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Composition of regional conditions for start-up activity- evidence based on Swiss Mobilite Spatiale regions

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Abstract

This paper analyses the driving forces behind start-up activity within Swiss regions. Based on theoretical and empirical literature on entrepreneurship, this study utilises determinants that influence entrepreneurial activity, in order to examine whether or not the regional composition of such factors contribute to the observed firm foundation rates within those regions.
A two step approach using cluster analysis and regression analysis was performed.
With the help of cluster analysis, types of regions with a specific factor endowment explaining entrepreneurship were formed. Regression analysis has been employed to determine whether these types of regions explain firm foundation rates.
The results show that different regional compositions of factors favourable for entrepreneurial activity can lead to similar firm foundation rates. This means, not only single factors influence firm foundation rates but furthermore the regional combination of factors contribute to the results.

JEL-Classification: R11, R58, L26,
Keywords: Regional Economics, Entrepreneurship, Business Formation

1. Introduction

Entrepreneurship is one of the central features of a market based economy and of economic growth. As Schumpeter (1942) pointed out in his theory of creative destruction, innovation and new firms are an important element of competition, conducive for economic growth. Following this idea, research in regional economics indicates that new businesses foster regional economic development and growth (see e.g. Audretsch et al. 2006; Fritsch and Mueller 2008). New venture creation, however, varies considerably between regions, indicating differences in the endogenous potential and structural characteristics of regions for new business formation. For this reason, understanding the determinants influencing firm formation is crucial for regional economic policy makers. It enables them to shape the conditions for new firm formation and hence new firm formation rates.

There are numerous studies on determinants of national and regional differences in entrepreneurial activity. In general, these studies focus on single determinants and their influence on venture creation, with other variables being controlled. They indicate that several factors contribute to the explanation of entrepreneurial activity in regions. For instance, population density, agglomeration economies, high shares of small firms, a specialized employment structure, and high immigration contribute to high start-up rates (Armington and Acs 2002, Bergmann and Sternberg 2007, Mueller 2006, Parker 2004, van Stel and Storey 2004, Wagner and Sternberg 2004, Verheul et al. 2001). This study tries to contribute to the existing knowledge in so far that it analyzes whether the regional composition of these determinants is important for venture creation. It focuses on the combination of underlying regional structural and (personal attribute)-related characteristics of the population of Swiss regions and its influence on firm foundation rates.

The paper uses a two step approach employing cluster analysis combined with regression analysis. Firstly, homogenous types of regions with regard to their structural potential for start-up activities are formed with the help of cluster analysis. The selection of determinants conducive for firm formation is based on the theoretical and empirical literature on entrepreneurship. Secondly, regression analysis is used to find out whether the different types of clusters with a specific composition of factors can be used to explain start-up activities.

The analysis is based on the spatial level of Swiss 'mobilité spatiale' regions (MS-regions). MS-regions are functional units based on economic interaction and commuting movements. At this level, data is available which provide information about the endogenous

entrepreneurial potential of regions. Furthermore, it is possible to distinguish between peripheral, semi-peripheral, urban regions and agglomerations.

The remainder of this article is organized as follows. In the next section, we will discuss the literature on determinants which influence entrepreneurial activity and their impact on start-up rates. The third section describes the data and the method used. Chapter four discusses the results. The last section summarises the results and presents policy recommendations.

2. Regional factors and new business formation

The literature on entrepreneurial activity can be classified into two major strands. Firstly, there are several studies focusing on individual and personal attribute-related characteristics of entrepreneurs. Secondly, literature deals with regional variation in new firm formation rates and with the underlying regional and structural conditions. Later on, both approaches are combined and start-up activity is explained by regional, structural as well as individual characteristics (Bergmann and Sternberg 2007, Mueller 2006, Wagner and Sternberg 2004). In the following the findings of these strands of literature are briefly presented. A stringent distinction between individual, person-related and regional, structural characteristics, however, is not always possible.

