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Recently published:

- Hauser, C./Werner, A.: The Impact of Foreign Trade Promotion on the Foreign Sales Intensity of SMEs. 1/2009.

Edited by:
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University of Applied Sciences Chur
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www.sife.ch

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ABSTRACT:

Based on the theory on entrepreneurship, regions are clustered according to a set of relevant factors discussed in the literature which are supposed to determine venture creation. The clustering results indicate that Swiss regions are distinct with regard to their potential for venture creation. From the results it is possible to derive different strategies for the particular clusters. In particular, for most of the clusters containing agglomeration and urban regions as well as of some semi-peripheral regions it might be a good strategy to strengthen the entrepreneurship education in order to compensate for existing weaknesses like the lack of role models. However, several clusters which contain peripheral regions should better rely on strengths available than to compensate existing weaknesses. Consequently, one strategy of Swiss New Regional Policy as an instrument to strengthen entrepreneurial activity in structurally weak and peripheral regions could be to focus on the potentials of regional centres. These could act as nucleus for the surrounding peripheral regions.

Keywords: Regional Economics, Entrepreneurship, Business Formation

JEL Classification: R11, M13, R58

Introduction

New businesses are considered to be important for regional economic development and growth. However, empirical observations show that new venture creation varies considerably between regions, indicating differences in their endogenous potential and structural characteristics. Taking this into account, numerous national policymakers and stakeholders attempt to align their policy instruments to support the establishment of new businesses most efficiently. In Switzerland, with the New Regional Policy (NRP) a policy instrument is created which aims at strengthening the potential for new firm formation in peripheral and semi-peripheral regions. However, so far it is rather unclear which regions should be supported and which policy measures fit regional structural conditions best, so that the limited resources are used in the most efficient way.

The present study compares the entrepreneurship potentials of Swiss regions on a highly disaggregated level by means of cluster analysis. The method of cluster analysis is used to form homogeneous groups of regions which are described by a variety of characteristics. It allows us to discuss the differences of Swiss regions with regard to their potential for new venture creation. Furthermore, cluster analysis makes it possible to identify regions with high entrepreneurship potentials on the basis of the used determinants, and to identify the main strengths and weaknesses of peripheral and semi-peripheral regions. The analysis is carried out at the level of Swiss *mobilité spatiale* regions (MS). MS regions are functional units based on economic interaction and commuting movements. Hence, they are closely linked to the endogenous potential of regions.

There are numerous studies dealing with new business formation and the related impact on regional economic growth. From the early 1990s, when firm formation data on the regional level have become available, empirical studies deal with regional variation in new firm formation rates and with the identification of explaining determinants on the regional level (among others Audretsch & Fritsch 1994, Reynolds et al. 1994). These studies find, for instance, that regions with a high population density, agglomeration economies, high shares of small firms and a specialized employment structure, high in-migration as well as a growth in demand have higher start-up rates than other regions. Subsequent studies distinguish between demand and supply side determinants for entrepreneurship (for an overview see Verheul et al. 2002). While the demand side stresses the market side and the need for new products and services, the supply side includes human and social capital of the population of a region or nation.

Regional economics literature provides further evidence on the relevance of agglomeration economies, in particular urbanization and localization economies. Numerous studies support positive effects of agglomeration on the formation of new ventures, regional innovation activities and growth (e.g. Acs et al. 2002; Glaeser et al. 1992). More recent studies combine regional with person-related characteristics. Start-up activities are explained by both regional characteristics

and individual variables by using micro data such as the GEM population survey or the German Socioeconomic Panel (SOEP) (Bergmann & Sternberg 2007; Mueller 2006; Wagner & Sternberg 2004). Furthermore, empirical studies on regional determinants and their impact on entrepreneurial activities emphasize a strong persistency in the regional variance as new firm formation rates are highly path-dependent on the regional level. Regions are able to perpetuate their entrepreneurial tradition over time and generations in contrast to less favoured regions lacking these potentials (for an overview see Parker 2004; Fritsch & Mueller 2008). Recent empirical studies primarily investigate the impact of new business formation on regional economic development (Fritsch 2008, introduction to a SBE special issue). They provide empirical evidence on the impact of new business formation on economic development of regions and nations. The effects become even more evident over a longer period of time (Fritsch & Mueller 2004; Fritsch 2008; van Stel & Storey, 2004).

Our study is based on this theoretical and empirical literature and uses explaining determinants to cluster regions according to their entrepreneurship potentials. This enables us to formulate policy measures specific to regions so that limited resources can be efficiently employed.

The remainder of this article is organized as follows. In the next section, we discuss the literature on determinants which influence entrepreneurial activity, their type of impact on start-up rates and the selection of the indicators. The third section describes the data set and methodology. The fourth section discusses the results. A final section summarizes the findings and discusses selected political recommendations.

