

**The charms of smallness:  
Economic dynamics and innovation mechanisms in small and  
medium-sized towns**

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*'It's not size, it's what you do with it'*  
(Bell and Jayne, 2006: 5)

## Preface and Acknowledgements

Switzerland is a country of small- and medium-sized towns (SMSTs). As I write this preface, only ten localities in Switzerland have more than 50,000 inhabitants. Thus, towns with 5,000 and 50,000 inhabitants are a crucial part of Switzerland's polycentric urban system, and depending on their geographical location, fulfil important functions as central places, place of residence or for different economic activities. However, SMSTs are neither small villages nor cities, and as such, are rarely considered as distinct places with their own characteristics, needs and problems. Hence, with this dissertation, I sought to gain insight into SMSTs from different geographic perspectives and to give SMSTs the scientific and policy attention they need and deserve.

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# Introduction

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## Background and motivation

When Thomas Friedman (2005) called the world ‘flat’, there was an outcry from economic geographers everywhere. Friedman argues that every place has the same opportunities and that this is made possible by new communication technologies and rapid transportation. Although economic geographers acknowledge the idea of a more interconnected world, they highly criticise Friedman’s flat world theory and emphasise (again) why place still indeed matters in a globalised world. One of the most popular refutations of Friedman’s theory is “The World is spiky” and it states that

“Surprisingly few regions truly matter in today’s global economy. What’s more, the tallest peaks – the cities and regions that drive the world economy – are growing ever higher, while the valleys mostly languish.” (Florida, 2005, p. 48)

The idea that big cities and large urban areas are the economic spikes of our globalised world – previously introduced to some extent by Alfred Marshall (1890), and further developed by Jane Jacobs (1969) – stands in sharp contrast to Friedman’s claim. Many economic geographers, as well as economists, theorise big cities as the engines of growth and consider that city size influences innovations and economic growth (for example Florida, Adler, & Mellander, 2017; Glaeser, Kallal, Scheinkman, & Shleifer, 1992; Lee & Rodriguez-Pose, 2013; Sassen, 2001). Hence, theories that explain the mechanisms behind urban domination, such as agglomeration economies, urbanisation advantages or ‘local buzz’ have been highly popular over the last decades. The idea behind these concepts is that co-location and high density of people and firms make them both more productive. Knowledge transfer is easier, linkages and exchanges between firms, suppliers and clients are more frequent and easier to maintain, firms are better able to find talented employees, exchange between people with different ideas and knowledge occurs spontaneously and economic actors can share infrastructures (Duranton & Puga, 2004; Fujita & Thisse, 2003; Krugman, 1991; Martin & Ottaviano, 2012).

However, there is a small but growing body of literature that questions the straight forward connection between city size and economic growth (for example Camagni, Capello, & Caragliu, 2015, 2016; Frick & Rodríguez-Pose, 2018). Duranton & Puga’s (2004) work on urban agglomeration economies shows that there is an efficient city size, which is the result of the interplay between urban disadvantages (such as long commutes, higher land rents) and agglomeration economies. Frick & Rodríguez-Pose (2018) show a nonlinear relationship between economic growth and city size, which depends on a country’s size. The two authors argue that, “for a majority of countries relatively small cities of up to 3 million inhabitants are more conducive to economic growth. A large share of the urban population in cities of more than 10 million inhabitants is only growth promoting in countries with an urban population of 28.5 million and more” (2018, p. 4). Moreover, they claim that the advantages of agglomeration benefits are highly context-dependent. The city must have industries that rely on agglomeration economies and an adequate level of governance effectiveness and urban infrastructure. Notwithstanding the dominance of studies focusing on agglomeration economies, identifying and separating the mechanisms that underlie agglomeration advantages is difficult (Duranton & Puga, 2004). Indeed, recent empirical studies show that in industrialised countries, smaller cities have higher population and economic growth rates than larger ones (Dijkstra, Garcilazo, & McCann, 2013; ESPON, 2012; McCann & Acs, 2011). It seems that smallness has gained a new charm for inhabitants and firms.

