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Local Industrial Clusters**

by

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The Long-term Implications of Local Industrial Clusters

Thomas Brenner and Andreas Gildner*

ABSTRACT. Local industrial clusters have attracted much attention in recent economic and geographic literature. The focus has been on identifying the conditions for the emergence of such clusters. Here the long-term implications of local industrial clusters are studied. To this end, we examine German regions where those that contain long-existing industrial clusters are compared to all other regions. We statistically examine what characterises regions that have contained local industrial clusters for quite some time. The analysis is conducted separately for three industries.

KEYWORDS: local industrial clusters, agglomeration economies, economic development.

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1. Introduction

In the recent economic and geographical literature, the phenomenon of local industrial clusters has attracted much attention. Under the headings of ‘industrial districts’, ‘industrial local clusters’, ‘innovative milieu’ and ‘regional innovative systems’, the reasons why certain regions are successful while others are not, have been extensively studied. Two kinds of approaches dominate this literature: case studies of regions that are identified as being economically successful (meta-studies of such case studies can be found in van der Linde 2003 and Brenner & Mühlig 2005) and more general theoretical approaches that aim to identify some of the circumstances that cause regions to be successful (such approaches can, for example, be found in Becattini 1990, Porter 1990, Scott 1992, Camagni 1995, Markusen 1996 and Lawson 1997). Furthermore, approaches in the so-called New Economic Geography explain the existence of local industrial clusters on the basis of simulating or mathematically analysing the effects of economies of location (Krugman 1991 and Fujita & Thisse 2002).

This entire literature tries to examine, why local industrial clusters exist, how they emerge and why they are successful in comparison to other locations. All these questions focus on the initial phase of the existence of local clusters. There are only a few studies that go beyond this initial perspective and, for example, focus on the negative impacts of local clusters and their disintegration (see, e.g., Grabher 1993 and Isaksen 2003). Furthermore, Italian researchers have recently started to study the actual developments in Italian industrial districts, which have emerged mainly in the 1970s and 1980s. New external situations have forced these districts to adapt and change their organisation, technology or even products (cf. Gottardi 1996 and Tappi 2004). However, all these studies are case-based.

We study the long-term development of local industrial clusters on a more general basis.

Through this we aim to give a more complete picture of the long-term implications of local industrial clusters as this aspect is mainly neglected in the literature. It is usually claimed and sometimes empirical shown (cf. Porter 1990 and Baptista & Swann 1998) that industrial clusters are very positive for the economic development of the respective location. It is assumed that local clusters come with higher innovativeness, more employment and economic growth. There is little doubt that this is true for the first years of a local cluster's existence. However, the literature does not give us concrete information about how long this positive impact lasts or whether it turns into a negative impact after some time, as some studies suggest (cf. Grabher 1993). This means that we know little about the long-term implications of local industrial clusters.

Therefore, we examine the impact of local clusters in Germany that have developed between 100 and 50 years ago on the current (economic) situation in the respective locations. An identification of all local clusters in Germany shows that many of these clusters, especially those that are quite old, belong to metal production and goods, textiles and optics and ceramics industries (cf. Brenner 2006). Hence, we concentrate our analysis on these three industries and study the characteristics of those regions in which the respective clusters are located.

The paper proceeds as follows. In Section 2 some theoretical considerations are given. Section 3 presents the empirical data used and the sources of this data. In Section 4 the data is analysed and the results are discussed. Section 5 concludes.

2. Theoretical considerations

The literature provides little information about the long-term impact of local industrial clusters. There is empirical evidence for a positive impact of local industrial clusters on growth and innovation activity (cf. Baptista & Swann 1998, Lublinski 2003, and Bönte 2004). However,

it is not clear whether this impact remains the same over the long run (50 or 100 years). The argument of lock-ins even points into the opposite direction (cf. Grabher 1993).

The theoretical literature mainly studies the factors and interrelationships that cause regional imbalances in the geographic distribution (Krugman 1991, Fujita, Krugman & Venables 1999, and Fujita & Thisse 2002). It is argued that product differentiation and local externalities, such as knowledge spillovers, are crucial for the emergence of industrial agglomeration (see Fujita & Thisse 2002, Section 8.5). It is then implicitly assumed that an agglomeration of industrial activities also causes a higher capability to create value (measured, e.g., by wages in Helpman 1998).