Factors accounting for regional entrepreneurial activity

Theoretical and empirical literature on entrepreneurship suggests that numerous macroeconomic factors have an impact on start-up activities. In particular these are (1) demand side factors, (2) supply side factors, and (3) urbanization and localization economies (agglomeration economies).¹

Demand side factors

On the demand side, entrepreneurial opportunities are created through the market demand for goods and services. In particular, the need for new products and services is stressed to have an impact on new firm formation. Hence, new firm formation is influenced by the stage of economic development, technological and structural change as well as by an increase in demand. Furthermore, the industrial structure as well as the size structure of the regional industry play an important role explaining new venture creation (Reynolds et al., 1995, Dunn & Holtz-Eakin, 2000; Wagner 2004). In particular, empirical studies show that population growth as well as increasing prosperity and wealth lead to a higher demand of goods and services. Economic development

¹ A similar classification is used in the literature, see for example Bosma et al. (2008), Verheul et al. (2002).

and structural change comes along with individualized, diversified consumer preferences for new, specialized and differentiated goods and services. It offers a large number of entrepreneurial opportunities for new entrepreneurs in market niches which serve local markets first (Armington & Acs 2002). Additionally, small firms are more capable to respond to changing market needs for new and specialized products and services due to a more flexible specialization (Loveman & Sengenberger 1991). Consequently, the role of scale economies has become less important for innovative industries and technological advancement in many sectors (Acs & Audretsch 1987). Also, small scale activity fosters regional competition and contributes to higher start-up rates (Fotopoulos and Spence 1999). Furthermore, there is a negative relationship between the employee size of a firm and the probability that an employee starts his or her own business out of this firm. This fact is determined by two arguments: Small firms do better serve as role models, whilst more favourable conditions in large firms restrain employees from quitting their jobs and getting self-employed (Storey 1994).

With structural change and an economic shift from the manufacturing sector towards a service economy, new business opportunities are particularly exploited at small scale production. The service sector has experienced a strong increase in new firms. Firms in the service sector are characterized by a relatively small average firm size and the number of firms increases with higher per capita income. Due to smaller start-up requirements, the initial start capital investments are low. New entrants have therefore low market entry barriers to start new business activities. Subsequently, a smaller business density of manufacturing firms also has a positive impact on the number of new firms being created (Reynolds et al. 1995). These empirical studies emphasize the role of the industry as well as the size structure on the demand side to explain new venture creation.

Supply side factors

The supply side provides potential entrepreneurs that can act upon opportunities. The supply side of entrepreneurship is determined by the size and structure of the population (Verheul et al. 2002). The size and structure refers to the population density and urbanization rate, employment structure, age structure, human capital and share of immigrants.

Population density in a region shows a high correlation with a number of factors such as business infrastructure, market proximity, wage level, educated work force and access to innovative products (e.g. from universities), and quality of communication infrastructure. Thus, this variable can be regarded as a catch-all variable for a variety of regional characteristics (Fritsch & Mueller 2008; Brüderl et al. 1998). The set-up of new business activities in these regions signals attractiveness to other businesses because of cooperation opportunities and spillover effects (Audretsch & Fritsch 2000).

With regard to the employment structure an observation in the literature is that a high number of self employed persons increases entrepreneurial activity in regions. Start-up activity is self reinforcing as existing entrepreneurs are observed by regional stakeholders and new potential entrepreneurs. Thus, the access to necessary information how to create a business is easier within an entrepreneurial region (Minniti 2005, Mueller 2006). Furthermore, persons who are already self employed (serial entrepreneurs) are predestined for further start-up activities (Westhead & Wright 1998)

There are numerous studies on the relationship between unemployment and self-employment. However, the impact of unemployment on new venture creation is ambiguous and still not conclusive (Parker 2004; Bergmann & Sternberg 2007). Serving as a supply side factor, unemployment reduces the opportunity of paid-employment and offers the option of becoming self-employed, in particular when there is shortage of alternative job opportunities. Nevertheless, high unemployment rates lower the demand for products and services that firms offer. Subsequently, the income and also the available capital for entrepreneurs are reduced and the risk of bankruptcy increases. This indicates a negative relationship between self-employment and starting a venture. Empirical results tend to reflect the method applied. While cross-section studies mainly show a negative relationship between unemployment and entry rates, most of the time-series studies demonstrate positive effects of unemployment rates on new firm formation rates (see Parker 2004 for an overview).

The age structure of a population has an influence on the level of entrepreneurship. The Global Entrepreneurship Monitor (GEM) shows that the age of people who likely become self-employed, is in mid-career times, precisely between 35 and 44 years (Reynolds et al 2002). Other studies report that many entrepreneurs start a new venture in their mid-thirties and are typically between 25 and 40 years old (Storey 1994; Evans & Leighton 1989). They also find out that the level of entrepreneurial activities is declining with an increasing age of the population. Subsequently, nations with a higher number of persons in the age class of 25-44 years demonstrably have more start-up activities than others (Reynolds, Hay & Camp 1999). Furthermore, studies show that even if there are more opportunities to become self-employed for older than for younger persons, older employees are less willing to become self-employed (Van Praag & van Ophem 1995).

