



# Where are the entrepreneurs when we need them?

**Christian Reiner and Helmut Gassler**

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## Abstract

**English:** Austria and other European countries try to increase the level of entrepreneurial activities in order to create jobs and income. Unemployment and other economic and social problems are not evenly distributed in space. Are entrepreneurial activities located where these problems are concentrated? The aim of this contribution is to establish stylized empirical facts about regional entrepreneurial activity in Austria. The methodology rests upon spatial explorative data analysis. In particular, methods of bivariate analysis, spatial statistics and cluster analysis are applied. A general decline in entrepreneurial activities in the last decade, a stable pattern of the spatial distribution of new ventures and high-growth firms, mixed outcomes in terms of the relationship between employment dynamics and entrepreneurship as well as a high concentration of high-quality new-firm formation are the main results. Overall, our empirical findings point to a number of relatively robust stylized facts that question whether entrepreneurship may deliver all the proposed miracles that policy-makers hope for.

**German:** Österreich und andere europäische Staaten versuchen durch eine Steigerung unternehmerischer Aktivitäten Arbeitsplätze und Einkommen zu generieren. Die österreichische Wirtschaftspolitik hat sich hierzu eine Reihe von sehr ambitionierten Zielen gesetzt. Die Frage ist, ob Unternehmensgründungen oder rasch wachsende Unternehmen tatsächlich in der Lage sind, ökonomische und soziale Probleme im von der Politik versprochenen Ausmaß zu lösen. Um diese Frage näher zu untersuchen, wird in der Studie ein statistisch-explorativer Ansatz gewählt, der darauf abzielt, stilisierte Fakten der regionalen Entrepreneurship-Aktivitäten in Österreich zu identifizieren. Es zeigt sich dabei unter anderem eine hohe und dauerhafte regionale Disparität von Unternehmensgründungen und rasch wachsenden Unternehmen. Strukturschwache Regionen gehören tendenziell gerade nicht zu jenen Standorten, die besonders dynamische Gründungs- und Wachstumsprozesse realisieren können.

**Keywords:** spatial explorative data analysis, entrepreneurial activities, unemployment, venture capital, spatial concentration

## Table of Contents

1	Introduction .....	3
2	Theory, methodology and data .....	5
3	Spatial patterns of entrepreneurship .....	7
4	Clusters of entrepreneurship .....	12
5	Entrepreneurial activities and unemployment dynamics.....	14
6	VC-firms and the spatial concentration of entrepreneurial activities .....	18
7	Conclusions .....	21
8	References .....	22

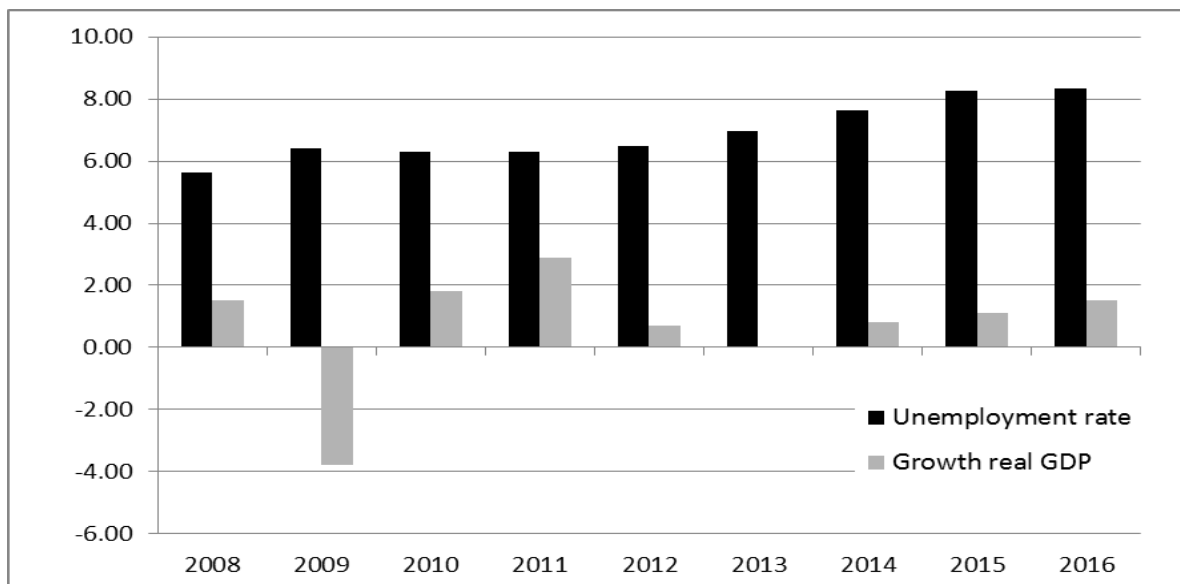
## List of Tables and Figures

Figure 1; Unemployment rate and real GDP growth in%, Austria, 2008-2016 (national statistics) .....	3
Figure 2: The nexus between regional economic context and entrepreneurship .....	6
Figure 3: New ventures as % of existing firms (entry rate) (2004-2012) .....	8
Figure 4: How new-firm formation contributes to .....	14
Figure 5: The relationship between the level of the unemployment rate and entrepreneurship .....	16
Figure 6: The relationship between the change of the unemployment rate and entrepreneurship .....	17
Figure 7: Locations of VC-funded startups (stock 2015).....	19
Table 1: The 5 regions with highest and lowest entry rates .....	9
Table 2: The 5 regions with the highest and lowest share of fast growing enterprises .....	10
Table 3: Analysis of spatial autocorrelation .....	10
Table 4: Regions with similar entrepreneurial dynamics .....	13
Table 5: Share, concentration and spatial disparity GDP, new ventures, high growth firms, venture capital (VC) financed firms and gross expenditures on R&D (GERD) .....	20

# 1 Introduction

The economies of the European Union suffer from a protracted period of sluggish economic growth and hence, high unemployment rates. According to Figure 1, the Austrian unemployment rate began to rise in the years after the Great Recession and plateaued at 8.3%, which is the second highest value after the end of World War II.<sup>1</sup> Even though entrepreneurship already figured high on the agenda of economic policy-makers before the Great Recession, the dire economic circumstances increased the importance of the topic as a proposed strategy to economic renewal. Disappointing rates of economic growth (see Figure 1) have also elevated the need to take growth policy measures, and fostering innovation-intensive entrepreneurship is one of the instruments in that regard. Almost no statement on economic policy excludes references to the need to increase startup activities and entrepreneurship in general. Indeed, Austria strives to become the location with the best framework conditions for entrepreneurs in Europe (“Gründerfreundlichstes Land Europas”) (BMWF, 2015). International comparison reveals a rather low level of entrepreneurial activity in Austria with respect to entry rates of new firms and the share of high-growth enterprises. At the same time, the survival rate of young firms is relatively high (Keuschnigg et al., 2014, p.103).