The first line of research examines individual and person-related factors influencing business formation. Studies found out that start-up activity is self reinforcing because existing entrepreneurs provide role models and information for regional stakeholders and potential entrepreneurs. The literature indicates that a high number of self employed persons increases entrepreneurial activity in regions (Minniti 2005, Mueller 2006). Furthermore, persons who are already self employed (serial entrepreneurs) are predestined for further start-up activities (Westhead and Wright 1998). Additionally, age is considered to be relevant for venture creation. The Global Entrepreneurship Monitor (GEM) shows that especially people in their mid-career period, between 35 and 44 years of age, become self-employed (Reynolds et al. 2002). Moreover, it has been reported that many entrepreneurs start a new venture in their mid-thirties and are typically between 25 and 40 years old, and thereafter, the level of entrepreneurial activities declines with increasing age of the population (Storey 1994, Evans and Leighton 1989). Subsequently, regions with a higher number of persons in the age class of 25-44 years demonstrably have more start-up activities than others (Reynolds et al.1999).In addition, studies show that even if there are more opportunities to become self-employed for older rather than for younger persons, older employees are less willing to become self-employed (Van Praag and van Ophem 1995). Studies concerned with

human capital found that entrepreneurship is related to education, qualification and work experience since the level of education, experience and background influences entrepreneurial success (Evans and Leighton 1989). There is a positive relationship between the duration of professional education and training and the probability of starting a company. This indicates a higher ability to recognize business opportunities. Additionally, Hinz (1998) points out that those individuals with a graduate degree are more inclined towards entrepreneurship and are thus more likely to start a company, particularly in knowledge intensive industries. Another factor indicated in the literature is that immigrants are more likely to be entrepreneurs than the local inhabitants (Reynolds et al. 1995, Saxenian 1999). In particular, there are two groups of immigrants. The first one consists of immigrants with a lack of skills, resources and networks. They tend to be, however, more self-employed than non-immigrants because, when looking for a job, they face the problem of barriers, such as language, lack of integration and discrimination. The second group consists of highly educated and skilled immigrants who are 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. People from different backgrounds foster diversity and creativity, which leads to a high level of innovative activity and new businesses (Lee et al. 2004). Furthermore, specific character traits, like entrepreneurial farsightedness, ambition, adaptation and flexibility as well as tenacity foster entrepreneurial activity (Blanchflower and Oswald 1990).

The second strand of literature deals with factors at a regional level influencing differences in start-up activities. Studies highlight that the company size and internal structure within regional industry seems to be important. Small firms appear to be more capable of responding to changing market needs for new and specialized products and services due to a more flexible market approach (Loveman et al. 1991). Small scale activity fosters regional competition and contributes to higher start-up rates (Fotopoulos and Spence 1999). In addition, there is a negative relationship between the employee numbers within firms and the probability that an employee starts their own business. The reason is that small firms act as role models. Furthermore, more favourable conditions in large firms discourage employees from the prospect of resigning from their jobs and becoming self-employed (Storey 1994, Wagner 2004). Additionally, technological and structural transformation leads to opportunities for venture creation. Economic development and structural change comes along with individualized, diversified consumer preferences for new, specialized and differentiated goods and services. This offers numerous entrepreneurial opportunities for new entrepreneurs in market niches (Armington and Acs 2002). The structural change from the manufacturing sector towards the service industry is considered to have a positive impact on firm formation.

The service sector is characterised by low start-up costs and a small size structure which make venture creation more likely and a more attractive prospect, due to smaller start-up requirements and lower entry barriers (e.g. Fritsch 1997). Hence, a smaller share of manufacturing firms also has a positive impact on the number of new firms being created (Reynolds et al. 1995). Population density is another factor found to be important. It 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 and Mueller 2008). The establishment of new business activities in these regions signals potential and attracts other businesses because of cooperation opportunities and spill over effects (Audretsch and Fritsch 1994). Population density is closely related to urbanization and localization economies. Both belong to the broader concept of agglomeration economies dating back to Marshall (1920). The difference between urbanization and localization economies is that the former arise for spatially concentrated firms irrespective of their industry. The latter refers to benefits for spatially concentrated firms of the same industry (Hoover 1948). With regard to entrepreneurship there is empirical evidence that urbanization economies have a positive impact on the new firm formation rate (Armington and Acs 2002, Reynolds et al. 1994). Urbanization economies 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 to start new business activities. Localisation economies show a similar linkage to that of urbanization economies with respect to entrepreneurship. Knowledge spill over supports firms in reducing uncertainty which is in particular associated with dealing with innovation activities. Furthermore, industry clusters foster competition and force new firms to launch their new products on the market, thereby generating an auspicious business environment, resulting in a potential fund of available knowledge and a general reduction in costs. This in turn leads to start-up business ventures being attracted to regions where industry clusters already exist (Audretsch et al. 2008). In this strand of literature also unemployment is considered. However, the discussion is ambiguous since the linkage between unemployment and entrepreneurial activity is not conclusive (compare Parker 2004, Bergmann and Sternberg 2007). On the one hand, unemployment reduces the opportunity of paid-employment and offers the option of becoming self-employed, in particular when there is a shortage of alternative job opportunities. On the other hand, high unemployment

rates lower the demand for products and services. Subsequently, the income and available capital for entrepreneurs are reduced and the risk of bankruptcy increases.