Empirical studies show a clear relationship between (higher) education, industry experience or background and entrepreneurial success (Brüderl et al. 1998). The general relevance of qualifications clearly shows a positive relationship between the duration of professional education and training of the entrepreneur and the probability of starting a company. This indicates a higher ability to recognize business opportunities. Hinz (1998) concludes that individuals with a graduate degree are more inclined towards entrepreneurship and likely to start a company, particularly in knowledge intensive industries, although the relationship is not linear. Entrepreneurs tend to be

individuals with a more hands-on educational background (vocational school, technical college, etc.) than an academic background.

The number of immigrants in a region plays an important role with regard to firm birth rates. First, it has indirect effects due to consequences on the age structure of a regional population because families are usually younger and have more children. Second, studies have found a significant and positive effect of immigrants on new firm formation (Reynolds et al. 1995; Saxenian 1999). In particular, there are two groups of immigrants. The first one consists of immigrants which lack skills, resources and networks, however, they tend to be more self-employed than non-immigrants. The second one consists of extremely well educated and skilled immigrants which are highly engaged in technology start-up activities (Saxenian 1999). Both groups enrich a region with new ideas and cultures, create new business opportunities, and are risk takers (Lee, Florida & Acs 2004).

Urbanization and localization economies

Agglomeration economies consist of urbanization and localisation economies. Urbanization economies arise for firms spatially located close to each other irrespective of their industry; localization economies bring benefits for firms located close to firms of the same industry (Hoover 1948).

Urbanization economies- economies of scale arising from the city size itself- provide access to highly educated people and a large workforce in general, infrastructure, research institutions and universities, customers, capital, suppliers, markets and demand for products and services. Jacobs (1969) argued that an open and diverse city attracts talented people, stimulating creativity and innovation which are necessary preconditions for entrepreneurship. Thus, urbanized and densely populated regions are attractive regions to start new business activities in. There is empirical evidence that agglomeration, and in particular urbanization, has a positive impact on the new firm formation rate (Armington & Acs 2002; Reynolds et al. 1994).

Localisation economies - economies of scale arising from spatial concentration of business activities within industries - stress the relevance of knowledge spill over within the same industry. Knowledge spill over supports firms in reducing uncertainty which is in particular associated when dealing with innovation activities. Furthermore, industry clusters foster competition and force new firms to implement their new products on the market. Because of the lower costs with regard to gaining knowledge of the business environment, start-ups are attracted by regions where industry clusters already exist (Audretsch et al. 2008).

Overall, our study is based on this theoretical and empirical literature when selecting the relevant variables with regard to the entrepreneurship potential of regions. The selected variables are industry structure, firm size structure, population density, self-employment, human capital and age

structure of population. The approximation of these factors by empirical indicators is described below.

Data and methodology

Data and descriptive statistics

Our analysis aims to cluster regions according to their entrepreneurial potentials on the spatial level of Swiss MS regions (*mobilité spatiale*). MS regions are functional units based on economic interaction and commuting movements of labour workforce. The 106 MS regions provide information about the endogenous potential of the regions. They account for a differentiation on a more disaggregated level than the level of the 26 cantons in Switzerland, in particular, when they are large and contain different agglomeration categories.

When selecting variables to describe the relevant factors for entrepreneurial activity, one has to take into account that the availability of statistical data is limited. With the following selection of data this is considered.

As indicators for the demand side of entrepreneurship, small scale activity is approximated by the share of small firms and the number of self-employed persons in a region (see appendix A1). Small scale activity is measured by the proportion of the number of small firms relative to the total number of a regional population. Small firms serve as role models for other potential entrepreneurs. Additionally, the variable can be regarded as an indicator for structural change towards flexible specialisation. Hence, a high share of small firms is supposed to have a positive impact on new firm formation. Self employed persons are measured as the ratio of the number of persons relative to the total number of a regional population. As role models they are important for new potential entrepreneurs. In addition, self employed persons are likely to be serial entrepreneurs.

Density of the business service sector is a further factor of the demand side. It is a proxy for structural change and economic progress towards a service economy. It also takes specialised and individual consumer preferences into account. Beside the density of the business service sector the density of the manufacturing sector is used. The indicator works in two directions. First, a high manufacturing density indicates retarded economic level of development and is assumed to have a negative impact on entrepreneurial activity. Second, it can be considered as an indicator for localisation economies which arise from spatial concentration of business activities within the same industry. Both variables are defined as the ratio of the number of businesses in the respective sector relative to the total number of a regional population (per 1'000 inhabitants).

Variables of the supply side of entrepreneurship are approximated by the size and structure of the population. A selected indicator is population density. Since population density in a region shows a high correlation with a number of other factors such as business infrastructure, market proximity, wage level, access to innovative products and quality of communication infrastructure we chose this “catch-all variable” as an indicator. Furthermore, it also serves as an indicator of urbanisation economies. It is defined as the number of population by square kilometres. Regional labour force also serves as supply side indicator as labour is a source for new entrepreneurs and as future employees for new and young firms.

