Regional clusters, competitiveness and economic growth

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ABSTRACT

Clusters are believed to increase competitiveness and this in turn is associated with economic growth. This article concentrates on the questions whether clusters do relate to competitiveness, and whether competitiveness does enhance economic growth. It appears that competitiveness and the presence of clusters are strongly related. However, competitiveness and the presence of clusters are not necessarily related to economic growth. The results based upon the analysis performed in this article indicate that competitiveness and the presence of clusters imply a high GDP per capita, but weak economic growth.

INTRODUCTION

The idea of this article is to examine a number of economic relationships. The first is the relationship between regional competitiveness and the presence of regional clusters. The second is the relationship between competitiveness and regional economic growth. Politicians and theorists alike see competitiveness and clusters as the key concepts in studying regional development. Since the 1990 publication of 'The Competitive Advantage of Nations' by Porter, regional policy practitioners and academic researchers alike have been captivated by the promise of regional development through improved business competitiveness. This book and Porter's later work on competitiveness, innovation and industry clusters contain the promise that regional development can be ensured by the development of regional clusters that improve the competitiveness of a region. Improved competitiveness in turn leads to increased economic growth of the regional economy. The promise of economic growth through cluster development has not only been noticed by academic researchers from a wide ranging field of different sciences. Numerous governmental and non governmental agencies are concerned with regional clusters in order to improve regional economies.

A vast number of qualitative studies have taken place on formal theory building of regional clusters, but this has not led to a consensus on a concise body of cluster theory.

Although numerous methods are used to analyse and measure the size and importance of regional clusters, there is no commonly accepted method of cluster determination and measurement (Brown, 2000).

The objective of this article is to investigate whether the presence of clusters and regional competitiveness are interrelated and, in addition, whether competitiveness stimulates regional economic growth. The most important definitions used in this article are given below (Altena et al., 2007).

REGIONAL CLUSTERS

Geographical concentration of industries is not a new and revolutionary concept in economic geography. Economic geography evolves around the questions: what economic activities locate where and why do they locate there? Co-location of industries, or industries located in a geographically concentrated area had already been observed. Marshall observed the co-location of industries into industrial zones in England (Martin and Sunley, 2001). According to Marshall, the concentration of these industries in so called industrial districts was to a significant extent based on knowledge and knowledge spill-overs, the relationship between the industries, and the supporting institutions (Andersen, 1996).

Perroux noticed that economic growth was not a fluent process and that different regions experienced different economic growth rates. Based on this, Perroux concluded that there must be something which he called *growth poles*. These are centres of economic growth whereas other regions lagged behind (Andersen, 1996).

In this article we will use the following definition of clusters (Altena et al., 2007): *'Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that are present in a nation or a region.'* (Porter , 1990).

The use of Porter's definition of the concept of regional clusters is a pragmatic choice. It allows for the distinction of two different characteristics of clusters that are important in our opinion. The first part of the definition states that clusters are regionally concentrated; the second part indicates that clusters are networks among different participants in the economic process. The first part, the regional co-location of industries can be quantitatively observed by a wide range of tools available to regional economists (including location quotients, and Shift and Share analysis as a more dynamic approach and the one used in this article).

Although the definition leaves much room for discussion on the exact contents of clusters, it is the most widely recognized definition for clusters. The debate on the exact definition for clusters has by no means ended. Martin and Sunley for example have catalogued ten different ways of defining the concepts of industry clusters (Cortright, 2006). Cortright suggest a more pragmatic approach among scientists by their accepting the concept of clusters to be an 'umbrella' concept, suitable for relevant policy

formulation. By this he proposes not so much an exact definition of the concept but rather an examination of the commonly shared characteristics of clusters instead.

According to Porter, competitiveness and the resulting growth are the consequences of private sector activities. The diamond model represents the importance of embeddedness of these private economic activities in their economic environment. The economic environment of business activities is created by the interplay of the relations with related industries, the demand side of the firm, the inputs needed for production, and the appropriate context for production that improves business competitiveness. The importance of a government is the impact it may have on the conditions for a competitive private sector.

COMPETITIVENESS

Competitiveness may be defined as:

'The degree to which a country can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of its people over the long term' (National Competitiveness Council, 2001).