Based on this literature, variables selected for this study include population density, economic structure, firm size structure, self-employment, labour force, human capital, diversity and age structure of the population. This selection is not exhaustive, e.g. there are further potential links between entrepreneurship and institutional factors or cultural attitudes. However, due to limitations in obtaining available data at the regional level we have to abstain from introducing these concepts.

3. Data and method

In order to examine more closely the composition of variables explaining firm formation in Switzerland, the spatial level of Swiss mobilité spatiale regions (MS-regions) is used. MS-regions are functional units based on economic interaction and geographical mobility of labour workforce. Switzerland is divided in 106 MS-regions. At this regional level, several pieces of data useful for the study are available. In comparison to the more aggregated level of the 26 Swiss cantons, however, the information available is somewhat limited. The advantage using MS-regions, is a more disaggregated level which is needed for this study. MS-regions are further classified as agglomerations, urban, and peripheral regions. Additionally, we distinguish the category of semi-peripheral regions for the aim of this paper. Regions are classified as semi-peripheral when they belong to peripheral regions but a middle-large town is located within the region. Otherwise they are classified as peripheral regions. In the following the indicators employed in the study are briefly presented.

Start-up rate

The start-up rate shows the effective firm formation activity within the regions considered. The data on start-ups is derived from the Swiss Federal Statistical Office. In 1999 they started to develop a new database called UDEMO, a Federal Establishment Census, which has been developed to analyze firm foundation activity in Switzerland (see appendix table A2 for a short description of data). The database comprises information about authentic newly founded independent firms of the secondary and tertiary sector. Subsidiaries and public institutions are not registered. Since regions are structurally different, absolute figures are standardized based on the labour market approach; by dividing the absolute number of firm formation, which is the average number of new firms 1999-2006, by the regional labour force (per 1'000). The labour force is defined as the economically active population as well

as the dependent population. In this way, the endogenous potential of regions, namely the potential founders, is taken into account.

In contrast to the start-up rate all other variables are proxies for determinants influencing firm formation activity in regions. The data also came from the Swiss Federal Statistical Office and are taken from the Annual Population Statistics, the Federal Establishment Census and the Federal Population Census, which is updated every 10 years.

Population density

Population density is considered as a determinant which influences start-up activity in regions. Furthermore, this determinant is shown to exhibit a significant correlation with a number of factors such as purchasing power, business infrastructure, market proximity, access to innovative products and quality of communication infrastructure, etc. and stands for specialised and individualised consumer preferences. A high population density indicates a high regional potential for entrepreneurship. The variable can be regarded as a "catch-all indicator". It is defined as the number of population per square kilometre.

Density of business services

Density of business services can be considered as a proxy for structural change and economic progress towards a service economy. A high value stands for high potential for entrepreneurial activity because the service sector shows a high rate of venture creation, due to its characteristics, e.g. low entry barriers. It is defined as the ratio of the number of firms in the service sector divided by 1'000 inhabitants.

Density of manufacturing sector

The density of the manufacturing sector is used in the study. The linkage of this indicator to entrepreneurship is ambiguous. Firstly, a high manufacturing density indicates a low economic level of development and it can be assumed that it influences entrepreneurial activity negatively. Secondly, it can be considered as an indicator for localization economies if a regional concentration of a specific industry exists. If this is the case a high industry share indicates a high potential for venture creation. As two interpretations are possible this indicator has to be used carefully. It is defined as the ratio of the number of firms in the manufacturing sector divided by 1'000 inhabitants.

Share of small firms

Firstly, the share of small firms can be considered as a further indicator of structural change and flexible specialisation. Secondly, small firms serve as role models for other potential entrepreneurs. Hence, a high density of small firms is supposed to have a positive impact on

new firm formation. It is measured by the proportion of the number of small firms relative to the total number of a regional population.