Young, high qualified people and a diverse population structure are further used indicators of the supply side. Many entrepreneurs start their new venture typically between 25 and 40 years. The share of this age group in relation to the total number of inhabitants is chosen as an indicator. Post secondary university degree is used as proxy for high qualification. It is measured by the number of inhabitants with, a university degree, compared to the total number of inhabitants. As also hands-on educational background plays an important role for the probability of starting a company, all types of post-secondary degrees are taken into account. They include university degrees as well as graduates from *Höhere Fachschulen* which are more vocational schools than academic university degrees. The share of immigrants in a region is expressed as the diversity index. It is the proportion of foreign born persons in a region relative to the total number of inhabitants.

Table 1. Summary statistics of variables used in cluster analysis

Indicator name	Mean	Standard deviation	Minimum	Maximum
Population density	374.938	676.738	7.865	5006.135
Density of business services	9.849	9.689	3.825	37.400
Density of manufacturing sector	10.978	2.168	6.889	15.638
Share of small firms	40.316	7.924	29.109	74.341
Labour force	0.534	0.039	0.449	0.699
Post-secondary university degree	0.064	0.032	0.021	0.171
Diversity index	0.174	0.069	0.034	0.373
Young people of 25-40 years	0.244	0.019	0.197	0.327
Self-employed persons	0.079	0.018	0.050	0.133
Start-ups (total number),	107.9	148.5	3.9	962.5
Start-up rate (average 1999-2006)	2.5	1.1	0.9	10.3

Agglomeration economies, and in particular urbanisation economies, are measured by population density as well as regional workforce (see both indicators above). The density of the business services and the manufacturing sector also account as proxies for localization economies (also described above).

The number of new businesses is provided by the firm registration office UDEMO (*Unternehmensdemographie*) published by the Swiss Federal Statistical Office. The database only comprises information about newly founded independent firms, no subsidiaries are registered. Start-up rates are calculated based on the labour market approach; the number of start-ups per 1'000 regional workforce.²

Cluster Analysis

To compare different regions according to their structural potential for new venture creation, and to find out about weaknesses and strengths of regions with regard to their entrepreneurial activity, cluster analysis is used. The objective of a cluster analysis is to form homogenous groups of objects which are described by a variety of characteristics (see e.g. Hair et al., 2006; Backhaus et al., 1996). Here cluster analysis is used to form several homogeneous groups of Swiss labour market regions, the MS regions, according to their individual structural potential and for comparative purposes.³

In the calculation of the clusters, first Ward's minimum-variance method is used. This technique belongs to the group of hierarchical agglomerative methods, in which every object is an individual cluster at the beginning of the algorithm. The clusters are then successively joined together into groups until only a single cluster remains. The objective of Ward's method is to join two clusters at each step, such that the *variance* for the joined clusters is minimized. In comparison to other hierarchical fusion algorithms, which use minimization of the *distance* between clusters as the fusion criterion, several simulation studies have shown that the Ward technique appears to be superior to alternative approaches and forms very homogenous clusters (Everitt et al., 2001; Backhaus et al., 1996). However, since clusters which are merged using Ward's method cannot be separated again in subsequent steps, it has been suggested that the results from the Ward technique should be corrected in an additional step, e.g. by using an optimizing clustering algorithm, which allows for a reassignment of regions (see e.g. Hair et al. 2006; Everitt et al., 2001).

² The start-up rate according to the labour market approach may be regarded as the propensity of a member of the regional workforce to start an own business. New ventures are usually located close the residence or the former workplace of the founder (Cooper & Dunkelberg 1987; Stam 2007). Thus, the number of firm founders who choose the location of their firm primarily on the basis of regional characteristics is very limited.

³ Cluster analysis is often used to find about the potential of regions. E.g. the German Sachverständigenrat zur Begutachtung der Gesamtwirtschaftlichen Entwicklung (1999) used cluster analysis to find out about regional disparities in East Germany and Kronthaler (2005) used cluster analysis to compare the economic capability of East German regions with West German regions.

A first issue when applying cluster analysis is the question whether variables used are highly correlated, since such variables tend to dominate the cluster analysis and are liable to distorting the results (Backhaus et al., 1996). In literature it is recommended that variables with a correlation coefficient $r > 0.8$ (Schmidt, 1995) or $r > 0.9$ (Backhaus et al., 1996) should be excluded. Calculation of the correlation coefficients shows that none of the variables are correlated to this extent. Another problem is the possibly different weighting of the variables due to differing unit scales. To avoid this, variables are standardized by a z-transformation (Bacher, 1996).

As mentioned above, the Ward algorithm stops when there is only one cluster left. To determine the optimal number of clusters we employ the agglomeration schedule, and the measure of homogeneity ETA^2 .