Competitiveness is a well known concept among politicians and academic researchers. The promises of economic development through competitiveness appeal to everyone, but the exact content is very hard to pinpoint. Two very distinct approaches to observe competitiveness can be identified: the ex-ante and ex-post measures of competitiveness. On the one hand a vast number of competitiveness rankings are produced where the state of competitiveness is estimated by indicators that enhance competitiveness. This approach is used for example by the World Economic Forum (WEF). Ex-post measures are not concerned about the specific indicators that lead to a perceived competitiveness level: they identify the revealed effect of competitiveness. If competitiveness indeed increases economic development, this should be observed by looking at economic development. The indicators that reveal ex-post competitiveness include added value, GDP per capita, exports and imports.

The construction of the competitiveness indices is a complex task involving a vast amount of data. The WEF approach is special in that quantitative and qualitative data is combined in order to give a precise measurement of competitiveness. Together with 'hard' economic statistical data, the WEF issues a survey to business representatives in the countries. Global competitiveness is based upon three pillars of importance for the competitiveness of nations: basic requirements, efficiency enhancers and innovation factors. The topics included in these indicators are: institutions, physical infrastructure, macro stability, security, basic human capital, advanced human capital, goods markets efficiency, labour market efficiency, financial market efficiency, technological readiness, openness and market size, business sophistication and innovation. The growth competitiveness index is a smaller version of the global competitiveness index, including only

those indicators that are perceived to be most directly linked to economic growth performance.

If competitiveness is indeed the capacity for regional or national economies to compete on larger markets, the revealed effects of competitiveness are the results from the sales on those markets. Competitiveness then can be measured by the effects of competitiveness; the increase in added value (Cook and Bredhal, 1991), in sales on non regional or national markets, in other words by exports (Feenstra et al., 2006), in the increase in the procurement of inputs, and increase in employment. The last relationship – between competitiveness and employment – is less straightforward. Employment however can be used as a substitute for value added as employment data is usually more easily obtained.

SHIFT SHARE ANALYSIS AND ECONOMIC GROWTH

The Shift and Share analysis has been a commonly used tool among economic geographers for a long time (Houston, 1967). The effect of the changes in employment and the associated competitiveness are calculated in order to identify the source of competitiveness for regions. From literature it becomes clear that the shift and share method is used to find the growth of a region's economic performance by either the structure of the economy or by the region specific components that make the region competitive. The relative components of the shift and share analysis are taken into account, to allow for an inter-regional comparison of the contribution of the components to competitiveness. The shift and share results used in this research are:

$$RAS = \frac{\sum_i W_{ijt} - \frac{W_t}{W_0} \sum_i W_{ijo}}{W_{ijo}}$$

$$RDS = \frac{\sum_i \left(W_{ijt} - \frac{W_{it}}{W_{io}} W_{ijo}\right)}{W_{ijo}}$$

$$RPS = \frac{\sum_i \frac{W_{it}}{W_{io}} W_{ijo} - \sum_i \frac{W_t}{W_o} W_{ijo}}{W_{ijo}}$$

Where:
W_{ijo} = Employment sector i in region j in year o
W_{ijt} = Employment sector i in region j in year t
W_{io} = Employment per sector i total economic area in year o
W_{it} = Employment per sector i total economic area in year t
(From Heijman, 2002).

The *actual total shift* shows the change in employment per sector of the region relative to the change in employment per sector on the national level. The *relative actual shift* (RAS) is measured by taking the total economy growth factor in employment and relat-

ing this to the employment development of the region. This shows whether the region has faster or slower growth in employment compared to the total economy. The relative actual shift is composed of two components: the structural component shift and the region specific shift.

The *relative proportionality shift* (RPS) explains how the industrial structure of the regional or national economy contributes to overall employment growth performance. It indicates the growth of employment in the region, relative to the development in employment on the national level, in order to estimate the contribution of fast growing industries to the regional economic development. A negative industry mix component suggests the county has employment concentrated in sectors growing more slowly than the overall national economy. This structural shift tells us something about the competitiveness of the region derived from the type of economic activity overrepresented in the region. A fast growing sector that is relatively well represented in the region increases regional development.