Furthermore, the New Economic Geography literature allows to draw a number of implications for the spatial distribution of economic activity (Ottaviano 2003). One of these implications is the existence of lock-ins in the location of industries. This means that local clusters, once they have emerged, will sustain as long as the reasons for their existence, such as local externalities, remain in place. However, the causes of spatial concentration of industries are often argued to be more relevant in new or high-tech industries (see, e.g., Fujita & Thisse 2002). This means that if industries become mature and existing for a very long time, the influence of the various local externalities might well change and the causes for spatial concentration might disappear.

This issue is not solved in the theoretical literature. However, for example, the identification of local industrial clusters in Germany shows that clusters that exist for about 100 years still can be easily identified (cf. Brenner 2004). Hence, the geographic concentration of industries seems to be very robust and does change slightly even if the industry lost much of its economic importance. For example, the traditional locations of the textile industry in Germany do still exist and are significantly identifiable although Germany is surely not a major player on the

global textile market anymore. Hence, the impact of local clusters on the local industrial structure is still clearly visible after many years. Whether the same holds for other characteristics of the local (economic) situation is to be examined in this paper.

Two different arguments can be taken. The first is based on the empirical finding that industrial concentration has a positive impact on the local economic situation in the short-run. The second is based on the negative effects of lock-ins.

According to the literature (cf. Baptista & Swann 1998, Lublinski 2003, and Bönte 2004), on the one hand, the existence of a local industrial cluster has a positive impact on the economic growth and innovations in a region. It might now be argued that such an impact should hold as long as a local industrial cluster exists. According to the theory of local clusters, local clusters are characterised by a certain structure and local organisation that allows firms within a region to benefit from the co-location and to be more innovative and successful (see, e.g., Becattini 1990, Camagni 1995 and Lawson 1999). Hence, for as long as they exist, local clusters should lend the region to be characterised by a higher innovativeness, more successful firms and, thus, lower unemployment rates and increase economic growth.

In addition, the above average economic performance of the location should provide regional policy makers with resources to improve local infrastructure. Economic growth in, at least, one industry should increase the amount of money collected by the government through taxes. This can be used to improve the circumstances in the region, these resulting in more universities, a better education, a better transportation infrastructure and a higher attractiveness of the region. This should make the region also attractive for other industries and could initialise a vicious cycle that leads to continuous growth.

On the other hand, the opposite argument can be taken. If one industry develops very well in a region, it might hinder other industries from also flowering there. This argument can be first

based on the consideration that a successful industry with many employees increases prices for space and labour in the region. This makes the region less attractive for other industries unable to benefit from economies of location in connection with the already existing industry.

Besides this simple cost argument, a second argument is provided in the literature (cf. Grabher 1993): a dominating industry and technology also influences the way of thinking in the region, its economic and social institutions. People tend to focus their attention on few things and are reluctant to change. Hence, economic opportunities not in line with the current dominating scheme are often neglected. As a consequence, local industrial clusters are an disadvantageous ground for developments in other industries. Most industries and technologies show a certain life cycle with a decline or, at least, stagnation of demand after some time (cf. Klepper 1997). Therefore, it might be argued that a region that contains an industrial cluster is unlikely to be economically successful in other industries and will decline once the market for its products decreases. There are examples that support such a claim, such as the Ruhr area in Germany (cf. Grabher), but there are also regions that have developed a very heterogenous industrial structure, such as Baden-Württemberg (cf. Staber 1996).

To sum up, the case studies in the literature provide an ambiguous picture. Local industrial clusters might lead into a lock-in and, therefore, have a negative impact on future development. They also might be the breeding ground for long-lasting economic success in a region. Theoretically we might also support both arguments as there are good reasons for both developments. The characteristics of the industry, detailed local circumstances and chance seem to determine whether local industrial clusters have a positive or negative impact on long-term regional development.

We might conclude that local industrial clusters can be expected to differ in their impact on the location's future economic state. Such a conclusion, however, is not very helpful to policy

makers. If they intend to invest in certain developments, they should know at least the returns that can be expected on average. Therefore, the approach taken here examines the average impact of local industrial clusters.

3. Empirical data

In order to analyse the long-term impact of local industrial clusters on the respective region's economic situation, two kinds of data are necessary. First, we require knowledge about the locations of industrial clusters that have been established for quite some time. Second, we require data about the current situation in these locations.

