economic interactive relationships and networks of the actors within a spatially defined area serving as a catalyst for innovation. Innovation can thus be viewed not as the product of a few individuals, but as the result of a collective process (BRAMANTI and SENN, 1991; CAMAGNI and CAPELLO, 2005; KOSCHATZKY et al., 2000).

Several definitions of innovative milieux are available (BUTZIN, 2000; KOSCHATZKY et al., 2000; LAWSON, 1997; TÖDTLING, 1990). In one of the most referred definitions, CAMAGNI (1991a, p. 3) delineates an innovative milieu as "… the set, or the complex network of mainly informal social relationships on a limited geographical area, often determining a specific external 'image' and a specific internal 'representation' and sense of belonging, which enhance the local innovative capability

through synergistic and collective learning processes". According to FROMHOLD-EISEBITH (2004), a milieu consists of three constitutive elements: First, a milieu comprises networks of informal social contacts arising both at the professional and at the private level. These contacts can foster mutual trust of the actors as well as the exchange of tacit knowledge.[2] From such social relationships, "emotional" support of innovation decisions can follow. Secondly, a milieu is a defined area offering the actors spatial proximity. This proximity is relevant since the human capital within a region is more mobile than between regions. Moreover, it forms a common cultural, psychological, and political basis, which in turn facilitates the transfer of knowledge and learning processes (CAMAGNI, 1991b). The third element is an externally perceptible image and an internal sense of belonging, resulting in homogenization and coordination of the actors, for example, through common rules of conduct, value systems, and conventions (CAMAGNI, 2004).

These three main elements favour the development of information channels, informal exchanges of information, development of reputations, and imitation of successful routines. Such a set of relationships and a common cultural background lead to informal coordination of the decisions of the actors within the milieu (CAMAGNI, 1991b; LAWSON, 1997) Furthermore, these relationships and the common background encourage innovation by diminished uncertainties and facilitated or rather accelerated collective learning processes (CAMAGNI, 1991a).

Like the innovative milieu, the city facilitates social contacts, integration, the interaction of actors, and the creation of synergies. The city as well as the milieu enables collective learning processes by providing relational capital through the common production of human capital and specific resources; by enabling the collective searching for and the transcoding of information; by facilitating the development of an internal sense of belonging and an external image; and by supporting the formation of co-operative and

trustworthy relationships of the actors (CAMAGNI, 2004; CAMAGNI and CAPELLO, 2005; CAPELLO and NIJKAMP, 2004; CREVOISIER, 2001, 2004; RÉMY, 2000). In spite of these common features, the innovative milieux approach is only partly transferable to the concept of the city (RÉMY, 2000, p. 43). Cities provide diversified structures, while economic activities of a milieu might show a tendency for specialization (CAMAGNI, 2000, 2004; and in contradiction LAWSON, 1997). Moreover, a city fulfils a role as a supra-regional centre, while a milieu is more locally oriented. The cognitive, organizational, social, institutional, and geographical dimensions of proximity (BOSCHMA, 2005) are also addressed in different ways by the two concepts (CAMAGNI, 2000, 2004; CAMAGNI and CAPELLO, 2005; CREVOISIER, 2000). While cities mainly provide geographical proximity, the milieux approach predominantly builds on social proximity, which implies social closeness between individuals. These five dimensions, however, are not independent of each other. For example, geographical proximity favours personal contacts and for this reason social proximity (BOSCHMA, 2005). Therefore, the city also provides the basis for other dimensions of proximity.

If exchange and interaction between the city and the milieu exist, two types can be distinguished: First, the entire city forms the physical basis and the milieu is constituted through the urban relational capital and collective learning processes. Second, a single specialised industry within a city constitutes a milieu. In this case, the physical basis is an urban production system. The relational capital of this industry and the arising learning processes are elements of an urban innovative milieu. Such a milieu exists within a city and thereby profits from the urban surroundings (CAMAGNI, 2004; CAMAGNI and CAPELLO, 2005).

Both the urban milieu and the city as an innovative milieu act as a “microcosm”, in which diverse actions take place (CAMAGNI and CAPELLO, 2005). For example,

there are collective and individual learning processes as well as traditional agglomeration effects such as Marshall-Arrow-Romer-, Jacobs- or Porter-Externalities (e.g. GLAESER et al., 1992; JACOBS, 1969; PORTER, 1990). Through the socio-cultural proximity and the interactive relationships, the milieu acts as an animator for these externalities and resources, resulting in an increasing innovative capability of the city.