The *relative differential shift* (RDS) describes how firms in the country or region perform relative to national averages for firms in those same industries. This relative differential shift is also known as a measurement of competitiveness of the region. To calculate the competitive share component, base year employment in each local industrial sector is multiplied by the margin between the local sector growth rate and the national average growth rate for that sector. If this shift is positive, it means that the region has attracted relatively more activity in the sector than the national economy. If the growth is negative, the region has not done well in attracting economic activity to the region. This relative differential shift is the component of competitiveness that indicates the region specific elements that contribute to the competitiveness of the region. If the relative differential shift is positive, there is something pulling economic activity to that specific location. Without saying anything about these specific indicators that pull the economic activity, it is clear there are positive indicators contributing to regional economic development.

Although employment development is a much used indicator for the Shift and Share development, it may not be the best indicator to represent economic growth. Growth is associated with increased productivity resulting in increased income. Added value, exports of the region and market shares (Houston, 1967; Esteban, 2000) provide useful information on the position of the regional economy on larger markets. In this research the Shift and Share method is applied to employment data because of the availability of reliable data in time-series on many regions. The directions of the employment development as represented by Shift and Share analysis in relation to competitiveness are verified by the direction of the relation between competitiveness of countries and the GDP per capita in purchasing power parities in both a static and dynamic approach. It is clear that the direction of the relative proportionality shift in employment on the national level is the same as the direction of the growth in GDP per capita.

RESULTS

The first relation is the link between the state of cluster development on the one hand and the competitiveness of the economy on the other hand. According to Altena et al. (2007) there is a positive highly significant correlation coefficient of 0.836 between the strength of clustering in national economies and the global competitiveness ranking of these countries. The growth competitiveness ranking, a less complicated version of the global competitiveness ranking, still gives a correlation coefficient of 0.752 with the ranking of cluster strength on the national level.

The correlation analysis indicates that the state of cluster development is closely and significantly related to the level of competitiveness of nations. This means that in more competitive nations it is more likely that strong clustering of economic activities can be observed (Altena et al., 2007).

The second relation is the relation between competitiveness on the one hand and the relative Shift and Share analysis on the other hand (Table 1). It appears that on the national level the relative proportionality shift indicates competitiveness, with a correlation coefficient of −0.747 and −0.626 for the global competitiveness rank and the growth competitiveness rank respectively. The strongly negative relation indicates that the stronger the relative proportionality shift, the stronger the structure of the economy and the more competitive the country is.

Table 1 Correlation between the competitiveness ranks and the Shift and Share analysis national level data

Correlations		Relative differential shift	Relative proportionality shift	Relative actual shift
Global Competitiveness Rank	Pearson Correlation	- 0.106	- 0.747(**)	- 0.219
	Significance (2-tailed)	0.630	0.000	0.316
	Number of observations	23	23	23
Growth Competitiveness Rank	Pearson Correlation	- 0.057	- 0.626(**)	- 0.153
	Significance (2-tailed)	0.797	0.001	0.484
	Number of observations	23	23	23

** Correlation is significant at the 0.01 level (2-tailed).

In the national level analysis it is clear that the relative proportionality shift yields the only strongly significant results for further analysis. The relative actual and the relative differential shifts seem to have no important connection.

Finally the relation between the Shift and Share analysis and the regional competitiveness index (Huggins index) was estimated (Huggins, 2004). Table 2 presents the results. Again it appears that competitiveness is indicated by the relative proportionality shift. It is even so that on the regional level the relative differential shift indicates the absence of competitiveness. So, on the regional level, competitiveness is significantly determined by all three shifts: the strong and negative relative proportionality shift, and the strong and positive relative differential and relative actual shifts with correlation coefficients of −0.572, 0.551 and 0.474, all significant to the 0.000 level.

Table 2 Correlation between NUTS-1 level competitiveness ranks (Huggins Rank) and shift share results

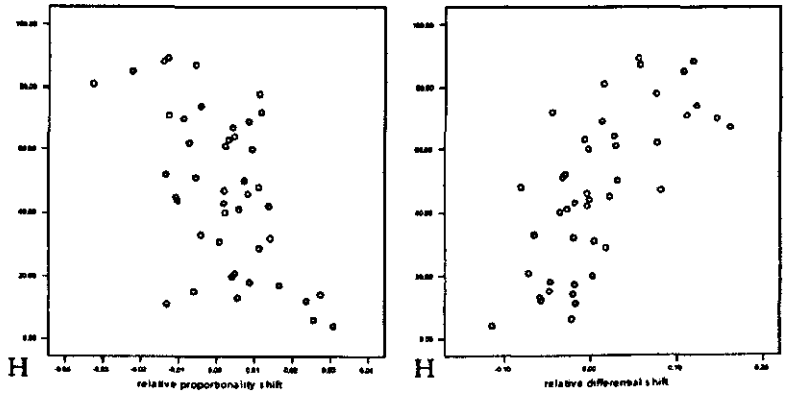
		RAS (N=51)	RDS (N=51)	RPS (N=51)	RAS (N=44)	RDS (N=44)	RPS (N=44)
Huggins Rank	Pearson Correlation	0.474(**)	0.551(**)	-0.572(**)	0.628(**)	0.697(**)	-0.567(**)
	Significance (2-tailed)	.000	.000	.000	.000	.000	.000