Local industrial clusters in Germany have been recently identified (Brenner 2004 and 2006 and Sternberg & Litzenberger 2004). What we require for the following analysis is such a list of local clusters for some specific industries. The considered industries have to satisfy two requirements: They have to exist for a long time and there have to be quite a few local clusters identified for these industries. The latter requirement is necessary for obtaining significant results in the statistical analyses. We base our analysis on data from the identification conducted by Brenner (2003). He identifies all local industrial clusters that have been proven to exist in administrative districts ('Kreise') on a 3-digit industry level in the year 2001 (Brenner 2006). In this identification a sufficient number (at least, 20 out of the 441 administrative districts) of locations that contain industrial clusters is only obtained for three aggregated (2-digit) industries: the metal industry, the textile industry and the glass & ceramics industry (non-metallic mineral products). Therefore, we have to restrict the analysis to these three industries, although there would be other industries that would satisfy the first requirement, the existence for a long time, such as chemicals or automobiles. In these other industries such few local clusters are identified that the statistical analysis does not lead to significant results.

For the same reason we use the German administrative districts as a unit of analysis. It might be argued that a number of the identified local clusters range across a few administrative districts. A more aggregated spatial unit might be more adequate in this case, at least, for the description of the local clusters. However, two arguments can be put forward in favour of the use of administrative districts. First, there is the practical reason that quite a few spatial units that contain a cluster are necessary to obtain significant results in the statistical analysis. Second, the administrative districts are more equal in population than the next higher level of German regional unit, the 'Raumordnungsregionen' (which are used in Sternberg & Litzenberger 2004). The analysis that we conduct is a comparison of the average characteristics of regions containing or belonging to a cluster with the average characteristics of all other regions. Hence, it is advantageous to average regions of similar size. Furthermore, there is no necessity to define the boundaries of local clusters exactly. All that is needed for the analysis conducted here is to determine for each region whether it belongs to a local cluster of the considered industry or not.

The local clusters in the metal industry in Germany can be assumed to exist for, at least, 100 to 200 years. In some places in the world the metal industry can be traced back even into the 13th century (see Enright 1991, pp. 2/135). In Germany the most well-known cluster in metal production and products is the Ruhr area, which became dominant around 100 years ago (Orsagh 1974), but studies for metal industry clusters exist that examine more than 200 years (Boch 1997). The most-studied local cluster in the textile industry, south of Stuttgart, emerged in Germany around 200 years ago and became leading 150 years ago (cf. Staber 1997). Local clusters have existed in various time spans in the glass & ceramics industry. Clusters in ceramics in Germany are rarely discussed in the literature. In the case of the glass industry, Jena is a prominent and well discussed location (Hagen 1996 and Walter 2000), in which the

glass industry plays an important role for more than 100 years. Hence, we find that the clusters that we studied here are mainly between 100 and 200 years old.

For these three 2-digit industries the method used in Brenner 2006 is applied to all 3-digit subindustries and the years 1999, 2000 and 2001. If in, at least, one of these three years and one 3-digit subindustry a cluster is identified in a certain administrative district, this administrative district is called to contain a local industrial cluster in the respective 2-digit industry. The identified local clusters for the three industries are depicted in Figures 1, 2, and 3. In the case of the metal industry 52 administrative districts are identified that contain a local cluster. Most of these clusters are located in the Ruhr area (south-east of Essen) and in Baden-Württemberg (north and east of Stuttgart and in the Black Forest, north-east of Freiburg). The textile industry is mainly located south of Stuttgart and in South-west Saxony (south-west of Dresden) down into North Bavaria (north of Munich). A total of 50 administrative districts containing a local cluster are identified in this industry. Thirty-nine administrative districts are found to contain a local cluster in the glass & ceramics industry. These are mainly located in the northern part of Bavaria (north of Munich) and the southern part of Thuringia (south of Erfurt).

We are interested in several aspects of the current situation of the locations of these industrial clusters. First of all we are interested in the economic situation. Above it has been argued that no predictions can be made about whether local industrial clusters that exist for a long time have a positive impact on the local economic situation. In order to measure the economic situation we use two characteristics:

- unemployment rate (UNEMP): average unemployment rate in 1999 (as provided by INKAR 2000).

- average income (INCOME): average taxable income in thousand German Marks (DM) per tax payer in 1998 (as provided by EASYSTAT 2000).