Nevertheless, the milieu can also have a hindering effect on economic development (CAMAGNI and RABELLOTTI, 1986). Restricted and close social relationships entail habits or increasing homogenization of the actors and can lead to lock-in effects ("enthropic death") (RÖSCH, 2000; LAWSON, 1997) or hinder the usage of other knowledge sources required for innovation (SIMMIE, 2003). To avoid such effects, inputs from contacts and networks external to the milieu are necessary. Another hindering effect can evolve from a reduced ability to adapt to economic shifts due to increasing specialization (KOSCHATZKY et al., 2000; LAWSON, 1997).

2.2 Relational Capital and Social Capital

Relational capital, regarded as being of central importance for a successful innovative milieu, can be defined as "the set of all relationships – market relationships, power relationships and cooperation – established between firms, institutions and people that stem from a strong sense of belonging and a highly developed capacity of cooperation, typical of culturally similar people and institutions" (CAPELLO and FAGGIAN, 2005, p. 77). Within an innovative milieu, a high relational capital can result in a reduction of risks, a coordination of the actors and collective learning processes, through which the capacity for innovation is favourably influenced (CAMAGNI, 2004; TURA and HARMAAKORPI, 2005).

Hence, the milieu-based relational capital shares many similarities with the concept of social capital (PUTNAM, 1993), which can be described as "the sum of the actual and potential resources embedded within, available through, and derived from the network of relationships" (NAHAPIET and GHOSHAL, 1998, p. 243). It comprises, therefore, shared norms, values, rules of conduct, or other formal or informal institutions evolving from these relationships. As a result, the development of trust, civic responsibility, reputation, and a sense of belonging leads to collective action and coordination of the actors, which can help to overcome market failures and contribute to economic and social development (CAPELLO and FAGGIAN, 2005; TURA and HARMAAKORPI, 2005; IYER et al., 2005).

A frequently used differentiation of social capital is that between bridging and bonding social capital. Bonding social capital forms strong ties between homogeneous groups and enables cooperation, while bridging social capital links different groups through weak ties (e.g. IYER et al., 2005; PUTNAM, 2000). A high degree of bonding social capital can lead to lock-in effects and reduce, for instance, the ability to access new markets or react to market changes. This emphasizes the importance of the existence of bridging social capital which can help to make new information accessible and to achieve new opportunities (COOKE et al., 2005; GRANOVETTER, 1973).

Both relational and social capital emphasize the importance of relationships. CAMAGNI (2007) distinguishes both concepts by the degree of rivalry and excludability. Social capital is regarded as a public good whereas relational capital can be classified as a club good. According to the former, the rivalry in club goods is low but the excludability is higher. While social capital exists in almost every region as an unintended by-product of other activities with differences in the magnitude of endowment, relational capital implies a capability for interaction, cooperation,

collective learning and therefore innovation (CAPELLO and FAGGIAN, 2005; MASKELL, 2000).

2.3 Associations, CCIs, and Milieux

Due to their ability to build and maintain formal and/or informal social relationships, associations and chambers of commerce and industry might be able to create relational and social capital, and thus innovative milieux.

The membership of clubs and associations is utilized as an indicator for social capital, as, for example, by COOKE et al. (2005), who examine the effect of social capital on the success of small and medium sized enterprises. BEUGELSDIJK and VAN SCHAIK (2005) study the social capital in 54 European regions on the basis of European Value Studies (http://www.europeanvaluesstudy.eu/) which include aspects of active memberships of associations. The use of associations as an indicator for social capital refers to PUTNAM (1993, p. 2), who analyzes Italian regions and concludes that "strong traditions of civic engagement - voter turnout, newspaper readership, membership of choral societies and literary circles, Lions Clubs, and soccer clubs - are the hallmarks of a successful region". With regard to regional innovative capability, it is necessary to exploit various sources of new information, which can be provided by these different forms of associations and clubs (TURA and HARMAAKORPI, 2005). Thus, the diversity of social and cultural associations is of importance and might serve as an indicator of the degree of milieu development (RÖSCH, 2000).