Figure 1; Unemployment rate and real GDP growth in%, Austria, 2008-2016 (national statistics)



Source: AMS, Statistik Austria

<sup>1</sup> The maximum was 8.7% in 1953.

The aim of this contribution is to establish stylized empirical facts about regional entrepreneurial activity in Austria. The spatial economic research focus is relevant because entrepreneurial activities are to a large extent a ‘regional event’ (Feldman, 2001). Our research questions address the intensity, quality and effects of regional entrepreneurship in Austria: (a) Are there systemic differences in entrepreneurship between Austrian regions and what factors may determine such differences? (b) Is there any indication of spatial clustering of entrepreneurship? (c) Is it possible to group the Austrian regions into different types of entrepreneurial regimes? (d) What is the statistical relationship between entrepreneurial activity and unemployment? (e) Where are VC-funded startup firms located and what are the potential consequences of these locational choices?

The rest of the paper is structured as follows: The next section provides a simple theoretical framework and information about the methodology and the data. Section 3 investigates the spatial patterns of entrepreneurship in Austria. A cluster analysis is presented in section 4 to identify clusters of entrepreneurship in Austria. In the fifth section we ask whether entrepreneurship can be considered to be an activity that adds new additional jobs and whether it is more intense in regions with problems of high unemployment rates. Section 6 analyses the spatial distribution of VC-funded firms. The final section summarizes the main results and draws policy conclusions.



## 2 Theory, methodology and data

A generally accepted and clear-cut definition of entrepreneurship (Hindle, 2010, p. 602) still does not exist. We follow Plummer and Pe'er (2010, p. 522) and refer to entrepreneurship as a “competitive process by which perceived profitable opportunities are discovered and exploited by alert individuals and the new organizations that emerge, grow, prosper, or fail as a result.” Hence, new ventures as well as growth processes of firms are considered important outcomes of entrepreneurship. In the following, we analyse these two characteristics of entrepreneurship by considering statistics on firm formation and high-growth firms. Business demography statistics provided by Statistik Austria are used for both variables.<sup>2</sup> The entry rate is defined as number of new firms as percentage of all existing firms (includes only firms whose revenue is greater than €10,000 or firms that have at least one employee).<sup>3</sup> A high-growth enterprise (growth by 10 % or more) is an enterprise with average annualised growth in number of employees greater than 10 % per year over a three-year period ( $t - 3$  to  $t$ ) and having at least 10 employees in the beginning of the growth ( $t - 3$ ). The share of growth firms refers to the number of high-growth firm divided by all firms with more than ten employees.<sup>4</sup>

Focusing on the regional level can be justified by two reasons. Firstly, most entrepreneurial businesses operate predominantly on a regional market. Secondly, larger countries are characterized by substantial variations in regional economic structures which lead to a vast variation on entrepreneurial contexts.

The relationship between entrepreneurial activities and the region as a subnational spatial entity is illustrated by Figure 2. Basically, it proposes a circular relationship between the entrepreneurial process on the individual level and the region. The latter may be characterized by variables such as economic structure, human capital endowment, presence of financial institutions such as banks or venture capital funds, social norms or regional public policies. On the one hand, new ventures may trigger a process of creative destruction within

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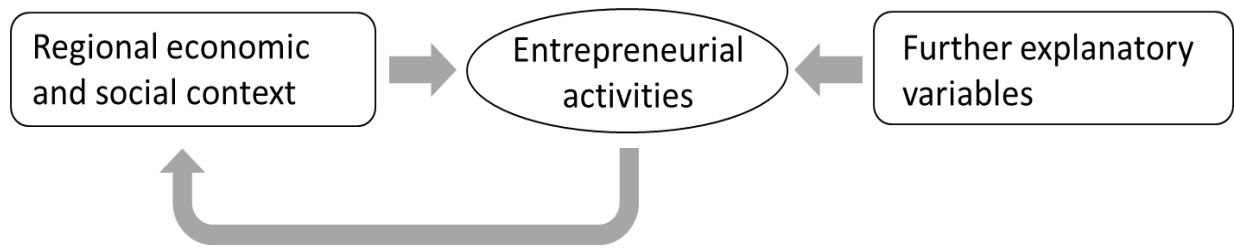
<sup>2</sup> We used the data sets “Unternehmensdemografie (bis 2014)” and “Schnellwachsende Unternehmen (bis 2014)“. Statistics on business demography and high-growth enterprises for the years after 2014 employ somewhat different definitions.

<sup>3</sup>[https://www.statistik.at/web\\_de/statistiken/wirtschaft/unternehmen\\_arbeitsstaetten/unternehmensdemografie\\_bis\\_2014/index.html](https://www.statistik.at/web_de/statistiken/wirtschaft/unternehmen_arbeitsstaetten/unternehmensdemografie_bis_2014/index.html) [20.11.2017].

<sup>4</sup>[https://www.statistik.at/web\\_de/statistiken/wirtschaft/unternehmen\\_arbeitsstaetten/schnellwachsende\\_unternehmen\\_bis\\_2014/index.html](https://www.statistik.at/web_de/statistiken/wirtschaft/unternehmen_arbeitsstaetten/schnellwachsende_unternehmen_bis_2014/index.html) [20.11.2017].

the region and thereby change the regional economic and social context. On the other hand, new ventures may generate spillovers, increase entrepreneurial knowledge and initiate a reinforcing process of circular and cumulative causation via positive feedback loops that reshapes the regional economic context. In addition other variables, such as the national business cycle or trade policy, will also influence the level and quality of entrepreneurial activities in a certain region. The ideas of a circular process of spatial development and the importance of the regional economic context are elaborated, for example in Porter (2000, p.263) and Krugman (1991, p.1-34). Plummer and Pe'er (2010, p.541) discuss the different theoretical approaches in great detail and conclude with a discussion wherein they propose a merger between entrepreneurship theories and regional economics into an integrated framework that conceptualizes entrepreneurship as an inherent spatial process.