Furthermore, the above discussion has resulted in the argument that lock-ins might occur which hinder new developments. Hence, we are interested in the involvement of the identified regions in new technological developments. New technological developments often involve highly educated workers and publicly financed R&D. Therefore, we analyse the following three characteristics of regions to approximate the involvement in new technologies:

- share of workers with university or college degrees (DEGREE): percentage of workers with a college or university degree of all workers at place of work in 1998 (as provided by EASYSTAT 2000).
- number of universities (UNI): number of universities and universities of applied sciences (*Fachhochschulen*) that fit all of the following criteria: 1) more than 500 students enrolled in 2001, 2) established before 1996, and 3) containing departments in at least two of the following areas: business administration, natural sciences, engineering or design, fashion and media (if a university was stretched over several districts, each district that fulfills the third criteria was counted with one university) divided by the average number of inhabitants per administrative district in 1998 times 100,000 (as provided by EASYSTAT 2000).
- number of public research institutes (RESEARCH): number of public research institutes that are an institute of either the Fraunhofer Society, Helmholtz Society, Max-Planck Society or Gottfried Wilhelm Leibniz Society and contain at least one department in either medicine, natural sciences or engineering divided by the average number of inhabitants per administrative district in 1998 times 100,000 (as provided by EASYSTAT 2000).

In addition, the openness to new industrial and technological developments should be reflected in a strong entrepreneurial activity within the region. It has been stated above that because of lock-ins regions with local clusters should be less open to new developments. This means that we expect less entrepreneurial activity in these regions. To measure the local entrepreneurial activity we use two factors:

- start-ups in manufacturing (START): the average value of the start-up index for the manufacturing sector between 1996 and 2000 as calculated by Fritsch/Niese TU Bergakademie Freiberg divided by the average number of inhabitants in 1998 times 100,000 (as provided by EASYSTAT 2000).
- number of VC-firms (VC): number of offices of venture capital firms in 2000 (as provided in BVK 2000) divided by the average number of inhabitants per administrative district in 1998 times 100,000.

However, these factors also measure the overall economic performance of a region to some degree. Since both factors are not restricted to firms that are involved in new technologies, the value of these factors is difficult to predict if local clusters improve economic performance and decrease the involvement in new technologies simultaneously.

Finally, we consider two additional characteristics of the administrative districts in order to examine whether these old local industrial clusters are located in cities or rural areas:

- population density (POP): the average number of inhabitants in 1998 divided by the expansion of the administrative district in kilometers squared (as provided by EASYSTAT 2000).
- type of region (TYPE): classification of the administrative districts into 1) agglomerations

(with a center with more than 300,000 inhabitants or a population density at or above 300 inhabitants per square km), 2) city-regions (with a population density at or above 150 inhabitants per square km or with a center with more than 100,000 inhabitants and a population density above 100 inhabitants per square km), and 3) rural areas (all other districts) (as provided by INKAR 2000).

However, these two characteristics are not considered to be effects of clustering. They simply serve as providers of some additional information about the location of industrial clusters which proves to be helpful as stated below. In a similar way we checked for differences between the Eastern and Western part of Germany, which is often an issue in empirical studies on Germany. However, for none of the studied industries we found a significant relationship between the existence of a local cluster in a region and an east-west dummy (the correlation coefficients ranged between -0.073 and -0.037, all insignificant, pointing to a slightly larger number of local clusters in Western Germany). Therefore, we do not further elaborate on this issue here.

4. Analysis

The analysis is conducted in a straight-forward way. In contrast to the usual situation in the literature, the above characteristics of the administrative districts are not the independent variables. Instead, these characteristics are the dependent variables. We intend to understand how the existence of a local industrial cluster influences these variables. Hence, each characteristic is studied separately and the aim is to examine the relation between the existence of local clusters and the value of these characteristics.

Although the statistical analyses that we conduct do only detect relationships between the variables, we argue that causal relationships can be inferred from these results. This is based

on the following argument. We know that the local clusters that are identified and used in this analysis are present for more than 100 years, at least in most of the cases. We also know that the economic situation in these regions has changed tremendously within the last 100 years. Income, unemployment rates, start-ups, and VC-firms are definitely today not distributed as they have been distributed 100 years ago. Hence, if we find a relationship between the economic situation today and the existence of local clusters that have emerged, at least, 100 years ago, it seems unlikely that this is the result of an impact of the measured economic situation on the emergence of local clusters. The causal relation must go the other way round or there must be a third factor that influences both variables that are found to be related. The regions with local clusters are, in most cases, dominated by the respective industry, so that industry characteristics might be such a third factors. Therefore, we study three different industries to check the generality of the results. Furthermore, the type of the regions might matter. We include the variables POP and TYPE in the analysis to check for their impact. There might be further factors, which we missed to consider. However, we are quite confident that what we observe are the impacts of the local clusters on the economic characteristics of the region. Nevertheless, we, of course, can not prove this with our statistical analysis.

We conduct a Mann-Whitney U test because none of the characteristics is normally distributed. This test allows us to state whether each of the characteristics is significantly higher or lower in the regions that contain a local cluster. The results are given in Table 1.