The membership of business-oriented clubs and trade associations facilitates networking, for example, through lobbying, exhibitions and other events, or through specific trainings (BENNETT and RAMSDEN, 2007). At the same time, these associations provide professional and "emotional" support by offering advice on how to start and run a business or connect science and commerce. A detailed analysis of

business associations in Britain is, for example, given by BENNETT (1998a, 1998b) and BENNETT and RAMSDEN (2007).

Non-business-oriented associations, such as sports clubs, can foster the creation of trust through the provision of personal contacts. This trust results in information being circulated more quickly, expediting collective learning processes (CAMAGNI, 1991b; LAWSON, 1997). Additionally, the membership of associations and clubs can facilitate the creation of reputation, which results in opportunities for business relationships due to decreasing uncertainty (TURA and HARMAAKORPI, 2005).

Thus, associations provide bridging as well as bonding ties. The informal contacts in recreational clubs or societies primarily develop bonding social capital, for instance, through the creation of a sense of belonging. Business and trade associations mostly support bridging social capital. These associations are less locally oriented than recreational clubs and can therefore ensure openness of the milieu.

Another possible animator of innovative milieu besides associations are CCIs. In Germany, they are public corporations with a compulsory membership for the commercial enterprises in the respective district. They consider themselves as representative organizations of their member enterprises and therefore as political stakeholders, mediators, and advocates for the local and regional business community as well as providers of customer-focused services.

These organizations could be of importance in the urban milieu, as they support networking, provide access to information, and take on further education and consultation functions. For instance, they administer the final examinations in vocational training. Moreover, CCIs act as lobbyists and stakeholders for the regional or local business community, establishing networks with public decision makers (WESTLUND and NILSSON, 2005). CCIs thus mainly provide bridging social capital, but they also can build bonding social capital through creating environments in which

like-minded people are brought together. Beyond this networking effect, CCIs can directly influence the regional innovative capability, for example, as moderator or founder of innovative initiatives (FROMHOLD-EISEBITH, 2004; KOSCHATZKY et al., 2000), and by providing advice and service in managing innovations, patents or quality standards. As a result, CCIs foster innovation at later stages than recreational clubs, which provide a basis for information circulation.

3 Data and Variables

The analysis is based on the 60 largest German cities representing autonomous administrative districts (NUTS3 level) from 2003 data. The treatment of innovation as a nonlinear process and its differentiation into radical, adaptive, and incremental innovations[3] makes quantitative assessment more difficult. Innovation arises through many pathways, not only through the actions of R&D staff, and is also not compulsorily patentable (CREVOISIER, 2001, 2004). Here, to cover various aspects of innovation arising from a milieu, business start-up rates and patent intensities are examined as two alternative endogenous variables.

Business start-up rates are a possible result of an urban innovative milieu. On the one hand, a milieu can directly influence the foundation of new firms through the reduction of risks or through "emotional" support and motivation. On the other hand, start-up rates can also be used as an indicator of innovative activity in a region (CAMAGNI, 1995). Newly founded or young businesses frequently rely on new knowledge and are established in competition through innovative products (KOSCHATZKY et al., 2000; RÖSCH, 2000; TÖDTLING, 1990). Furthermore, new firm start-up rates include non-patentable incremental innovations. It should be noted that the number of newly founded businesses varies greatly between industries, which possibly cause biased results (FRITSCH et al., 2004). With regard to low knowledge start-ups it is assumed

that these start-ups are founded at the same rate across German cities. In the following, the business start-up rates (per 10,000 inhabitants) of the Centre for European Economic Research (Zentrum für Europäische Wirtschaftsforschung; ZEW) for the year 2003 are employed.[4] The city of Braunschweig is omitted from the model because according to ZEW it showed an exceptionally high start-up rate in 2003, suggesting an outlier in the data.