Labour force

Labour force is a selected indicator for the availability of new entrepreneurs and future employees for new and young firms. It is defined as the ratio of available work force per inhabitants.

Graduates

A further indicator employed is the number of persons with a graduate degree. It serves as a proxy for high qualification since there is a positive relationship between education and entrepreneurial activity. It includes not only university degrees but also a practical skills based educational background too. This background plays an important role for the probability of starting a company. Besides graduates with degrees from Universities, also graduates from colleges 'Höhere Fachschulen', which are institutes which advocate more practically oriented or applied skills, are included. The indicator is defined as the number of inhabitants with a graduate degree compared to the total number of inhabitants.

Diversity index

The share of immigrants in a region is expressed by the diversity index. It is the proportion of foreign born persons in a region relative to the total number of inhabitants. A high value indicates a large potential for venture creation because both well and low qualified foreigners have a high probability to create or become involved in a potential new business venture.

Young and qualified people

Young highly qualified people are used as a further determinant influencing entrepreneurship. The point is that many entrepreneurs start their new business venture typically between 25 and 40 years. Hence, the proportion within this age group in relation to the total number of inhabitants was chosen as a representative factor.

Self employed persons

The last indicator chosen is the number of self employed persons. On the one hand, self employed persons act as role models for potential entrepreneurs. On the other hand, self employed persons are likely to be serial entrepreneurs. This indicator is defined as the number of self employed persons per number of the regional population. The following table (table 1) gives a brief summary of variables used.

Table 1. Summary statistics of variables used in cluster analysis

Indicator name	Mean	Standard deviation	Minimum	Maximum
Start_Up	2.5	1.1	0.9	10.3
Pop_Den	374.938	676.738	7.865	5006.135
Business_Den	9.849	9.689	3.825	37.400
Manu_Den	10.978	2.168	6.889	15.638
Small_Firms	40.316	7.924	29.109	74.341
Labour_Force	0.534	0.039	0.449	0.699
Grad_Deg	0.064	0.032	0.021	0.171
Div_Ind	0.174	0.069	0.034	0.373
Young_People	0.244	0.019	0.197	0.327
Self_Empl	0.079	0.018	0.050	0.133

To investigate whether the composition of regional conditions influence firm foundation we use a two step approach using cluster analysis und regression analysis.

In a first step, cluster analysis is employed to form homogenous groups with regard to the variables explaining entrepreneurship. This enables us to form groups of regions which have similar endowments with the aforementioned characteristics (see e.g. Backhaus et al. 2009, Hair et al. 2006, Everitt et al. 2001). In particular, Ward's minimum variance method is used to form cluster according to the characteristics which influence start-up rates. Additionally, with k-means an optimizing algorithm is used to optimize the result generated by Ward's minimum method. Altogether, 10 clusters with a similar endowment of variables explaining firm foundation rates are identified with the help of cluster analysis (for a description of the clusters see appendix figure A1 and table A1).[1]

[1] Ward's minimum-variance method 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. To determine the optimal number of clusters we employed the agglomeration schedule, and the measure of homogeneity ETA2. The agglomeration schedule reveals increases in the distances at each step of the fusion process. It indicates that the 10-cluster solution would be appropriate. With this solution ETA2 is about 70%, meaning that most of the variance is between clusters as it should be. Afterwards the cluster solution is optimized using a non-hierarchical clustering algorithm (k-means). 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 (see Appendix

In a second step, this classification of regions has been utilised to estimate a regression model using OLS. The classification of regions serves as independent variable explaining our dependent variable, the start-up rate. In the regression model our classification of regions is transformed in a set of dummy variables, whereby each dummy variable represents a cluster, i.e. a type of region in which we have a specific combination of endowments with determinants explaining firm foundation. Then the regression model is estimated leaving out each time a dummy variable which acts as reference category. This allows us to have deeper insights with regard to the combination of determinants explaining venture creation. The following formula shows the regression model using cluster A as reference category.

$$Start\_Up_i = \beta_0 + \beta_1 Cl\_B + \beta_2 Cl\_C + \beta_3 Cl\_D + \beta_4 Cl\_E + \beta_5 Cl\_F + \beta_6 Cl\_G + \beta_7 Cl\_H + \beta_8 Cl\_I + \beta_9 Cl\_J + u_i \quad (1)$$

Table A1). The F-value provides information about the homogeneity of the individual groups. 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 characterize each cluster. Negative (positive) t-values 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. For a detailed description of the cluster analysis performed see Becker et al. (2010/forthcoming).