The differences in the average ranks listed in Table 1 are difficult to interpret. Therefore, we also conduct a correlation analysis (according to Spearman). This means that for each industry and local characteristic a correlation is calculated between the existence of a local cluster and the value of the local characteristic. The results are given in Table 2.

In the theoretical section above it has been argued that local industrial clusters that have

Factor	Industry		
	Textile	Glass & Ceramics	Metal
UNEMP	-44.2** (0.021)	-46.6** (0.027)	-20.7 (0.271)
INCOME	-0.9 (0.964)	-12.7 (0.548)	53.1*** (0.005)
DEGREE	-43.6** (0.023)	-74.0*** (0.000)	-14.0 (0.458)
UNI	-27.6* (0.065)	-37.4** (0.023)	-3.9 (0.791)
RESEARCH	-12.7 (0.179)	-9.7 (0.350)	-4.0 (0.669)
START	45.7*** (0.004)	28.3 (0.181)	53.4*** (0.005)
VC	3.3 (0.776)	-22.0* (0.087)	5.2 (0.651)
POP	10.7 (0.577)	-35.5* (0.093)	70.5*** (0.000)
TYPE	6.3 (0.726)	59.5*** (0.003)	-14.5 (0.408)

Table 1: Results of the Mann-Whitney U test: Differences in the average ranks of regions with and without clusters (positive values represent a situation where region with clusters have higher values), p-values are given in the brackets and significance is highlighted by * (0.1), ** (0.05) and *** (0.01).

existed for a long time might have an impact on the economic performance of the region. This ambiguous picture is confirmed by the results of our study. The highest absolute value of any of the correlations presented in Table 2 is 0.179. Thus, none of the performance measures correlates strongly with the existence of long-existing industrial clusters. Hence, if there is an impact of local clusters on the performance of regions, it is either generally weak or seems to wear off with time.

If we examine the details of our results (Table 1), we find that the studied local clusters are, at least, significantly positive correlated with some measures of economic performance. Unemployment (UNEMP) is significantly lower in those regions that contain local clusters in

Factor	Industry		
	Textile	Glass & Ceramics	Metal
UNEMP	-0.110** (0.021)	-0.105** (0.027)	-0.052 (0.272)
INCOME	-0.002 (0.964)	-0.029 (0.548)	0.134*** (0.005)
DEGREE	-0.108** (0.023)	-0.167*** (0.000)	-0.035 (0.458)
UNI	-0.088* (0.065)	-0.108** (0.023)	-0.013 (0.792)
RESEARCH	-0.064 (0.179)	-0.045 (0.350)	-0.020 (0.669)
START	0.139*** (0.004)	0.064 (0.182)	0.135*** (0.004)
VC	0.014 (0.776)	-0.082* (0.087)	0.022 (0.652)
POP	0.027 (0.577)	-0.080* (0.093)	0.179*** (0.000)
TYPE	0.017 (0.726)	0.144*** (0.002)	-0.039 (0.409)

Table 2: Correlation between the existence of a local cluster and the value of local characteristics (p-values are given in the brackets and significance is highlighted by * (0.1), ** (0.05) and *** (0.01)).

textile and glass & ceramics. Average income (INCOME) is significantly higher in regions that contain a local cluster in the metal industry. In addition, the start-up rate in manufacturing (START) is significantly higher in all regions that contain local clusters in textiles or metals. Hence, there seems, on average, to be some positive economic impact of local clusters even once they have existed for a long time. This positive relation concerns variables that represent the overall economic activity.

However, the obtained correlations are all very weak, so that this relation is, at least, not very strong. In addition, there is a fact that weakens the above argument on inferring from the observed relationship to an impact of local clusters on the economic performance. It might be

claimed that the current economic situation in the various regions containing local clusters did not had an effect on the emergence of local clusters, but had an effect on the likelihood that these clusters survived. This is a valid point if some of the original local clusters disappeared. However, at least in the textile industry, the local clusters seem to have remained mainly as they were 50 years ago. We conclude that it is very likely that the positive relationship between the existence of local clusters and the economic performance is indeed caused by a causal impact of local clusters on economic performance. Nevertheless, this impact seems to become very weak if the local clusters become old and the impact is proved here only on average.

For the industry of glass & ceramics a negative relation with the number of venture capitalists (VC) is found. This is somewhat at odds with the identification of a positive relationship with start-up rates in the other two industries. One conclusion would be that regions that are dominated by glass & ceramics production are less active with respect to start-ups, in contrast to regions dominated by textiles or metals. Another explanation would be that, as can be seen from the correlation with the regional type (TYPE), the glass & ceramics industry is located outside of cities while venture capitalists are usually located inside of cities.