Besides the business start-up rates, the patent applications of a region are also suitable as an indicator of innovation (CAMAGNI, 1995; SIMMIE, 2003). However, while using this indicator, problems can occur. Patent applications are more likely to record inventions than innovations and simply show an interim result ("throughput indicator") of the innovation process. In addition, there is no patent application for every innovation and there exist sector-specific and structural differences in patenting trends. Thus, businesses in service industry, in fast-moving industries and small enterprises seldom apply for patents (CAMAGNI and RABELLOTTI, 1986; KOSCHATZKY et al., 2000; SMITH, 2005). The spatial reference of the urban districts can also cause a distortion of the results since patent applications are recorded according to the domicile of the inventor. In the case of large cities, these domiciles often lie in surrounding areas (GREIF et al., 2006).

The basis for the calculation of patent intensities are the number of patent applications (per 10,000 inhabitants) for the years 2003 to 2005 according to the patent atlas, which records published patent applications at the German Patent and Trade Mark Office (Deutsches Patent- und Markenamt; DPMA) as well as at the European Patent Office (EPO) by the domicile of the inventor, adjusted for duplication (GREIF et al., 2006). In order to take into account both the application cycles of large firms as well as the temporal delay between date of filing and publication, a weighted average of the years 2003, 2004, and 2005 was used. Since publication follows after a delay of

12–18 months after the date of filing, a large number of patents deposited in 2003 will have been published in 2004. This year was thus weighted with 0.5, the other two years were weighted with 0.25.

An empirical analysis of the socio-economic effects of innovative milieu, of social as well as of relational capital includes the difficulty in that their concept is multidimensional and, therefore, requires complex indicators. Another difficulty is the context dependency, with some indicators able to measure, for example, social capital in a certain situational context or within special circumstances but not being transferable to other situations. In some cases it is questionable whether indicators measure social capital itself or its outcomes (TURA and HARMAAKORPI, 2005; STABER, 2007).

This having been said, we decided to test several variables as proxies to represent animators of the innovative milieu. The density of associations (per 10,000 inhabitants) is obtained from the website www.npo-info.de by V&M Service GmbH. Associations can register voluntarily online on this website. During the registration, the applicant has to enter the address with the postal code. For this reason, the number of associations at NUTS3 level can be ascertained. As a result, a total of 27,807 organizations could be assigned for the 60 largest cities considered in this contribution. Through a comparison of a survey of the number of organizations on the legal register of associations in 2001, 2003, and 2005 with the above mentioned voluntarily registered organizations, V&M Service GmbH ascertained a mean deviation of less than 15%. The inclusion of V&M data ensures that only active associations are included. Historically, a multitude of federal or umbrella organizations, which are active nationally, have been registered in the city of Bonn. Therefore, to avoid biased results, Bonn was omitted from the relevant model.

Besides density of associations, the influence of CCIs on urban innovative milieux was empirically examined. For this, the budget data of the 81 CCI districts for the year 2003 were converted into those of the urban districts, assuming the same per capita expenditure in cities and rural areas. Using expenditure rather than budget data ensures that differences in investment are considered. The membership of CCIs is compulsory for enterprises in each respective district. However, the amount of basic fees, the determination of services subject to fees, and the division as well as the amount of expenditure vary among the CCIs.

For the calculation, we applied the total expenditures on the one hand, and the total expenditures minus the overheads for maintaining property or buildings, rent, and lease costs (reduced CCI expenditure) in Euro per inhabitant on the other hand. More extensive budget-relevant data or structural or organizational differences such as the outlay in certain areas of expenditure could not be taken into account for lack of adequate data. For the cities of Frankfurt-am-Main, Stuttgart, Mannheim, Rostock, Ludwigshafen-am-Rhein, Heidelberg, and Ulm, no budget data were submitted. For chambers of handicrafts, no regionalized expenditure data were available, and therefore could not be tested for influence.

Besides the exogenous variables representing the third sector activities, the proportion of employees in research and development (R&D) and the proportion of the employees in small and medium-sized businesses were considered as potential additional actors in a milieu. The gross value added (GVA) and value added intensity were investigated as further influencing quantities.

The quota of employees engaged in research and development per 10,000 inhabitants (R&D intensity), is frequently taken as an input variable for innovation (DE PROPRIS, 2002). Here, there is the danger of exaggeration of the regional innovation potential because only a small part of the knowledge produced directly affects the region

(KOSCHATZKY et al., 2000). In the milieu, the R&D staff, as a part of the human capital of a region, can initiate collective learning processes through the generation of knowledge. Besides an expected influence of the R&D intensity on the patent rate of the respective region (SIMMIE, 2003), there may also be a positive effect on business start-up rate since spin-offs from colleges, universities, and other (public) research facilities may follow (FRITSCH and MUELLER, 2006; KOSCHATZKY et al., 2000).