4. Empirical results

Table 2 displays the estimation results. As can be seen the models are highly significant and explain a large part of the variation in the data. Altogether around 64% of the variation in the data is explained by the regression models.

Table 2. Estimation results (Dependent variable: Average start up rate 1999-2006)

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10
Cl_A		1.03*	1.53**	2.14***	2.02***	2.35***	0.60	-6.26***	1.20**	1.93**
Cl_B	-1.03*		0.50**	1.11***	0.99***	1.32***	-0.43	-7.29***	0.17	0.90**
Cl_C	-1.53**	-0.50**		0.61**	0.49**	0.82**	-0.93**	-7.79***	-0.33	0.40
Cl_D	-2.14***	-1.11***	-0.61**		-0.11	0.22	-1.53**	-8.40***	-0.93***	-0.21
Cl_E	-2.02***	-0.99***	-0.50**	0.11		0.33	-1.42**	-8.28***	-0.82**	-0.09
Cl_F	-2.35***	-1.32***	-0.82**	-0.22	-0.33		-1.75***	-8.61***	-1.15***	-0.42
Cl_G	-0.60	0.43	0.93**	1.53**	1.42**	1.75***		-6.86***	0.60	1.33**
Cl_H	6.26***	7.29***	7.79***	8.40***	8.28***	8.61***	6.86***		7.47***	8.19***
Cl_I	-1.20**	-0.17	0.33	0.93***	0.82**	1.15***	-0.60	-7.47***		0.73*
Cl_J	-1.93**	-0.90**	-0.40	0.21	0.09	0.42	-1.33**	-8.19***	-0.73*	
Constant	4.08***	3.054***	2.55***	1.95***	2.06***	1.73***	3.48***	10.35***	2.88***	2.15***
No. obs.	106									
Adj.R²	0.64									
F-value	21.4***									

Firstly, the results in table 2 show that clusters with high potential for entrepreneurial activity have high start-up rates (see table A1 and table 2). Secondly, regions with different potentials can have similar start-up rates. The following interpretation of the results concentrates on the second aspect; it specifically focuses on non-significant clusters with regard to the reference cluster. This is rather atypical when interpreting regression results. However, it allows us to answer the question whether or not a different combination of regional endowments, with determinants explaining firm foundation, can lead to the same firm foundation rate. Furthermore, not every single result of our regression models is discussed. The results chosen to give a view of this model, show that a completely different combination of variables explaining firm foundation rates can lead to the same outcome, i.e. non-significant different firm foundation rates.

Table 3. Comparison of selected clusters with similar start-up rates but different endowments (compare appendix table A1)

Variables	Model 1		Model 2		Model 3	
	Cl_A	Cl_G	Cl_B	Cl_I	Cl_C	Cl_J
Pop_Den	++	-	+	-	+ -	-
Labour_Force	na	na	+	- -	+	- -
Div_Ind	++	+	++	+	+	-
Young_People	na	++	+	+ -	+	- -
Self_Empl	-	++	-	-	-	++
Grad_Deg	++	-	++	+ -	+ -	-
Small_Firms	++	++	-	+	-	++
Manu_Den	++	- -	++	+	+	- -
Business_Den	++	++	+	-	+	+ -

In model 1 cluster A acts as reference category. It is the cluster with the highest potential for start-up activity (see Table A1). In fact it can be seen that it has a higher start-up rate compared to most of the other clusters except of cluster G. Empirically cluster A and cluster G have similar high start-up rates. However, their potential for entrepreneurship with regard to the variables included is generally high, but in relation to specific factors different (see table 3 as well as appendix figure A1 and table A1). Differences occur especially with regard to population density, self employed and qualified people, and density of manufacturing firms. While, e.g. cluster A consists of Zürich and Basel, two main agglomerations of Switzerland; cluster G comprises only peripheral regions, like St. Moritz/Oberengadin. Furthermore, cluster A has a lack of self-employed people acting as role models contrary to cluster G. In addition to this cluster A has a lot of qualified people, which is the opposite to that found in cluster G. The last difference refers to the manufacturing sector. Whilst in cluster G the density of manufacturing firms is high, it is however low in cluster A.