The agglomeration schedule (see Appendix) reveals increases in the distances at each step of the fusion process. As an informal test high increases in these distance levels are checked, because a high increase suggests an optimal number of clusters. Jumps in the distance levels are apparent from cluster number 25 to 24, 21 to 20, 14 to 13, 10 to 9, 9 to 8, 7 to 6, and 5 to 4. Therefore several cluster solutions are possible and it has to be decided which cluster solution is preferable. Considering the jumps more precisely one can judge that the increases from 10 to 9 and 9 to 8 are the substantial ones, for that we proceed with the 10-cluster solution. This is in line with the objective of cluster analysis to reduce complexity and to facilitate interpretation of the cluster solution. Furthermore, it is in line with the second criteria, the measure of homogeneity of the cluster solution ETA^2 . This measure describes the share of the variance which occurs between clusters. With the 10-cluster solution, ETA^2 is about 70%, meaning that most of the variance is between clusters.⁴

Finally, with the help of a non-hierarchical clustering algorithm (k-means), the selected cluster solution is optimized using the cluster seeds resulting from the Ward algorithm. In 6 iteration steps 14 regions have been reassigned improving the original solution.

To interpret the individual clusters the F-values, t-values, and mean values of the variables are used. The F-value provides information about the homogeneity of the individual groups. It is the quotient of the variance of a variable within the cluster and the variance of the variable in the population:

$$F_j^C = \frac{Var_j^C}{Var_j}. \quad (1)$$

⁴ More formal criteria to decide about cluster solution is the use of Mojena test statistics I and II (Bacher, 1996). However, both tests normally provide different results and are not really reliable. Hence, we abstain from considering the test results, which both indicate different solutions.

The smaller this quotient is, the more homogenous is the cluster. F-values smaller than one indicate homogeneous clusters (the variance of the variable j within the cluster is smaller than the variance of the variable j within the population).

The t-value is used to characterise each cluster. It is the difference between the cluster mean value of the variable j and the mean value of the variable j of the population divided by the standard deviation:

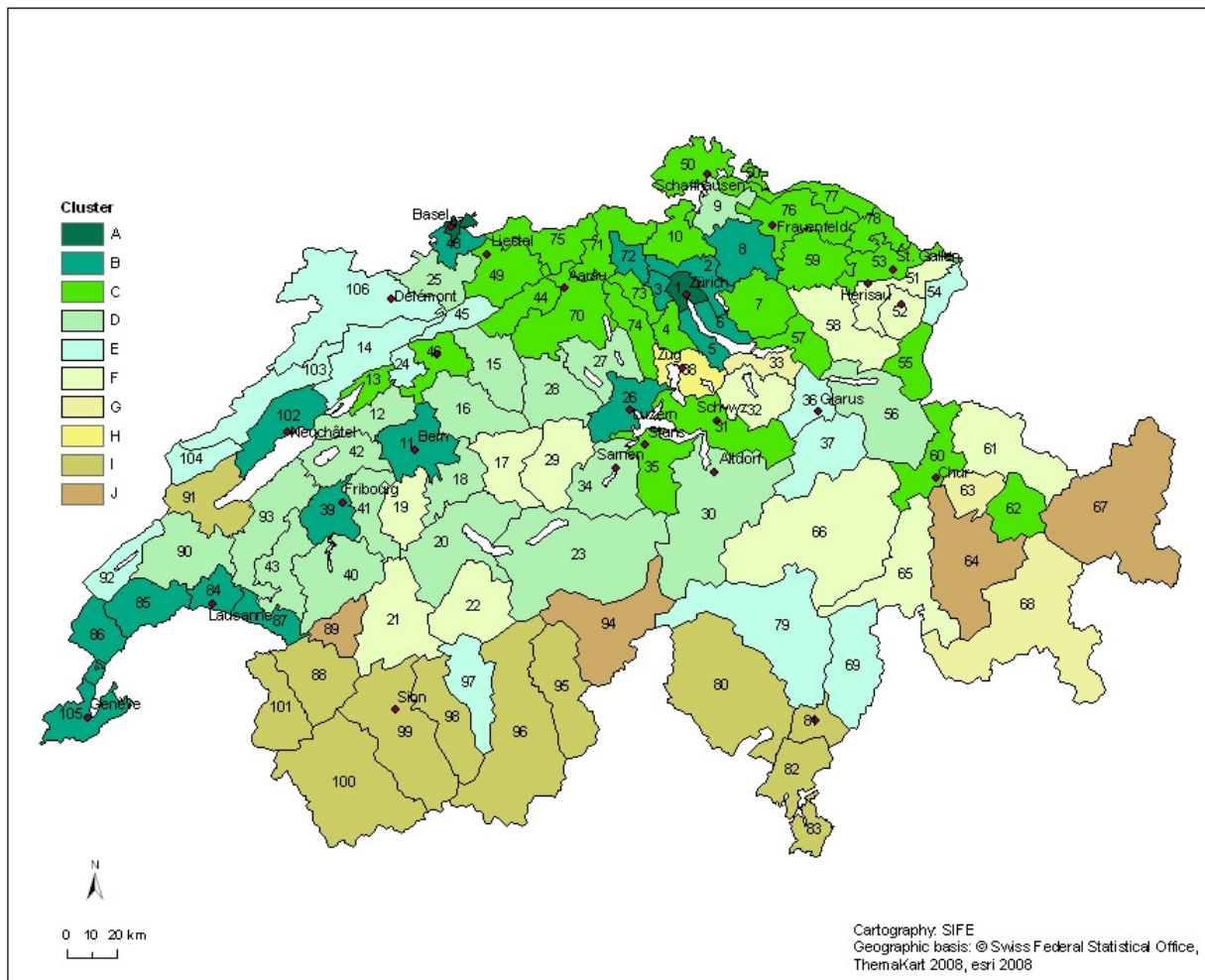
$$t_j^C = \frac{\bar{X}_j^C - \bar{X}_j}{\sqrt{\text{Var}_j}}. \quad (2)$$