In the theoretical section we also concluded that local industrial clusters should hinder development in new technological fields in the long run. We have not been able to directly measure the involvement in new technologies. Therefore, we used the share of workers with university or college degree (DEGREE), the number of universities (UNI) and the number of public research institutes (RESEARCH) as proxies for the involvement of a region in new technologies. All correlations with these variables are negative, although they are only significant in the cases of textiles and glass & ceramics. Hence, our study confirms the theoretical claim that regions with a local cluster in an old industry are less involved in new technologies.

This is proved here for local clusters in textiles and glass & ceramics. In the case of the metal industry, where we have empirical evidence about this fact from case studies in Germany (see Grabher 1993), no significant results are found.

The differences between industries can be explained by the kind of regions in which the clusters are located. In the case of glass & ceramics we have already stated above that the local clusters are mainly located outside of cities. Since universities, colleges and public research institutes are usually located in cities, the negative correlation between local clusters in glass & ceramics and the variables DEGREE, UNI and RESEARCH might be a consequence of the clusters' location outside of cities. In the case of the textile industry, instead, no concentration of local clusters either in cities or outside of cities is found. Hence, the negative correlation with the variables DEGREE and UNI has to be assigned to the existence of a local cluster. In the case of the metal industry, local clusters are rather found within cities. This should cause a positive correlation with the variables DEGREE, UNI and RESEARCH. The absence of any such significant correlation might again be interpreted as some negative impact of old clusters on the involvement in new technologies. Hence, we obtain some confirmation of the statement that local clusters tend to hinder involvement in new technologies in the long run.

To sum up, we mainly find a positive relationship between the existence of local clusters and economic performance (measured by income and unemployment) and a negative relationship between the existence of local clusters and human capital and research. The results for start-up activities (start-up rates and VC-firms) are rather mixed. Hence, we obtain a result that seems to be contradicting on a first sight because human capital and research is usually associated with economic strength. However, this result seems to be well in line with the arguments in the literature that have been presented in Section 2. Due to lock-in effects, local clusters are dominated by the respective industry and can be expected, once this industry has become

low- or medium-tech, to be less involved in high-tech activity. Therefore, human capital and research plays a smaller role in these regions and might be less present. Nevertheless, the firms in the local cluster might still benefit from positive local externalities and might therefore create more income and employment in the region than a region with a similar industrial structure but no local cluster would do.

5. Conclusions

We have analysed the meaning of old local industrial clusters for a region's economic performance. While local clusters are usually assumed to have a positive impact on the local economic performance, this assumption is only proven for short periods of time. We find that the positive relation between local clusters and economic performance wears off with time, although it is still visible, on average, in local clusters that exist for more than 50 years. However, the positive impact of old local clusters seems to effect unemployment, income and the local start-up rate only. With respect to the involvement of a region in new technologies, the positive impact of local industrial clusters seems to turn into a negative impact over time.

This has implications for policy measures to support the emergence of local clusters. There is a positive impact of local industrial clusters on the regions' economic performance. While, this impact seems to wear off it is nevertheless observable even after a long time. In contrast, local industrial cluster seem to be negatively correlated with the involvement of regions in new technologies. Hence, supporting the emergence of industrial clusters in a region causes economic benefits for the region but might also constrain the region to the respective industry and hinder new technological development, at least on average.

These findings are well in line with the knowledge from case studies. However, the analysis presented here is the first of its kind. It is restricted, so far, to Germany and three specific

industries. Hopefully more studies of this kind are conducted in the future, so that the evidence is strengthened and the findings become more reliable.