** Correlation is significant at the 0.01 level (2-tailed).

Source: Altena et al. (2007).

Figure 1 shows the directions of the relations between the relative differential and relative proportionality shifts. From the analysis it is clear that the two shifts are indeed strongly and significantly related to the competitiveness of the region. However, to get an impression of the competitiveness of a region the relative proportionality shift is crucial. The higher the RPS, the higher the Huggins competitiveness rank (H), which gives of course a negative correlation coefficient.

Figure 1 Scatter diagram of Huggins rank (H) and relative differential shift (left panel), and relative proportionality shift (right panel)



Source: Altena et al. (2007).

The conclusion is that more competitive regions experience less growth in employment than less competitive regions. This is a rather unexpected result. However, it was confirmed when the correlation between the global competitiveness rank and GDP was

examined. More competitive regions have a higher level of GDP per capita but show a lower growth rate in GDP per capita than less competitive regions (See Table 3).

Table 3 Correlation between the GDP per capita in a static and dynamic representation and the competitiveness ranks national level data

		Global Competitiveness rank	Global Competitiveness score	Growth Competitiveness rank	Growth Competitiveness score
GDP 2004 in ppp	Pearson Correlation	- 0.685(**)	0.688(**)	- 0.674(**)	0.668(**)
	Significance (2-tailed)	.000	.000	.000	.000
% change in GDP per capita	Pearson Correlation	0.333	- 0.355	0.365(*)	- 0.374(*)
	Significance (2-tailed)	0.072	0.055	0.047	0.042

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

N = 30 for all correlations.

Source: Altena et al. (2007).

Table 3 presents the correlations between the global- and growth competitiveness indices the GDP per capita both in a static and dynamic picture. The correlations estimated are not as strong as the Shift and Share results are in relation to competitiveness, but the picture they represent is still concise. Competitiveness and GDP per capita are related in a positive way when the level of GDP per capita in 2004 is taken into account. The global competitiveness rank and the growth competitiveness rank give a correlation coefficient of –0.685 and –0.674 respectively, at the significance level of 0.000. The stronger the competitiveness of the country is, the higher the GDP per capita. A more dynamic approach where the GDP per capita in purchasing power parity growth is taken in to account, does give a less concise yet important result. The weaker but very significant relation between the growth competitiveness index and the GDP per capita growth over a five year period shows that GDP per capita growth and competitiveness are negatively correlated with a correlation coefficient of –0.374 and a significance of 0.042. GDP growth per capita seems negatively correlated to competitiveness, indicating that more competitive countries experience slower GDP per capita growth.

CONCLUSIONS

Because the presence of clusters and competitiveness go hand in hand it is possible to determine the presence of potential regional clusters by observing regional competitiveness. More competitive regions are more likely to have clustered economic activities in multiple sectors.

In general more competitive regions experience slower employment development in comparison to less competitive regions, but have a higher GDP per head. In other

words, less competitive regions have a higher employment growth than more competitive regions.
The composition of this growth in employment as analysed by applying the Shift and Share analysis is even more interesting. More competitive regions have a slower overall employment development, caused by the negative relative differential shift. But this negative relative differential shift is moderated by a positive relative proportionality shift. The structure of the economy contributes positively to competitiveness; the region specific elements are impacting competitiveness negatively.

Probably, the explanation for this paradox is that a high regional competitiveness is an indicator for already developed clusters that can also be detected by the simple indicator of GDP per head. However, it is far more interesting to have an indicator for promising clusters that are in the initial phases of development. Probably, a high differential shift contributing to a positive total shift is a plausible indicator for a promising cluster development. This is an interesting topic for further research.

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