In the literature it has been widely reported that a high density of manufacturing firms influences start-up rates negatively. It may be that this is not valid for all regions, since an existing manufacturing cluster can have positive effects on firm formation, as it is pointed out in the cluster theory of Porter (Porter 1990 & 1998). In general, it seems to be the case that different endowment parameters can lead to the same start-up rate.

The reference category in model 2 is cluster B, which indicates an overall high potential for entrepreneurial activity and shows a high start-up rate. Cluster I has a similar start-up rate. In comparison to the example shown above where both clusters have a high but different

potential for venture creation, cluster B and I differ in terms of determinants as well as with regard to the overall potential. While in cluster B the overall potential seems to be quite good, it is lower in cluster I. Main differences lie in population density, labour force, qualified persons, small businesses, and in the density of business services. Mostly, variables of cluster B show higher values than variables of cluster I, except of small businesses where cluster I has an advantage. It seems to be the case that some determinants can have a large influence on the start-up rate in a specific combination. In cluster I the combination and perhaps interrelationship between the manufacturing firms, business size together with a favourable diversity mix form an environment conducive to business development.

In model 3 the reference category is cluster C. Cluster C and J are characterized by similar medium start-up rates. With regard to their potential they differ substantially. Overall the potential for venture creation is medium to high in cluster C but low in cluster J. Differences exist in nearly all variables. Exceptions are population density, qualified people, and density of business services. In these variables the clusters are more or less similar. On the one hand, in cluster C the determinants, labour force, diversity, young people and density of manufacturing sector show a higher potential for entrepreneurial activity. On the other hand cluster J performs better in the variable self-employed and small businesses. One explanation could be that the combination in cluster C is not optimal although the potential in the respective variables is quite good. However, cluster G has low potential but still, the factor combination works well, which is expressed by relatively high start-up rates, similar to cluster C.

These are only three selected cases from many. Table 2 shows further examples with clusters having similar start-up rates but with different endowments, e.g. in model 4 cluster D, E, J. In model 5 cases are E, F, and J, and so on. All in all, our empirical results indicate that not only the endowment with single characteristics favour entrepreneurial activity. Rather it seems to be the case that the combination of factors is important for firm formation.

5. Conclusions

The paper has analysed whether different combinations of determinants for new venture creation in regions can lead to similar start-up rates. The literature so far discussed several factors which are relevant for venture creation. These include person-related and regional, structural determinants. For instance, studies show that creativity is favourable for venture creation (e.g. Lee et al. 2004) and that human capital plays a role (e.g. Evans and Leighton 1989). Other variables important for venture creation are e.g. the age structure (e.g. Reynolds et al. 2002), role models (e.g. Minniti 2005), character traits of persons (Blanchflower and Oswald 1990), the size structure of firms (e.g. Wagner 2004), the structural change (e.g. Armington and Acs 2002) and agglomeration economies (e.g. Audretsch et al. 2008). The findings of these studies may have implications for policy makers, in that they have the opportunity to influence single factors and in doing so could increase the dynamics of entrepreneurial activity in their region.

However, the results of our study indicate that it is probably not that easy. This study has shown that completely different regional combinations of factors can lead to similar high or low start-up rates. Hence, not just one single factor in isolation has the ability to influence start-up rates but rather it is the combination and interrelationship of the various parameters which is important. Policy makers should not only take into consideration single factors; rather they should focus on a region specific set of determinants. Furthermore, other regions cannot easily be used as a benchmark. Each region has to incorporate within regional policy planning its own specific combination of factors conducive to venture creation.

The main purpose of this study is not to establish a formula for the determination of which combinations of factors can lead to high start-up rates; but rather to indicate that specific factor combinations would be particularly favourable for start-up activity. The main limitation of the study is that it is not able to point out in advance, which combinations of factors can lead to high start-up rates. This study just gives examples of factor combinations favourable for start-up activity. Each region is characterized by specific strengths and weaknesses regarding their factor combination and consequently, policy makers have to analyse by a trial and error approach which factor combination is relevant for their own region. Further research should concentrate on this particular issue.