Figure 2: The nexus between regional economic context and entrepreneurship



Source: authors' own draft.

The methodology rests upon spatial explorative data analysis. In particular, methods of bivariate analysis, spatial statistics and cluster analysis are applied. Data sources that are utilized include (i) business demography statistics, (ii) statistics on high-growth enterprises, (iii) regional unemployment statistics and (iv) regional economic accounts. All data sources are available for either the NUTS 2 or the NUTS 3 level. Regarding the time dimension, the data is from 2004 or 2008 to 2012 or 2014. In addition, and to account for the fact that new firms can be of very different “quality”, primary data on VC-funded firms is used.

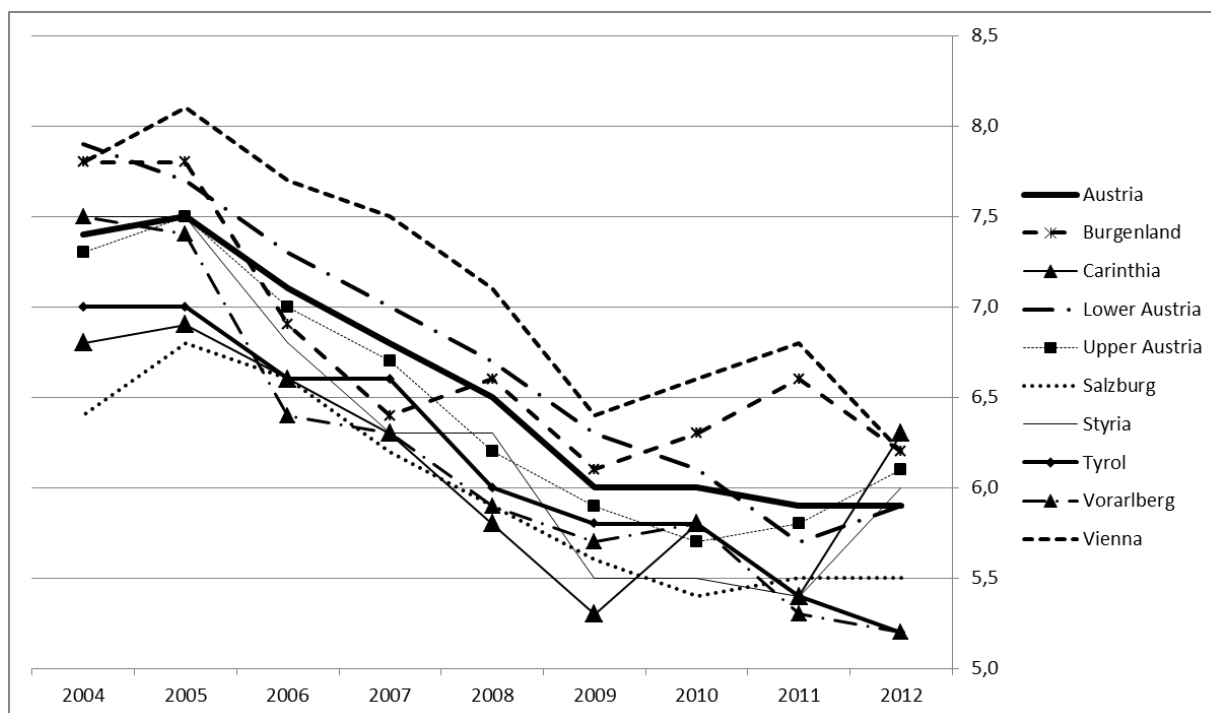
### 3 Spatial patterns of entrepreneurship

The question of where entrepreneurial activities take place is quite naturally the first question when it comes to a spatial analysis of entrepreneurship. We address this question at the level of NUTS2 regions and NUTS3 regions.

Figure 3 shows the entry rate of new firms at the NUTS2 level, i.e. for the nine Austrian federal states (“Bundesländer”). Interestingly, a clear downward trend can be observed which already began before the “Great Recession”. The entry rate declined from about 7.5% in 2005 to somewhat below 6% in 2012. This negative trend captures all new ventures without taking into account the differences of the new ventures in terms of their quality. According to the Austrian innovation strategy “Becoming an Innovation Leader”, the number of new knowledge-intensive firms is supposed to increase by 3% per year (Republic of Austria, 2011, p.30). Yet, data about new knowledge-intensive firms in services and manufacturing reveal that they actually declined between 2010 and 2014 (RFTE, 2017, p.95). As a result, the declining rate of new firm formation holds also for high-quality ventures. This pattern of an overall reduction in entrepreneurial dynamism is of course not unique for Austria. Time series data for Germany (Metzger, 2016, p.1) and the United States (Hathaway & Litan, 2014, p.6) reveal quite a similar negative trend.

In addition to this general trend, a persistent pattern of regional disparities in entrepreneurial activities exists between the nine regions. While Vienna and Lower Austria display a constantly higher entry rate than the national total, Salzburg and Kärnten perform below the national level. The lines are more or less parallel, which suggests that the differences remain stable even under changing conditions during the business cycle. The range between the region with the highest and the lowest entry rate is about 1.5 percentage points.

Figure 3: New ventures as % of existing firms (entry rate) (2004-2012)



Data: Statistik Austria

In the next step, we consider the spatial disparities at the level of the 35 Austrian NUTS3 regions.