Negative (positive) t-values therefore indicate that the variable j is lower (higher) than the mean of the population. In addition to the t-value, the mean value of the variable is used in the interpretation, because it provides information about the variables in their original scale.

Results

According to the discussion of the results of the cluster analysis we identify 10 clusters. The spatial distribution of the clusters is shown in Figure 1.

Figure 1: Spatial distribution of Clusters



Considering the spatial distribution of the clusters it can be seen that three clusters (cluster A, B, C) mainly consist of regions which are classified as agglomerations or urban regions in Switzerland. Cluster A is formed by the two city regions Basel and Zurich. Cluster B is characterized by agglomerations like Berne, Fribourg, Geneva, Neuchâtel, and Lausanne as well as the greater Zurich area. Cluster C mainly consists of urban regions but also includes semi-peripheral regions⁵ such as the regions Chur, Nidwalden, Frauenfeld and Aargau. The cluster group (cluster D, E, F,

⁵ Semi-peripheral regions are defined as regions which do not belong to Swiss agglomeration and urban regions but are classified as a middle-large town.

G, H, I, J) mainly consists of semi-peripheral and peripheral regions. Regarding the overall regional composition of the clusters, it can be derived that some semi-peripheral regions have a similar potential than agglomeration regions.

Considering the profiles of the cluster (see table 2), it seems to be the case that in particular in cluster A, B, G, and H the potential for venture creation is high compared to the other clusters. This result is in accordance with the start-up rates which are also above average.

Starting with cluster A and B consisting of the main agglomerations of Switzerland, it can be seen that strengths lie in population density with a high share of young and highly qualified people, high level of diversity and density in business services as well as the available labour force. Below average is the number of self-employed people which could act as role models for new venture creation. Furthermore, the share of small firms in cluster B is below average. Hence, in these two clusters the main weakness for firm formation lies in the lack of role models for venture creation. Due to this lack it might be a good policy for these regions to support entrepreneurship education at universities as well as to encourage technology transfer out of universities and research institutes in order to strengthen the regional entrepreneurship base.

Cluster G and H can be considered as outliers consisting only of a few regions. In particular cluster H consist only of the region Zug, which is also a small canton, where start-up rates are extraordinary high, with an average rate of 10.4 new firms per 1'000 work force. Both clusters have among others an economic structure focused on business services in the financial sector and feature a high share of small firms in general. Furthermore, they have nearly in all other variables values above average. The high start-up rate of cluster H can additionally be explained by a low cantonal tax rate and the closeness to Zurich. Both arguments lead to the fact that firm founders from abroad are attracted to set up their new business in this region.

Cluster C is the most interesting cluster with regard to regional policy in Switzerland. This cluster contains of 24 regions, which are not only agglomerations and urban regions but also semi-peripheral regions targeted by Swiss regional policy. Overall the potential for venture creation is lower than in the cluster discussed above but it is still above average. First, strengths lie in a high level of given labour force, young and diversified people, as well as in a high density of business services. Weaknesses can be seen, however, in a low level of self employed persons and small firms. This indicates a lack of role models for venture creation. Especially for these types of regions, universities of applied sciences can compensate for existing weaknesses. They play a major role for three reasons: First, they could provide role models through entrepreneurship education; second as higher education institutions they strengthen the regional knowledge and human capital base of the population; third, they support existing regional small and medium sized firms, and entrepreneurs with regard to their individual needs for innovation and research activities. In regions without higher education institutions, one option could be to implement entrepreneurial

support and educational activities in the curricula of secondary school and on the vocational training level.

The other clusters (D, E, F, I, J), which consist of mainly semi-peripheral regions, share some similar characteristics but still are different with regard to specific variables. Overall, the potential of venture creation with regard to the underlying variables seems to be under average. The main weaknesses seem to lie in a lower population density, a lack of business services, in the diversity index, a lack of young people, and a lack of qualified human capital. Furthermore, in most of the clusters the share of the regional workforce is below average. With relatively high shares in the manufacturing sector and a low shares in the business services one can assume that self-employment occurs mainly in the agricultural sector, the craft sector, in the personal services, and in the tourism sector. Considering the disadvantages and the advantages, it might be a good strategy for these regions to tie on the cluster specific available strength. This means for example, when there is an advantage in the availability of manufacturing firms, e.g. in a specific industry, it is probably a good strategy to focus on this industry, rather than trying to compensate for existing weaknesses. Overall, cluster analysis shows that some regions are clearly distinct with regard to their potential for venture creation according to the analyzed determinants. Consequently, based on the characteristics different strategies for individual clusters are available to strengthen the entrepreneurial potential.