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Appendix

Figure A1: Spatial distribution of clusters

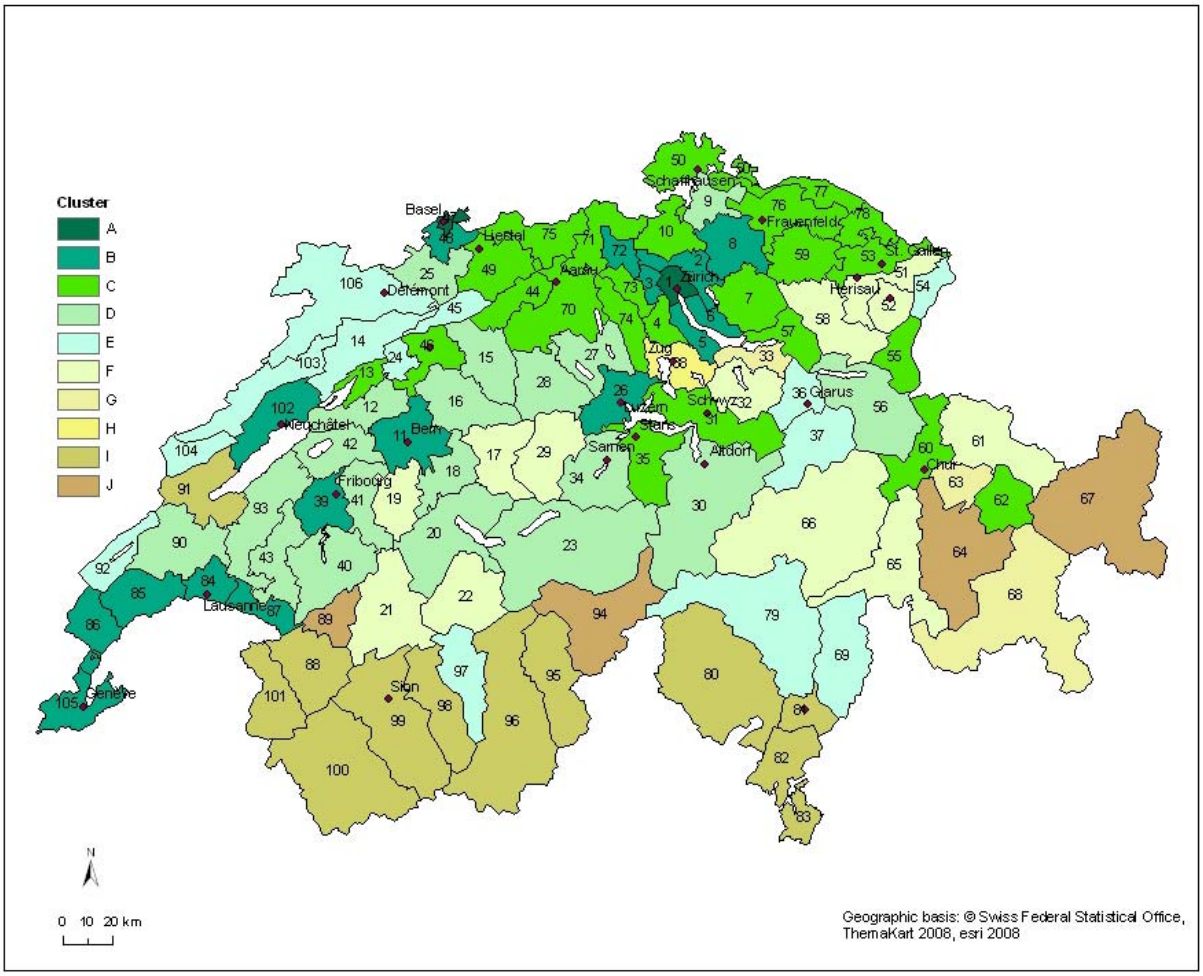

Table A1: Characteristic profile of clusters

		Pop_Den	Labour_Force	Div_Ind	Young_People	Self_Empl	Grad_Deg	Small_Firms	Manu_Den	Business_Den
ROR	Mean value var j	374.94	0.53	0.17	0.24	0.08	0.06	40.32	10.98	9.85
Cluster A N=2	Mean value	4543.01	0.57	0.30	0.29	0.06	0.14	50.77	7.00	21.93
	t-value	6.16	1.03	1.77	2.29	-0.85	2.48	1.32	-1.83	2.69
	F-value	0.47	1.88	0.01	4.27	0.03	0.41	0.70	0.00	1.10
Cluster B N=16	Mean value	888.94	0.56	0.25	0.26	0.06	0.12	37.88	8.13	12.60
	t-value	0.76	0.66	1.06	0.84	-0.83	1.66	-0.31	-1.31	0.61
	F-value	0.48	0.46	0.85	0.58	0.30	0.85	0.11	0.18	0.28
Cluster C N=24	Mean value	346.07	0.56	0.18	0.25	0.07	0.06	38.71	10.63	10.61
	t-value	-0.04	0.55	0.15	0.11	-0.31	-0.09	-0.20	-0.16	0.17
	F-value	0.07	0.24	0.29	0.20	0.17	0.15	0.26	0.25	0.16
Cluster D N=19	Mean value	146.18	0.53	0.11	0.24	0.08	0.05	34.36	10.81	6.93
	t-value	-0.34	0.01	-0.87	0.00	0.20	-0.48	-0.75	-0.08	-0.65
	F-value	0.01	0.28	0.24	0.24	0.21	0.12	0.22	0.23	0.06
Cluster E N=13	Mean value	123.58	0.50	0.18	0.23	0.07	0.04	38.82	13.31	6.56
	t-value	-0.37	-0.79	0.03	-0.84	-0.37	-0.67	-0.19	1.08	-0.73
	F-value	0.03	0.48	0.36	0.33	0.16	0.07	0.26	0.18	0.15
Cluster F N=12	Mean value	63.21	0.51	0.09	0.23	0.11	0.04	40.81	13.21	7.61
	t-value	-0.46	-0.50	-1.22	-0.88	1.72	-0.90	0.06	1.03	-0.50
	F-value	0.01	0.30	0.25	0.26	0.48	0.09	0.51	0.39	0.20
Cluster G N=3	Mean value	165.35	0.63	0.19	0.28	0.10	0.06	60.19	13.65	15.23
	t-value	-0.31	2.32	0.19	1.77	1.12	-0.23	2.51	1.23	1.20
	F-value	0.09	1.93	0.19	0.52	0.84	0.06	0.15	0.06	0.98
Cluster H N=1	Mean value	527.00	0.58	0.21	0.28	0.07	0.11	74.34	11.22	37.40
	t-value	0.22	1.25	0.51	1.95	-0.41	1.31	4.29	0.11	6.13
	F-value	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