Table 1 displays the entry rates for the 5 regions with the highest and the lowest entry rates respectively. Whereas the region of Nordburgenland had on average 7% of new firms relative to existing firms, the number for Lienz was just 4.8%. Again, the spatial disparities are characterized by a high degree of persistence over time. It is not the case that one region has a relatively high entry rate in one year and then a low entry rate in another. Quite the contrary: Regions with a high entry rate perform constantly above the median of all 35 regions and vice versa. There is not a single year in which a leading or a laggard region performed below or above the median. This stable pattern is also reflected in a high positive temporal auto-correlation between the years from 2008 to 2012. The coefficients are between 0.6 and 0.8. The development of the entry rates over time suggests that there is no clear sign of convergence between two groups of regions in

Table 1. Indeed, the standard deviation for the 35 regions with respect to the entry rate increases from 0.62 (2008) to 0.65 (2012). Fritsch and Wyrwich (2014, p. 955) corroborate the finding of persistent spatial differences in entrepreneurship activities for Germany for the period from 1925-2005. They find that persistency tends to exist for about eight years despite

substantial changes in the institutional context. Their explanation rests upon the existence of cultures of regional entrepreneurship exhibiting characteristics of inertia.

Table 1: The 5 regions with highest and lowest entry rates

	2008	2009	2010	2011	2012	Average	Difference 2012-2008
AT112 Nordburgenland	7.5	6.7	6.5	7.4	6.7	7.0	-0.8
AT130 Wien	7.1	6.4	6.6	6.8	6.2	6.6	-0.9
AT126 Wiener Umland/Nordteil	7.3	6.6	6.5	6.1	6.6	6.6	-0.7
AT122 Niederoesterreich-Sued	7.3	6.9	6.9	5.7	5.9	6.5	-1.4
AT127 Wiener Umland/Suedteil	6.8	6.5	6.2	5.9	6.4	6.4	-0.4
MEDIAN	6.2	5.8	5.5	5.6	5.7	5.8	
AT333 Osttirol	5.8	5.8	5.0	4.7	4.4	5.1	-1.4
AT212 Oberkaernten	4.9	4.4	5.3	5.3	5.2	5.0	0.3
AT334 Tiroler Oberland	5.6	5.0	5.1	4.7	4.7	5.0	-0.9
AT341 Bludenz-Bregenzer Wald	4.9	4.9	5.3	4.6	4.9	4.9	0
AT222 Liezen	5.6	4.4	4.4	4.4	5.0	4.8	-0.6

Data: Statistik Austria

The regional disparities of high growth firm activities are somewhat less persistent. Table 2 shows the 5 regions with the highest and the lowest shares of fast-growing firms from 2008-2013. While it is still true that there are substantial and also stable differences between the two regional groups, laggard regions may occasionally perform above the median value and leading regions below the median value, perhaps due to regression-to-the-mean effects. The respective cells are coloured in grey. The differences in the last column show that the share of high-growth firms is also characterized by a negative trend. The correlation coefficient between the years ranges from about 0.4 and 0.6, hence lower than in the case of entry rates.

Table 2: The 5 regions with the highest and lowest share of fast growing enterprises

	2008	2009	2010	2012	2013	Average	Difference 2013-2008
AT13 Wien	10.6	7.7	6.9	8.1	9	8.46	-1.6
AT221 Graz	9	6.5	7	8.4	8.7	7.92	-0.3
AT112 Nordburgenland	8.3	6.3	7	8.1	8.3	7.6	0
AT123 Sankt Poelten	8.5	6.4	6.7	8.3	7.8	7.54	-0.7
AT225 West- und Suedsteiermark	9.2	8.6	6.4	6	6.9	7.42	-2.3
MEDIAN	8.65	5.75	5.3	6.4	6.85	6.59	-1.8
AT125 Weinviertel	8.7	4.4	4.1	2.5	5.8	5.1	-2.9
AT226 Westliche Obersteiermark	7.7	2.8	2.8	6.1	5.5	5.0	-2.2
AT335 Tiroler Unterland	6.2	3.9	4.1	4.3	5.6	4.8	-0.6
AT111 Mittelburgenland	4.9	2.0	3.4	7.1	3.8	4.2	-1.1
AT331 Ausserfern	6.7	3.1	3.0	1.8	5.1	3.9	-1.6

Data: Statistik Austria, data for 2011 are not available

The spatial structure of entrepreneurship is not only characterized by significant regional differences but also by the fact that regions with high and low levels of entrepreneurial activities are not randomly distributed (Plummer & Pe'er, pp. 2010, 519-522). There is a high probability that regions with a high entrepreneurial performance have neighbouring regions with similar characteristics, perhaps indicating the existence of regional spillovers. To measure the pattern of spatial co-location of regions with similar attributes we use the metric of Moran's I which is basically a correlation coefficient for spatial data. Therefore, the spatial structure must be modelled in the form of a spatial weights matrix that basically provides the information whether or not two regions have a common border. The results of the analysis of spatial autocorrelation are given in Table 3.

Table 3: Analysis of spatial autocorrelation

Variable	Moran's I	p-value
Firm entry rate	0.27	0.010
Firm exit rate	0.31	0.003
Share high growth firms	-0.05	0.847
Share quality entrepreneurship (% of all new firms)	0.13	0.169

Data: Statistik Austria, Eurostat

The calculation of the Moran's  $I^5$  for the entry and exit rates of firms for the NUTS3 regions gives a positive and significant spatial correlation for both variables. In the case of

<sup>5</sup> We used the R-Package `spdep` from Roger Bivand et al.

entry rates, Moran's I equals 0.27 (p-value: 0.01) and for exit rates Moran's I equals 0.31 (p-value 0.003). In contrast to the entry and exit rate, the share of high-growth firms shows a weak negative and non-significant Moran's I. This result fits with the discussion above, where it was argued that the regional disparities of high-growth firm activities are somewhat less persistent than the exit rates.

The final row of Table 3 provides information about the spatial autocorrelation of "quality entrepreneurship". We define quality entrepreneurship as new firms in manufacturing and professional, scientific and technical activities as % of all new firms. From a theoretical point of view it can be expected that firms in these sectors exhibit a stronger tendency of spatial clustering than the other startups because they rely on spatial knowledge spillovers to a larger degree (Usai 2011). Yet, at least for our chosen definitions of quality entrepreneurship and spatial disaggregation, there is no statistically significant indication of spatial autocorrelation of quality entrepreneurship in Austria.