		Population density	Labour force	Diversity Index	Young people of 25 to 40 years	Self employed persons	Post secondary university degree	Share of small firms	Density of manufacturing sector	Density of business services	Reporting Start-up rate 1999 - 2006
ROR	Mean value var j	374.94	0.53	0.17	0.24	0.08	0.06	40.32	10.98	9.85	2.52
Cluster A N=2	Mean value	4543.01	0.57	0.30	0.29	0.06	0.14	50.77	7.00	21.93	4.08
	t-value	6.16	1.03	1.77	2.29	-0.85	2.48	1.32	-1.83	2.69	1.37
	F-value	0.47	1.88	0.01	4.27	0.03	0.41	0.70	0.00	1.10	0.15
Cluster B N=16	Mean value	888.94	0.56	0.25	0.26	0.06	0.12	37.88	8.13	12.60	3.05
	t-value	0.76	0.66	1.06	0.84	-0.83	1.66	-0.31	-1.31	0.61	0.47
	F-value	0.48	0.46	0.85	0.58	0.30	0.85	0.11	0.18	0.28	0.21
Cluster C N=24	Mean value	346.07	0.56	0.18	0.25	0.07	0.06	38.71	10.63	10.61	2.55
	t-value	-0.04	0.55	0.15	0.11	-0.31	-0.09	-0.20	-0.16	0.17	0.03
	F-value	0.07	0.24	0.29	0.20	0.17	0.15	0.26	0.25	0.16	0.15
Cluster D N=19	Mean value	146.18	0.53	0.11	0.24	0.08	0.05	34.36	10.81	6.93	1.95
	t-value	-0.34	0.01	-0.87	0.00	0.20	-0.48	-0.75	-0.08	-0.65	-0.50
	F-value	0.01	0.28	0.24	0.24	0.21	0.12	0.22	0.23	0.06	0.09
Cluster E N=13	Mean value	123.58	0.50	0.18	0.23	0.07	0.04	38.82	13.31	6.56	2.06
	t-value	-0.37	-0.79	0.03	-0.84	-0.37	-0.67	-0.19	1.08	-0.73	-0.40
	F-value	0.03	0.48	0.36	0.33	0.16	0.07	0.26	0.18	0.15	0.20
Cluster F N=12	Mean value	63.21	0.51	0.09	0.23	0.11	0.04	40.81	13.21	7.61	1.73
	t-value	-0.46	-0.50	-1.22	-0.88	1.72	-0.90	0.06	1.03	-0.50	-0.69
	F-value	0.01	0.30	0.25	0.26	0.48	0.09	0.51	0.39	0.20	0.33
Cluster G N=3	Mean value	165.35	0.63	0.19	0.28	0.10	0.06	60.19	13.65	15.23	3.48
	t-value	-0.31	2.32	0.19	1.77	1.12	-0.23	2.51	1.23	1.20	0.84
	F-value	0.09	1.93	0.19	0.52	0.84	0.06	0.15	0.06	0.98	3.04
Cluster H N=1	Mean value	527.00	0.58	0.21	0.28	0.07	0.11	74.34	11.22	37.40	10.35
	t-value	0.22	1.25	0.51	1.95	-0.41	1.31	4.29	0.11	6.13	6.87
	F-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cluster I N=12	Mean value	159.07	0.49	0.22	0.24	0.07	0.07	41.98	9.70	9.35	2.88
	t-value	-0.32	-1.08	0.64	0.00	-0.66	0.09	0.21	-0.59	-0.11	0.32
	F-value	0.04	0.14	0.67	0.35	0.24	0.25	0.52	0.10	0.49	0.82
Cluster J N=4	Mean value	13.56	0.49	0.14	0.21	0.12	0.04	57.73	14.75	10.09	2.15
	t-value	-0.53	-1.23	-0.54	-1.63	2.00	-0.62	2.20	1.74	0.05	-0.32
	F-value	0.00	0.33	0.22	0.29	0.46	0.13	0.46	0.09	0.01	0.18

Conclusions and political recommendations

Cluster analysis has shown that in general agglomeration and urban regions have a high entrepreneurial potential compared to all other regions. But the results also indicate that several semi-peripheral regions have favorable conditions for new venture creation. A second result is, however, that almost all semi-peripheral and peripheral regions have some explicit strengths. Both results have significant implications for regional policy, particularly for entrepreneurship policy which is a relevant part of New Regional Policy (NRP) and is an instrument for territorial cohesion which aims to strengthen entrepreneurial and innovation activity of structurally weak and peripheral regions.