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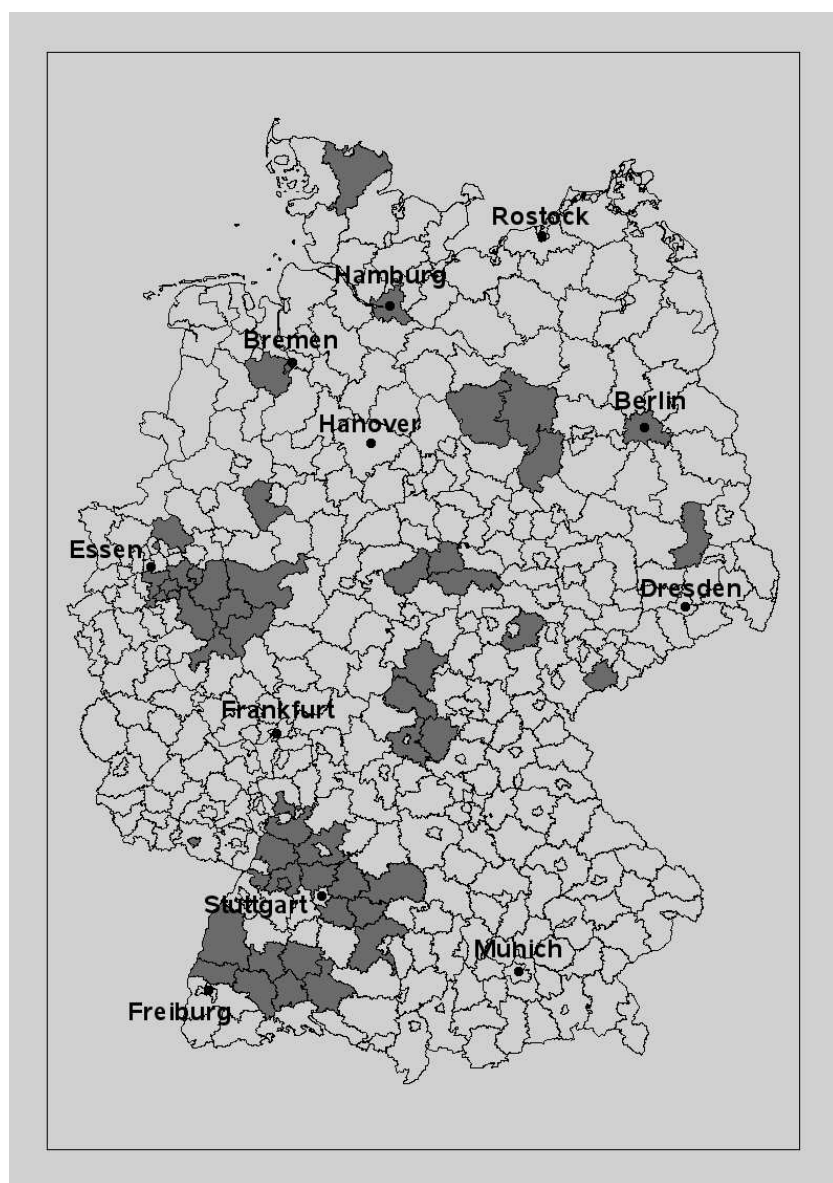


Figure 1: Regions that contain at least one local industrial cluster in the metal industry.