## 4 Clusters of entrepreneurship

The analysis of spatial disparities and spatial correlation suggests that there are stable and significant differences between regions in terms of their entrepreneurial performance. In order to gain a better understanding of the differences between regions we performed a hierarchical cluster analysis utilizing the Euclidean distance to measure the dissimilarities between observations and the average linkage method as clustering method.<sup>6</sup> Hence, we ask the following question: Is it possible to group the Austrian regions into different types of entrepreneurial regimes based on different indicators of entrepreneurship?

We use only the two entrepreneurial variables “entry rate” and “share of high growth firms”. To control for yearly fluctuations, the average of the variables between 2008 and 2012/13 is used for the cluster analysis. The agglomerative coefficient is 0.81 which suggests that the data is well suited for a cluster analysis. The main results of the analysis are displayed in Table 4. While there is always a subjective element in deciding how many clusters to extract, it turned out that 5 clusters are a practical solution. The clusters show clear differences and are relatively simple to interpret, perhaps with the exception of cluster 2, which consists of quite different kinds of regions.

The big picture of the cluster analysis reveals substantial differences between core and peripheral regions: Higher levels of regional entrepreneurial activities are inversely related to the median regional productivity level. Whereas the former show high levels of entrepreneurial activity, the latter have low levels of entry rates and low shares of high growth firms. In that sense, entrepreneurship may not be a force that induces catching-up processes of lagging regions. The high intensity of entrepreneurial activities in Vienna (and Nordburgenland) testifies to the importance of agglomeration economies in entrepreneurship.

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<sup>6</sup> The R-package “cluster” was used for the cluster analysis.



Table 4: Regions with similar entrepreneurial dynamics

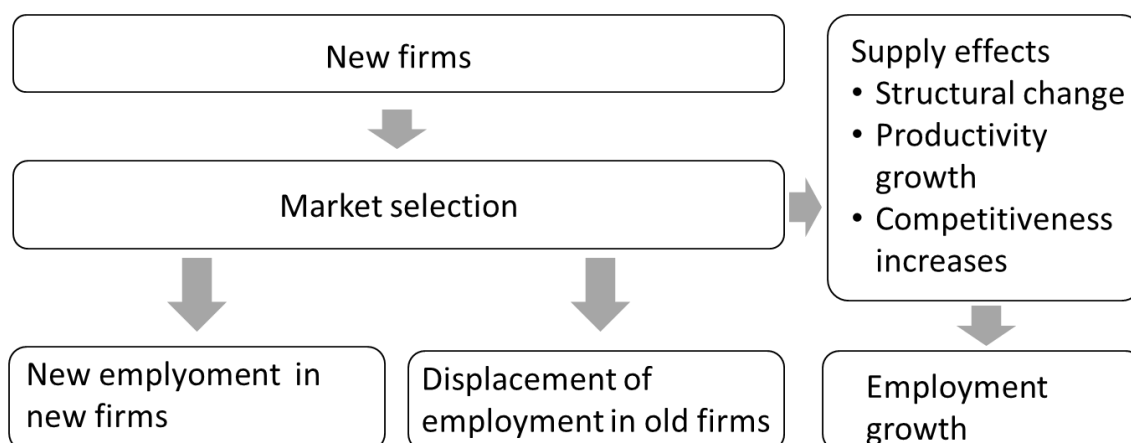
Cluster	Entry rates (average)	Share high-growth firms (average)	Regions	Productivity median region (Output per person employed in thousand Euros, average 2011-2013)
1	6.80	8.05	AT112 Nordburgenland, AT130 Wien	71.36
2	6.50	6.17	AT122 Niederoesterreich-Sued, AT126 Wiener Umland/Nordteil, AT127 Wiener Umland/Suedteil	66.53
3	5.88	7.12	AT113 Suedburgenland, AT121 Mostviertel-Eisenwurzen, AT123 Sankt Poelten, AT213 Unterkärnten, AT221 Graz, AT211 Klagenfurt-Villach, oestliche Obersteiermark, AT224 Oststeiermark, AT225 West- und Suedsteiermark, AT311 Innviertel, AT312 Linz-Wels, AT314 Steyr-Kirchdorf, AT315 Traunviertel, AT323 Salzburg und Umgebung, AT332 Innsbruck, AT342 Rheintal-Bodenseegebiet,	61.04
4	5.70	4.78	AT111 Mittelburgenland, AT125 Weinviertel, AT226 Westliche Obersteiermark, AT335 Tiroler Unterland	53.31
5	5.24	6.05	AT124 Waldviertel, AT212 Oberkaernten, AT213 Unterkaernten, AT222 Liezen, AT313 Muehlviertel, AT321 Lungau, AT322 Pinzgau-Pongau, AT333 Osttirol, AT334 Tiroler Oberland, AT341 Bludenz-Bregenzer Wald	53.97

Source: Statistik Austria

## 5 Entrepreneurial activities and unemployment dynamics

The public discourse usually associates new ventures with employment growth. Yet this conjecture may be overoptimistic about the actual employment effects of new firms (Figure 4). One explanation for this biased perception of entrepreneurship may have to do with the distinction between partial equilibrium effects vs general equilibrium effects. Of course, a new firm increases *ceteris paribus* and on average total employment. But this usually goes together with a loss of employment in incumbent firms because of the competition from the new venture. If new ventures are more productive than established companies, then the total direct employment effect becomes negative. The positive effects of new ventures rest predominantly upon indirect, supply side effects that ultimately lead to an improved competitiveness of the regional business sector. This reasoning points to the fact that the quality of entrepreneurial activities is a crucial variable in determining the employment impact of new businesses.