First, a good strategy for NRP might be to strengthen the several semi-peripheral regions which already have an entrepreneurship potential above average and can act as nucleus for the surrounding peripheral regions. Main weaknesses of these regions, however, are the lack of role models with regard to small firms and entrepreneurs. It leads to the assumption that ideas and opportunities for new business models are not fully exploited in entrepreneurial activities. These regions should strengthen their ability to transfer their already existing entrepreneurship potentials into economic value by strengthening the entrepreneurship education. Entrepreneurship education at higher education institutions has gained much importance and acknowledgement over the last years in Switzerland, but there seems to be a need to further increase these activities. Entrepreneurship education can in particular involve role models into curricula to motivate students and university employees to exploit own business opportunities.

Second with regard to weak and peripheral regions it seems to be the case that many regions have an existing small firm base and a number of entrepreneurs, particularly in the manufacturing sector. Therefore, strategies could be to support existing industrial sectors in these regions. However, given the limited financial resources the question remains whether policy should efficiently concentrate and focus on regional centers with already existing potentials.

One problem in the study is the availability of data on a highly disaggregated level. Also, further research has to be carried out on the impact of different determinants on entrepreneurship on the macro as well as on the micro level. From earlier studies it is known that both, individual and regional variables affect the decision to become self-employed. A better match of data bases on both levels should therefore be regarded as a major challenge for future research in this field.

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Appendices

A1: Indicators used in the study

Factors based on theory	Indicator name	Indicator	Source
Demand /supply side/ agglomeration economies	Population density	Number of inhabitants 2007 per km ²	Swiss Federal Statistical Office, ESPOP 2007 ^a
Demand side/agglomeration economies	Density of business services	Number of firms of the business services per 1000 inhabitants 2005	Swiss Federal Statistical Office, UDEMO 2005, ESPOP 2005
Demand side/agglomeration economies	Density of manufacturing sector	Number of firms of the manufacturing sector 2005 per 1000 inhabitants	Swiss Federal Statistical Office, UDEMO 2005, ESPOP 2005
Demand side	Share of small firms	Number of small firms (until 49 employees) per 1000 inhabitants 2005	Swiss Federal Statistical Office, UDEMO 2005 ^b , ESPOP 2005
Supply side/agglomeration economies	Labour force	Labour force 2000 per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000 ^c , ESPOP 2000
Supply side/agglomeration economies	Post-secondary university degree	Number of persons with post-secondary university degree per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000, ESPOP 2000
Supply side	Diversity Index	Number of foreign born persons per number of inhabitants 2006	Swiss Federal Statistical Office, ESPOP 2006
Supply side	Young people of 25-40 years	Number of 25-40-years old persons per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000, ESPOP 2000
Supply side	Self-employed persons	Number of self-employed persons (incl. family members) per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000, ESPOP 2000

^a ESPOP: Annual Population Statistics (*Statistik des jährlichen Bevölkerungsstandes*), - ^b UDEMO: Federal Establishment Census (*Unternehmensdemografie*), - ^c VZ: Federal Population Census (*Volkszählung*).

A2: Agglomerations schedule (Ward technique, last 35 steps)

Number of cluster	Cluster combined		Sum of squares	Distance	Increase in distance	ETA ² (%)
35	4	35	82.744	6.060	0.115	91.24%
34	20	28	85.804	6.120	0.060	90.92%
33	14	37	89.016	6.424	0.304	90.58%
32	40	96	92.380	6.728	0.304	90.22%
31	80	82	96.069	7.379	0.651	89.83%
30	67	89	99.777	7.415	0.036	89.44%
29	21	22	103.521	7.489	0.074	89.05%
28	23	69	107.390	7.736	0.247	88.64%
27	39	86	111.522	8.264	0.528	88.20%
26	24	27	115.823	8.602	0.338	87.74%
25	5	8	120.204	8.763	0.161	87.28%
24	9	20	125.399	10.389	1.625	86.73%
23	14	79	131.551	12.304	1.916	86.08%
22	4	62	137.716	12.329	0.025	85.43%
21	40	81	144.103	12.775	0.445	84.75%
20	2	5	152.216	16.227	3.452	83.89%
19	4	13	160.694	16.955	0.728	83.00%
18	21	23	169.647	17.907	0.952	82.05%
17	6	39	180.103	20.911	3.004	80.94%
16	33	63	191.945	23.683	2.772	79.69%
15	40	80	204.305	24.721	1.038	78.38%
14	2	6	216.796	24.981	0.261	77.06%
13	4	24	231.260	28.928	3.947	75.53%
12	17	21	246.863	31.207	2.279	73.88%
11	2	84	263.763	33.801	2.594	72.09%
10	1	47	281.334	35.141	1.340	70.23%
9	17	67	301.510	40.351	5.210	68.09%
8	33	38	327.522	52.024	11.673	65.34%
7	4	9	353.973	52.902	0.878	62.54%
6	14	17	388.363	68.781	15.878	58.90%
5	4	40	423.265	69.802	1.021	55.21%
4	1	2	495.382	144.235	74.433	47.58%
3	1	33	585.340	179.915	35.680	38.06%
2	4	14	691.327	211.974	32.058	26.84%
1	1	4	945.000	507.347	295.373	0.00%