The quota of employees liable to social insurance in private industrial R&D departments, as well as in the public sector like colleges, universities (almost all of them are state-owned in Germany), and other educational facilities for 2003 at the NUTS3 level is based on an evaluation by the Federal Agency for Employment. For cities with only a few enterprises and/or a business structure that could result in data being used in a way that would violate data privacy no data was available (the cities of Hamm, Herne, Bottrop, Bremen, Solingen, Ludwigshafen-am-Rhein, Wolfsburg, Offenbach-am-Main, and Ingolstadt). Due to lack of data, the sample of the 60 largest German cities is reduced depending on the estimation model; however, a minimum sample of 50 cities is always ensured.

To test for the possible influence of firm size structure, the ratio of the number of employees liable to social insurance in small and medium-sized enterprises (SMEs) compared with the number of employees in large businesses was used (SME share). Following the definition of the European Union (EUROPÄISCHE UNION, 2007) businesses with 1–249 employees were classified as SMEs. Operations with 250 or more employees were described as large businesses. The evaluation was conducted by the Federal Agency for Employment at NUTS3 level.

The direction of influence of firm size structure is a priori unclear: potentially, large businesses are more innovative because they can more easily support high investment in research and development. SMEs, on the other hand, can respond more flexibly to

demand and market changes, offer niche products, and possibly innovate more efficient (KOSCHATZKY et al., 2000; ROTHWELL, 1989; TÖDTLING, 1990).

Incidentally, regional firm size structure can affect business start-up rate. According to the "incubator hypothesis", employees in SMEs get a broad overview of operational connections. On the basis of this experience they attain advantages for their own business activities. Consequently, SMEs can be viewed as actors of urban innovative milieux and higher business start-up rates can be expected in regions with a greater share of SMEs.[5]

To measure the advantages of agglomeration, arising through indivisibilities (infrastructure, trade fairs, universities, or local product and employment markets), the GVA was analyzed. Here, the absolute GVA records the regional pure gross advantages, employed in current and basic prices in millions of Euros for 2003 from the database GENESIS Online. The value added intensity (in millions of Euros per 10,000 inhabitants) on the other hand records differences in the factor endowment (SIEVERS and MAENNIG, 2006).[6]

4 Methods and Results

Two approaches of analysis of the regional innovation process dominate: The case study approach – for innovative milieu initiated by, for example, CAMAGNI and RABELLOTTI (1986) and PERRIN (1986) – excels in disclosing locally and regionally the idiosyncratic constellations of the actors and relationships, of formal and informal institutions and actions, and of self-reinforcing interactive dynamics to the regional, national, and international environment. This has advantages in nominating potential influences of non-quantifiable variables. Critics of the case study method believe that the study of a small number of cases can offer only limited grounds for establishing reliability or generality of findings and may bias the findings.

The second approach, applied by authors as ACS and AUDRETSCH (1988) at the firm level, uses regression analysis. Caveats of regression analysis in this context concern its ability to assess complex realities, being heavily dependent on using appropriate assumptions. Otherwise, correctly applied, regression analysis may be able to quantify the size of influencing factors and to separate significant factors from others, which might be important only on a theoretical basis (BERK, 2004).We follow the second approach and use the above mentioned data for a cross-section regression analysis of the contribution of associations and CCIs to regional innovative output in Germany.

Similar to ACS and AUDRETSCH (1988) we use a semi-logarithmic regression model which allows for non-linear relationships between exogenous and endogenous variables:

$$\ln(y_i) = c + \sum_{j=1}^{J} \beta_j \cdot x_{ij} + \varepsilon_i \quad \text{with} \quad \varepsilon_i \sim iid(0; \sigma^2) \;\forall\; i = 1, \ldots, n$$

where c is a constant; ε_i is the error term, which is taken to be independent and identically distributed; β_j denotes the coefficients; and y_i and x_i denote the endogenous and exogenous variables.