Figure 4: How new-firm formation contributes to



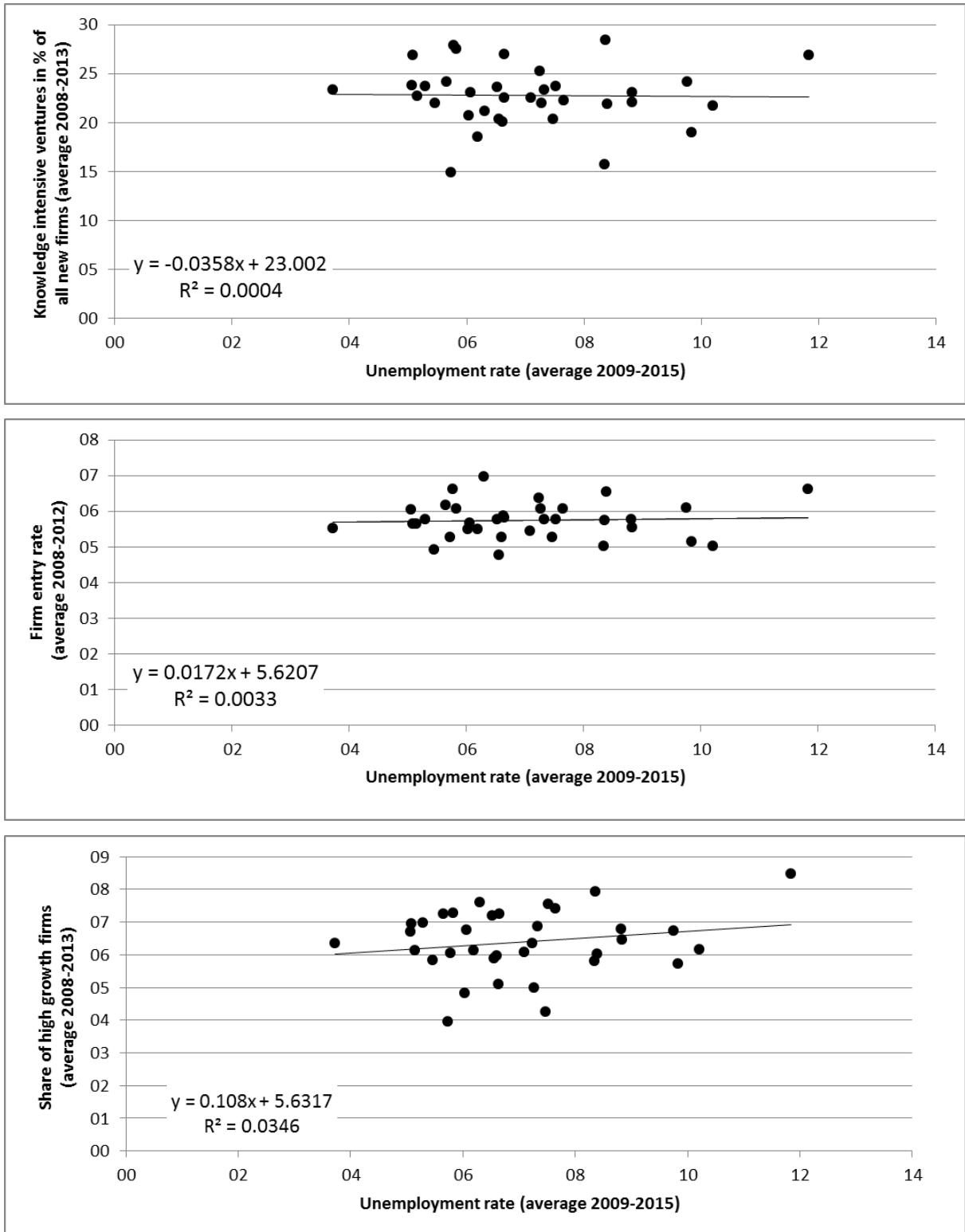
Adapted from Fritsch (2008)

Analysing the causal employment effects of entrepreneurship requires the use of advanced quantitative techniques and the use of panel data. In the present study we follow a more humble approach and provide only bivariate descriptive evidence. Figure 5 shows the relationship between the unemployment rate (average 2009-2015) and different measures of entrepreneurial activity (also measured as average over several years to account for idiosyncratic effects). While the entry rate and the share of high growth firms were already mentioned, the share of knowledge-intensive new firms in % of all new firms is new. It is computed as the number of new firms in manufacturing and knowledge-intensive services

(professional, scientific and technical activities) as percentage of all new firms. The overall picture is that there is no clear relationship between entrepreneurship activities and the unemployment rate. It could theoretically be expected that higher unemployment leads to a higher level of new-firm formation as unemployed workers are “pushed” into more or less precarious forms of self-employment. Yet this is - at least on the regional level - not the case.