	t-value	-0.32	-1.08	0.64	0.00	-0.66	0.09	0.21	-0.59	-0.11
	F-value	0.04	0.14	0.67	0.35	0.24	0.25	0.52	0.10	0.49
Cluster J N=4	Mean value	13.56	0.49	0.14	0.21	0.12	0.04	57.73	14.75	10.09
	t-value	-0.53	-1.23	-0.54	-1.63	2.00	-0.62	2.20	1.74	0.05
	F-value	0.00	0.33	0.22	0.29	0.46	0.13	0.46	0.09	0.01

Table A2: Indicators used in the study

Indicator	Abbreviation	Indicator	Source
Start-up rate	Start_Up	Average number of new firms1999-2006 per 1000 workers	Swiss Federal Statistical Office, UDEMO 2005
Population density	Pop_Den	Number of inhabitants 2007 per km2	Swiss Federal Statistical Office, ESPOP 2007[a]
Density of business services	Business_Den	Number of firms of the business services per 1000 inhabitants 2005	Swiss Federal Statistical Office, UDEMO 2005[b], ESPOP 2005
Density of manufacturing sector	Manu_Den	Number of firms of the manufacturing sector 2005 per 1000 inhabitants	Swiss Federal Statistical Office, UDEMO 2005, ESPOP 2005
Share of small firms	Small_Firms	Number of small firms (until 49 employees) per 1000 inhabitants 2005	Swiss Federal Statistical Office, UDEMO 2005, ESPOP 2005
Labour force	Labour_Force	Labour force 2000 per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000[c], ESPOP 2000
Graduate degree	Grad_Deg	Number of persons with graduate degree per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000, ESPOP 2000
Diversity Index	Div_Ind	Number of foreign born persons per number of inhabitants 2006	Swiss Federal Statistical Office, ESPOP 2006
Young people between the ages of 25-40 years	Young_People	Number of 25-40-years old persons per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000, ESPOP 2000
Self-employed persons	Self_Empl	Number of self-employed persons (incl. family members) per number of inhabitants 2000	Swiss Federal Statistical Office, VZ 2000, ESPOP 2000