In the estimate, the variables that did not attain a 95% significance level were successively removed by means of stepwise forward-backward selection. For the density of associations as well as the CCI expenditure, the significance levels were partly lowered. In Table 1, five model specifications and their results are listed.

Insert Table 1

Since, as described above, data are lacking for certain cities, the number of observations in the respective data sets varies according to each model. The remaining number of observations in each case is given in Table 1 in the N row. For correct and simplified

interpretation of the coefficients, the percentage increase in the endogenous variables for an increase in the respective exogenous variables of one unit is given in square brackets. The conversion was carried out according to $\beta_{\%} = (\exp(\beta) - 1) \cdot 100$[7] (HALVORSEN and PALMQUIST, 1980; THORNTON and INNES, 1989). Thus, an increase in the SME share of one unit indicates a rise in the business start-up rate of around 20%. In interpreting the coefficients, it should be taken into consideration that the SME share relative to the number of large businesses was examined, i.e., an increase in the variable by one unit indicates, depending on the existing distribution of firm sizes, a multiple of the number of SMEs.[8]

According to White tests, corrections for heteroskedasticity were not necessary. The Jarque-Bera test indicates the existence of a normal distribution. Also, the Ramsey RESET test with two transformations of the fitted values of the endogenous variables did not contradict the linear modelling carried out here. An examination of the exogenous variables for multi-collinearity likewise gave no anomalous features.[9]

The models (1) to (4) use the business start-up rate as a proxy for the regional competitiveness or capacity for innovation. The GVA, the value added intensity, and the SME share are highly significant in each of models (1) to (4), while the positive parameters of the CCI expenditure and the density of associations are only weakly significant.

The coefficients of the density of associations and total expenditure of CCIs are significant in model (1), with an error probability of 10%. As an alternative to the total CCI expenditure, model (2) uses reduced CCI expenditure, obtained by subtracting the costs for maintaining property or buildings, rent, and lease costs. The parameter of this alternative CCI expenditure specification attained the 95% significance level; the parameter for density of associations also remains significant in model (2), with an error probability level of 10%, only just failing to reach the 5% level. Models (3) and (4)

examine either density of associations or reduced CCI expenditure, without raising the adjusted R^2. Altogether, an increase in the CCI expenditure of one Euro per inhabitant induces an increase in the business start-up rate of around 2.5%. The raising of density of associations by one unit causes an increase in the business start-up rate of around 1% and is only weakly significant.

In model (5), in which the patent intensity is used as a proxy variable for the capacity for innovation or competitiveness, merely the GVA rate and number of employees engaged in R&D proved to be significant, with an error probability of 1%. Density of associations, which at the 90% level is significant, has a negative effect on the patent intensity. CCI expenditure proved to be insignificant in this context. Model (6) additionally includes the SME share, which shows an insignificant, but negative impact on patent intensity.

All in all, it can be emphasized that models (1) to (4) attain an R^2 of over 40% while models (5) and (6) attain values of around 55% and 60%, respectively. With regard to the variables approximating the innovative milieu, the CCI activities, as measured by their expenditure, are significantly positive in models (1) to (4). Moreover, the significance of the reduced CCI expenditure is higher. In models (5) and (6), in which the patent intensity is used as a proxy variable for competitiveness, the influence of the CCI expenditure is insignificant. The coefficients of the density of associations are weakly significant in all of the models. With regard to the business start-up rate they are positive; in the case of the patent rates they are negative.

5 Discussion

The variables of interest – density of associations and CCI expenditure – show the expected positive impact on the business start-up rates in models (1) to (4). This supports that CCI can foster regional entrepreneurship through mentoring and advising

start-ups. German chambers of commerce and industry provide this through service offers, e.g. workshops, seminars, information days, and the set up of networks with experienced business executives and personal advice. We agree that CCI expenditure is no direct measurement of the quality of supporting the regional innovative capability, but are not aware of the availability of a more appropriate dataset. We diminish the share of innovation inefficient expenditure by using the expenditure minus the overheads for maintaining property or buildings, rent and lease costs. As models (2) and (4) show, this reduced expenditure is in fact more significant than the total expenditure.