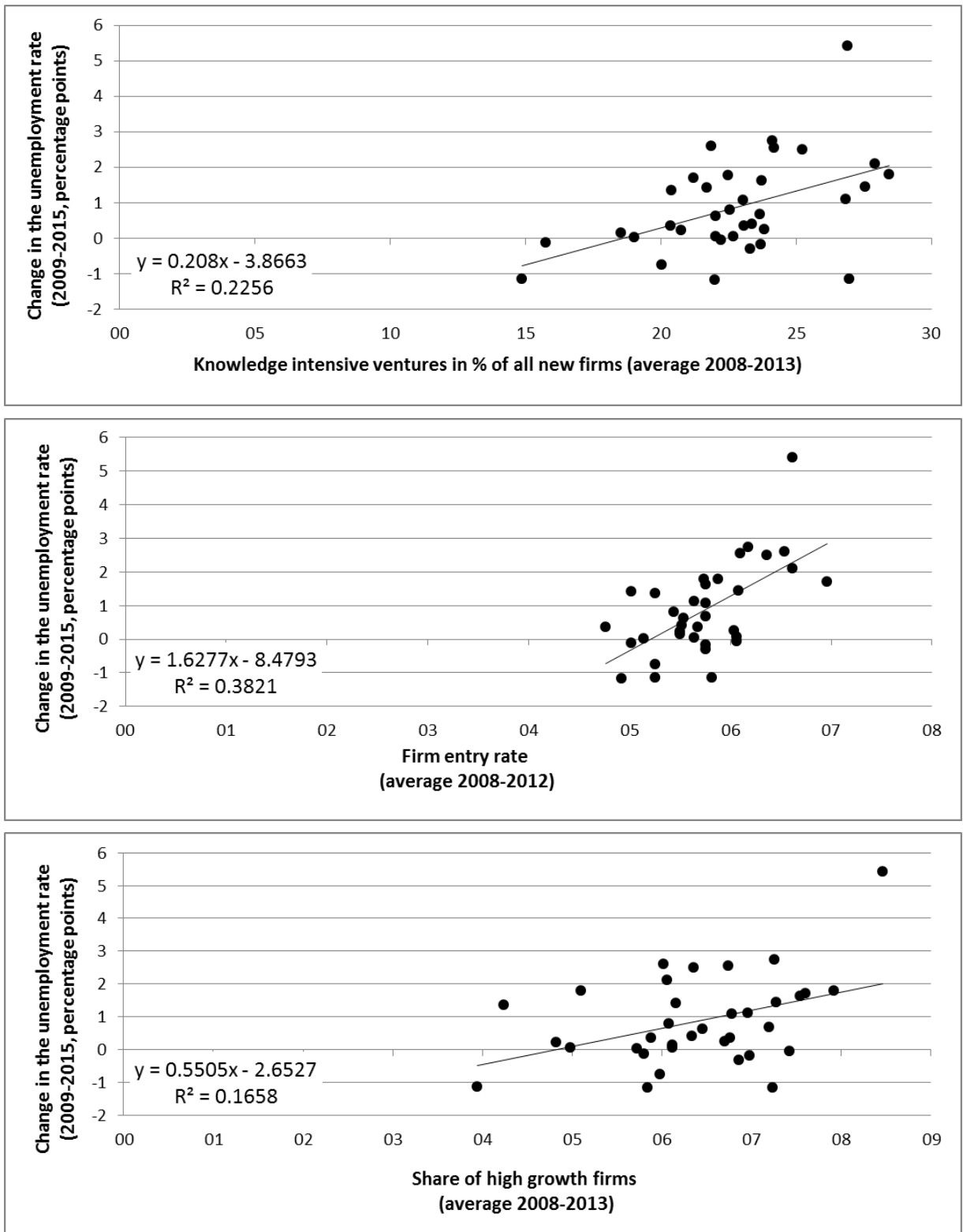
A different question is whether entrepreneurial activities may have an influence on the change of the unemployment rate. Figure 6 shows the change in the unemployment rate between 2009 and 2015 as a dependent variable on the y-axis. However, the relationship is quite the opposite of what policy-makers hope for: A higher level of entrepreneurial activity is associated with a higher increase in the unemployment rate. Of course, this may not be interpreted in a causal way even though the initial effect of new ventures on employment might be initially negative (see above). The outlier in the three scatter plots in Figure 6 is Vienna, which again shows the peculiar role of the capital city in shaping the entrepreneurial dynamics in the Austrian economy.

Figure 5: The relationship between the level of the unemployment rate and entrepreneurship



Data: Statistik Austria, Eurostat, AMS

Figure 6: The relationship between the change of the unemployment rate and entrepreneurship



Data: Statistik Austria, Eurostat

## 6 VC-firms and the spatial concentration of entrepreneurial activities

Startups<sup>7</sup> are not founded in a vacuum or out-of-thin-air but are created and then co-evolve within a diverse system with dense interactions with suppliers of physical goods as well as ideas, customers and financiers. The two main pillars of an entrepreneurial eco-system are first and foremost the startups themselves which generate the ideas and try to develop them into scalable business models potentially leading increases in value added, employment and profits. The second pillar is formed by the financiers (individual business angels and institutionalised venture capital firms) which are ready to take the risk and inject venture capital into the startup often long before any marketable product (and hence turnover) is available. These two pillars form the scissor blades of the regional VC market where VC firms provide the supply of risk capital and startups demand financing. However, the role of financiers goes well beyond mere capital allocation. Usually, they provide necessary business know-how and social capital (i.e. access to networks etc.) for the startups in their portfolio and offer strategic guidance and monitoring. Obviously, spatial proximity is beneficial for performing these tasks. Externalities play a prominent role as well. It is easier to start a new business if there are plenty of other entrepreneurs around from whom one can learn. VC markets and startups are often co-evolving and localised phenomena and their interdependency might initialise cumulative, self-reinforcing processes: VC goes to regions where new startups are created and new startups are created where VC is located (Lerner, 2010, p.3).

This co-evolving pattern for Austria was analysed by the following empirical approach: We identified the major VC funds (and a selection of business angels) operating in Austria. Essentially, we selected all VC-funds that participated in the aws Venture Capital Initiative or a similar public policy program to support VC investments in Austria, and the aws Gründerfonds (public venture capital).<sup>8</sup> The data represent the stock of investments in the year 2015. Finally, the portfolio firms (startups) of the selected VC funds were identified and their locational pattern recorded. Even though this procedure does not take into account all VC-funded firms, it is – based on the literature and anecdotal evidence - reasonable to assume that the locational pattern of the non-included VC-funded firms is similar to the one observed