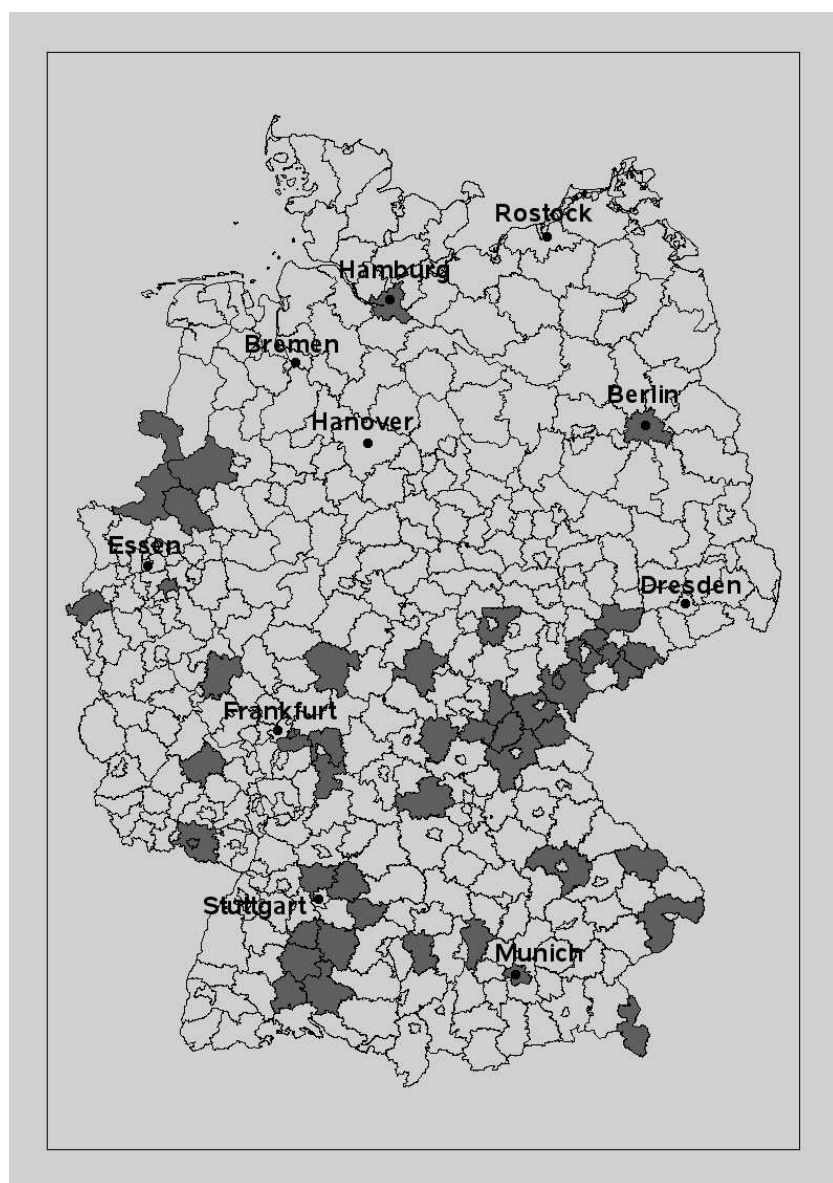


Figure 2: Regions that contain at least one local industrial cluster in the textile industry.

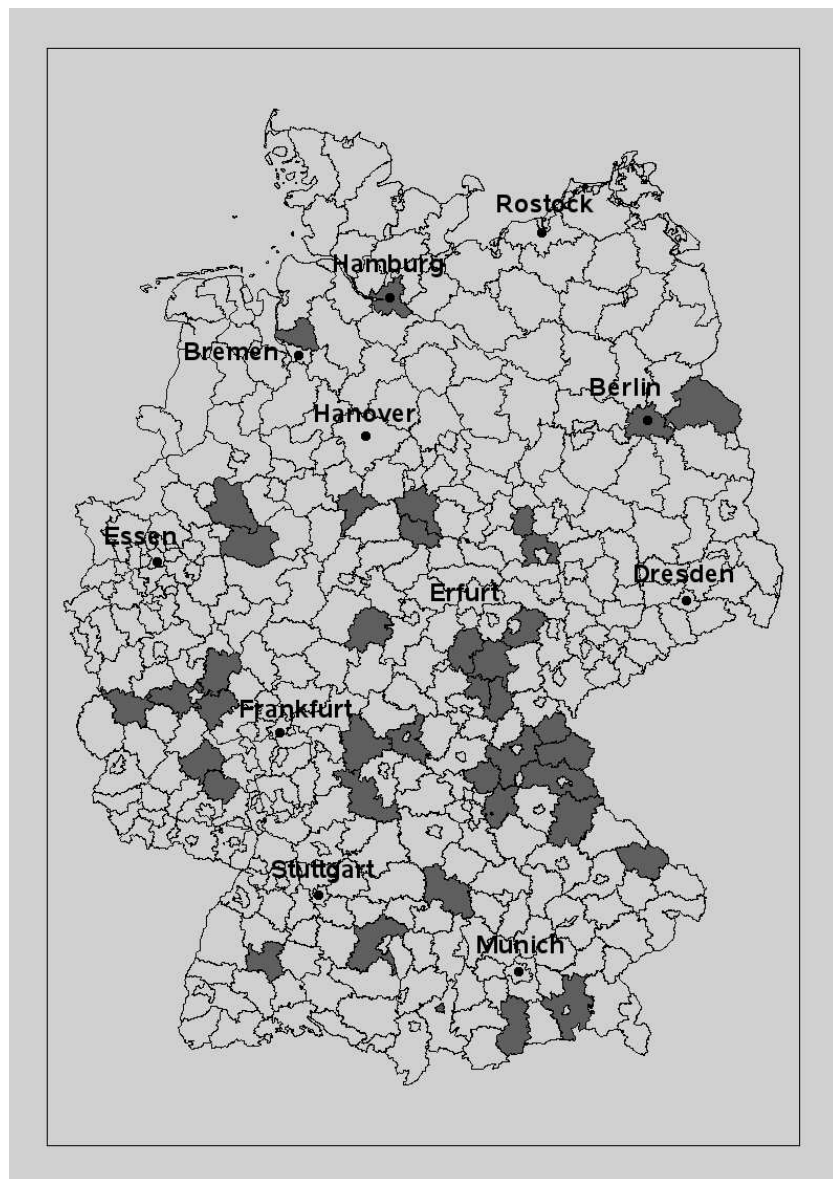


Figure 3: Regions that contain at least one local industrial cluster in the glass industry.