The positive parameter of the density of associations supports the above mentioned argument of "emotional" support in the foundation process as well as successful advice by business associations. Furthermore, the thesis that the variety of associations in a region is of importance cannot be refuted and should be analyzed in further research. As the applied dataset disallows a distinction between business associations and recreational clubs, the impact on the start-up rate cannot be apportioned. An improved dataset could lead to a more detailed discussion with regard to the different forms of associations.

The other exogenous variables in models (1) to (4) show the supposed direction of influence. Thus, the GVA (absolute and intensity) covers differences in agglomeration advantages as well as factor endowment and the parameters possess significant positive signs. The positive influence of the SME share corresponds to the incubator hypothesis and underlines the role of SMEs as actors in innovative milieux.

Interpreting the business start-up rate as an indicator for the innovative capability of the region is ambiguous. A high start-up rate can, for example, be a result of a high unemployment rate (FRITSCH et al., 2004). To preclude this effect, the unemployment rate was examined as an exogenous variable but turned out to be insignificant in all models. Another shortcoming of the business start-up rate is the varying number of

newly founded businesses in different industries, which is not captured by our analysis. If appropriate data on business start-ups in different industries is available, this should be included in further research.

Models (5) and (6) employ patent intensity as an indicator for innovative capability. As aforementioned, this endogenous variable covers inventions rather than innovations, affects not only one region, shows sector-specific patterns and tends to underestimate regional innovation output of SMEs. Nevertheless, patent applications are frequently used as an indicator for innovative output. In models (5) and (6) the CCI expenditure turned out to be insignificant and was therefore excluded. The density of associations and the share of SMEs have negative coefficients in model (6). The insignificance of the coefficient of the SME share can result from utilizing the patent intensity as a sum of applications by science and commerce, whereas SMEs affect primarily the latter. The negative direction of influence indicates that SMEs apply less frequently than large firms for patents. This can be underlined by the positive influence of R&D intensity on the patent intensity. R&D personnel are mostly employed in large firms with the desired outcome to produce patentable knowledge. If associations contribute in creating innovative milieux and SMEs benefit more from this existing milieu than large firms, patent intensities are not an appropriate indicator for the innovative output of a milieu because higher patent activities are shown by large firms which can innovate even without a milieu. Thus, the negative influence of association density could be accompanied by these milieu-independent patented innovations of large firms and models (5) and (6) cannot refute the hypothesis that associations can animate an innovative milieu.

In summary, our analysis provides significant parameters on the start-up rates and indicates that associations and the chambers of commerce and industry in Germany can affect innovative milieux through the building of relational capital, despite several

problems of the variables and their interdependencies, the difficulty in finding indicators for innovation and relational capital, as well as the inability of the method to disclose causalities.

6 Summary and Outlook

Coordinated market economies like the German one rely on the existence of networks, institutions, and organizations. Business associations, trade unions, and other organizations such as CCI are regarded as a means to reduce the transaction costs for the coordination of private sector activities (HALL and SOSKICE, 2001).

Our analysis is one of the first examining the roles of chambers of commerce and industry and associations in innovative milieux through multivariate cross-section analysis of secondary datasets. It indicates that CCIs in Germany indeed represent an efficient medium for market coordination (and thus policy transfer). Regarding the German structures of markets of goods and factors, and the special structure of CCIs in Germany our analysis might nevertheless only be partly transferable to other countries, especially to those with liberal market structures. Up to now, the majority of studies which analyse the concepts of innovative milieux and relational capital as well as of social capital empirically were those relying on primary datasets. Like the application of secondary data in our model, the collection of primary data through interviews bears its own problems. Both forms might be able to explain a part of the complexity of the underlying structures. Thus, to obtain deeper insights, our analysis could be accompanied by cross-city case studies with special emphasis on contextual factors in the future.[10]

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[1] The first publication (GREMI I) of the founder Philippe AYDALOT (1986) was followed up with GREMI II (MAILLAT and PERRIN, 1992), GREMI III (MAILLAT et al., 1993), GREMI IV (RATTI et al., 1997), and GREMI V (CREVOISIER and CAMAGNI, 2000), four further works with different areas of emphasis. A brief overview is given, for example, by CAMAGNI (2000, p. 1).

[2] The differentiation of tacit and explicit knowledge goes back to POLANYI (1966), who coined the term "tacit knowledge" and described it as that which "we can know more than we can tell" (POLANYI, 1966, p. 4).