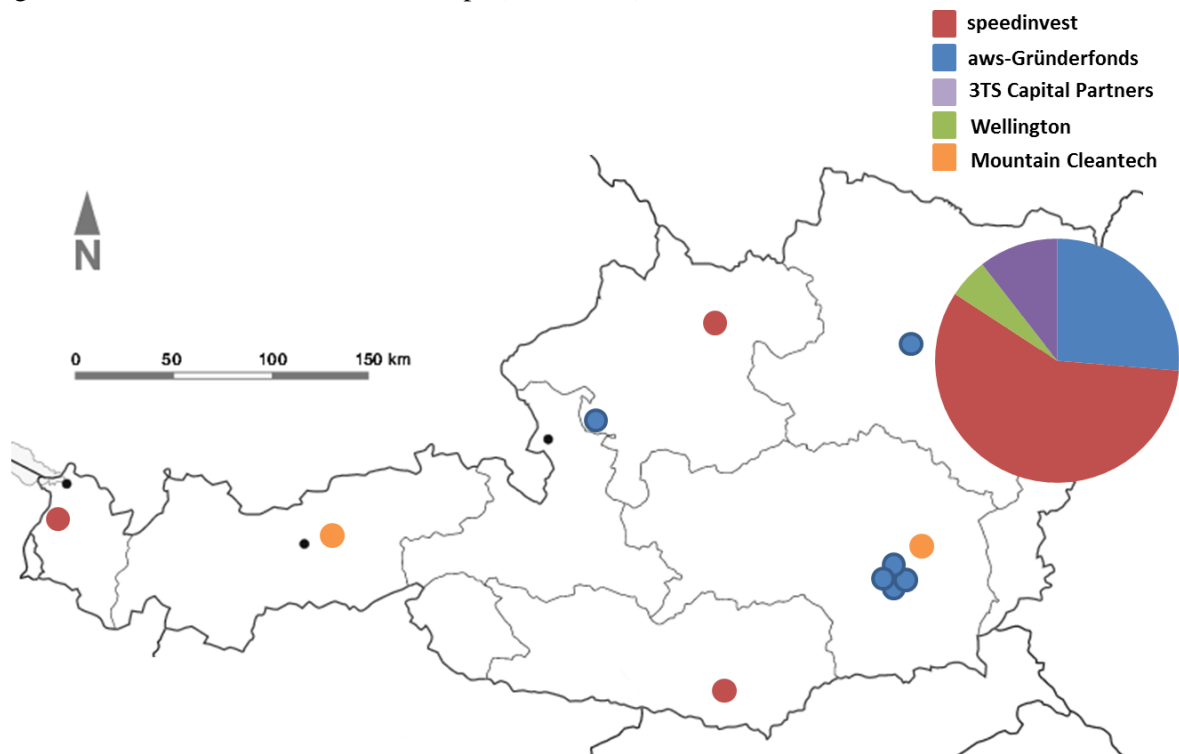
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<sup>7</sup>The is no common agreed-upon definition of startups. We define it as follows: A 'startup' is a young (i.e. up to five years) company primarily focused on developing an innovative technology or service with an innovative scalable business model, capable of and focused on rapid growth.

<sup>8</sup> <https://www.aws.at/foerderungen/aws-venture-capital-initiative/> [15.11.2017]

for our sample. In total, a sample of 33 VC-funded firms was realized. Figure 7 shows the spatial distribution of VC-funded firms in Austria. The overall result is a striking degree of concentration of spatial concentration of VC-funded firms in Vienna and only two other cities manage to host at more than one VC-funded firm, namely Graz (4 firms) and Linz (2 firms); only 18% of the 33 startups are located outside Vienna or a regional capital.

Figure 7: Locations of VC-funded startups (stock 2015)



Source: own empirical research

The issue of spatial concentration of entrepreneurial activity is further explored in Table 5 for the nine Austrian NUTS 2 regions. The columns show the shares of the regions in entrepreneurial variables in comparison with shares in GDP. In addition, the Herfindahl-Index is given the last row.<sup>9</sup> Comparing the shares of GDP and new ventures and share of high-growth firms indicates a strong relationship between them; a result that is also corroborated by the almost identical number of the Herfindahl-Index for the three variables. Hence, at least

<sup>9</sup> The Herfindahl-Index is a measure of concentration and defined for a variable  $x$  by  $\sum_{i=1}^N \left( \frac{x_i}{\sum_{i=1}^N x_i} \right)^2$ . The higher the value, the higher the degree of concentration. In the case of a uniformly distributed variable over  $N$  statistical units the HI takes on the minimum value of  $1/N$ . If entire sum of the variable is concentrated in one statistical unit, the HI assumes the maximum value of 1.

on NUTS 2 level, entrepreneurial activities in the form of new ventures and the high growth firms are not more concentrated in space than GDP. However, things are different when we consider VC-funded firms. Vienna hosts about 55% of them whereas not VC-firm is located in Burgenland or Salzburg. As a consequence, the corresponding Herfindahl-Index is more than double the size compared to the share of all new ventures.

Table 5: Share, concentration and spatial disparity GDP, new ventures, high growth firms, venture capital (VC) financed firms and gross expenditures on R&D (GERD)

	Share GDP (2015)	Share new ventures (2015)	Share high growth firms (2015)	Share VC firms (2016)	Share GERD (2015)
Burgenland	2.3	4.2	2.5	0.0	0.8
Carinthia	5.5	7.1	4.5	3.0	5.6
Lower Austria	15.7	18.8	13.4	6.1	8.9
Salzburg	7.3	6.2	8.1	0.0	3.7
Styria	12.8	14.3	14.0	15.2	21.3
Tyrol	9.1	7.8	9.6	6.1	9.2
Upper Austria	17.1	14.0	16.2	12.1	17.6
Vienna	25.5	23.9	27.3	54.5	30.2
Vorarlberg	4.7	3.6	4.4	3.0	2.9
<i>Herfindahl-Index (NUTS 2)</i>	0.154	0.151	0.159	0.344	0.189

Source: own empirical research, Statistik Austria

If it is the case that the praised benefits of startups accrue first and foremost to the region where they are located, for example because of localized positive externalities, then the hope that public policy initiatives foster startups will “lift all boats” is misplaced. Lerner (2010, p. 6) points out that the overall dynamic of VC investments may induce a vicious circle in regions with few venture capital related activities. Thereby, publicly supported VC investments may increase the overall level of entrepreneurial activities at the high end of the quality distribution of new ventures. Concomitantly, however, this may also lead to rising interregional disparities in the Austrian landscape of entrepreneurship. There may be no simple way to counteract this tendency by redirecting publicly supported VC-investments into non-central regions, because the efficiency gains associated with VC investments are assumed to emanate only in an open, creative and high-skilled environment of cities.



## **7 Conclusions**

There are huge and persistent differences in entrepreneurial activities between Austrian regions at the NUTS2 and the NUTS3 level. Entry rates and the share of fast-growing enterprises are on the decrease. Entry and exit of firms displays positive spatial correlation. The core regions are characterized by a higher level of entrepreneurial activities compared to the regions in the periphery. Entrepreneurship shows no association with unemployment dynamics. In particular, entrepreneurial regions experienced a higher increase in unemployment than less entrepreneurial regions. Knowledge-intensive startups that rely on VC-funding are heavily concentrated in a few capital regions, thereby increasing spatial disparities between central and peripheral regions. Short time series data and a concentration on a small number of indicators of entrepreneurship are limitations to the generalizability of our results.

Taken together, the empirical findings point to a number of stylized facts that can be considered no good news for policy makers who are probably too enthusiastic about the wonders that entrepreneurship may deliver.

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