[3] Radical innovations open up completely new possibilities and offer solutions for hitherto unsolved problems. Adaptive innovations arise through the application of (radical) innovations in the case of new products, new processes, and in other industries. Incremental innovations describe the improvement or alteration of existing structures (BRAMANTI and SENN, 1991; FAGERBERG, 2005; RATTI, 1991; TÖDTLING, 1990). For the role of product diversification on firm-level productivity, see for example GÖRZIG et al. (2008).

[4] ZEW ascertains the data in co-operation with the "CREDITREFORM", the largest German credit rating agency. They carry out a systematic search of the commercial register, newspapers, business reports etc. In addition, searches through customer enquiries are also released. Thereby, primarily economically active businesses are recorded. With regard to unregistered businesses, there is an underestimation, since they are only taken into account if there is a credit enquiry or commercial credit transfer (ZEW, 2005).

[5] Cf. BOSCHMA and KLOOSTERMAN (2005); CAMAGNI (1991b); CAMAGNI and CAPELLO (2005); CREVOISIER (2004); FRITSCH et al., (2004); FRITSCH and MUELLER (2006); FROMHOLD-EISEBITH (2004).

[6] In addition, the number of students, number of inhabitants, unemployment rate, as well as a dummy for possible structural differences between the areas of the former East and West Germany were examined. However, none of these variables proved to be significant, obviating the need for a detailed description.

[7] Since the coefficients are for the most part small, the conversion is only essential in the case of the SME share.

[8] If the number of SMEs corresponds to the number of large enterprises, the SME share is 1. Thus, an increase of one unit would require a doubling of the SME.

[9] With a maximum of 1.79, the variance inflation factors (VIFs) of the coefficients remain well below the value of 10, which is viewed as critical with regard to the existence of multi-collinearity (CHATTERJEE and PRICE, 1991).

[10] For the relevance of contextual factors in examining social capital, see STABER (2007).

Table 1: Summary of semi-logarithmic regression analysis

	Semi-logarithmic model					
	Dependent variable (logarithm)					
	Business start-up rate				Patent intensity	
	1	2	3	4	5	6
Density of associations	0.011* (5.52%) [1.06%]	0.010* (5.62%) [1.05%]	0.010* (5.30%) [0.99%]	–	–0.026* (8.72%) [–2.53%]	-0.028* (5.84%) [-2.77%]
Total CCI expenditure	0.024* (6.07%) [2.43%]	–	–	–	–	–
Reduced CCI expenditure	–	0.027** (4.09%) [2.72%]	–	0.027** (4.04%) [2.77%]	–	–
GVA (absolute)	0.006*** (0.21%) [0.62%]	0.006*** (0.04%) [0.69%]	0.007*** (0.02%) [0.68%]	0.007*** (0.03%) [0.71%]	–	–
Value added intensity	0.001*** (0.15%) [0.10%]	0.001*** (0.19%) [0.10%]	0.001*** (0.04%) [0.10%]	0.001*** (0.08%) [0.11%]	0.004*** (0.00%) [0.37%]	0.003*** (0.06%) [0.29%]
SME proportion	0.190*** (0.53%) [20.92%]	0.187*** (0.56%) [20.58%]	0.182*** (0.53%) [19.94%]	0.190*** (0.56%) [20.92%]	–	-0.321 (11.37%) [-27.43%]
R&D intensity	–	–	–	–	0.003*** (0.01%) [0.27%]	0.003*** (0.01%) [0.27%]
Constant	2.380*** (0.00%)	2.376*** (0.00%)	2.640*** (0.00%)	2.460*** (0.00%)	0.263 (30.77%)	1.038* (6.18%)
Adjusted R^2	45.85%	46.64%	42.98%	43.52%	54.36%	59.50%
N	51	51	58	52	50	50
White test	22.92%	20.31%	54.70%	5.77%	18.18%	13.82%
Jarque-Bera test	92.23%	96.68%	25.73%	41.69%	65.72%	82.12%
Ramsey RESET test	81.41%	92.89%	67.45%	89.90%	7.57%	2.84%

Coefficients of the models, with error probability in parentheses and converted coefficients in squared brackets.

* 90% significance level
** 95% significance level
*** 99% significance level