Hence, the overarching subjects of my thesis are economic dynamics and innovation mechanisms in small and medium-sized towns (SMSTs). Three leading questions underlie this dissertation:

- Is there a relationship between the socio-economic characteristics of SMSTs and their geographical links with their surrounding areas?
- How can knowledge intensive firms be innovative in SMSTs despite the absence of a so-called ‘local-buzz’?
- How are SMSTs inside a metropolitan region able to influence their economic characteristics through economic development policies?

This dissertation allows me to contribute to the work of fellow scholars who seek to remove the dust that has been covering SMSTs during the last nearly three centuries in order to restore them to the realm of scientific and policy attention. The growth dynamics in SMSTs require new concepts and theories in order to explain the mechanisms that drive growth beyond the urban size and agglomeration economies paradigm. Camagni, Capello & Caragliu (2016, p. 138) assume that “smaller cities [may] utilise other attributes and context advantages to boost their locational advantage.” With this in mind, my dissertation begins in the next section with theories that consider factors other than the size of a place as the main determinant for growth. I expect to contribute to these theories by finding factors, beyond the size-paradigm, that explain the economic success of SMSTs.

I choose SMSTs in order to investigate mechanisms that drive growth beyond urban size and agglomeration economies because, despite their lack of ‘local buzz’, they fulfil important functions in the European urban system as places for socio-economic activities (Servillo et al., 2014). Moreover, they are under-theorised and scholars know little about what ‘smallness’ actually means for economic activity (Bell & Jayne, 2006, 2009).

The remainder of the first part of the dissertation outlines the theoretical framework. I then continue with the geographical context of the empirical analysis and end by describing the structure of the dissertation.

## Theoretical framework: research gaps and contribution

This dissertation builds on theories that pursue an explanation for economic growth and characteristics that go beyond the location size paradigm, and it seeks to extend theories that highlight different factors that influence the economic characteristics of places. Camagni, Capello & Caragliu (2015, p. 1069) state that the “oversimplified interpretation that urban economic performance simply depends on the exploitation of agglomeration economies and that these agglomeration economies merely depend on urban size alone should be abandoned.” Fitjar & Rodriguez-Pose (2017, p. 36) also claim that we actually know “nothing about whether frequent chance, casual, and/or serendipitous interaction between economic actors in urban environments and clusters leads to greater innovation.” Hence, scholars are now considering different theories and concepts that explain economic prosperity and innovation dynamics beyond urban environments. The theoretical framework of this dissertation builds on the three blocks of 1) geographical proximity and connectivity to cities, 2) innovation mechanisms beyond agglomeration advantages and 3) economic development policies. These three blocks cannot be separated completely from each other. Block 2 and 3 might depend on the geographical proximity and connectivity to cities (block 1). Moreover, there is also the possibility that block 2 and 3 influence each other. Economic development policies might induce special innovation mechanisms and vice versa.

### Geographical proximity and connectivity to cities

The first block focuses on how a SMST’s geographical proximity and connectivity to cities influence its function and performance. As McCann & Acs (2011, p. 17) state “for industrialized countries the

size of a city is nowadays much less important than its level of global connectivity, whereas the size of the city is still dominant in newly industrializing countries”; they also claim that size was more important at the time of Marshall (1890). Statistics from various European and North American countries show that towns that are closer to core cities have higher growth rates and more specialised economies than towns farther away (Gatzweiler et al., 2012; Hamdouch, Demaziere, & Banovac, 2017; Polèse & Shearmur, 2006; Vaishar, Šťastná, & Stonawská, 2015). Two concepts dominate the recent debate on these differences and seek to explain why SMSTs can have functions and performance levels normally associated with cities: borrowed size and network dynamics.

To understand why small towns possess growth rates and functions normally associated with cities, Alonso (1973) originally introduced the concept of ‘borrowed size’, which Meijers & Burger (2015) reintroduced and extended to better understand today’s urban system. Alonso’s basic idea is that towns located around a city are better off than towns farther away. Meijers & Burger (2015) empirically test this assumption and show that processes of borrowed size are more likely to occur in polycentric metropolitan regions. A city or town with less functions or a weaker performance than expected could indicate an agglomeration shadow. Towns may be more able to take advantage of the borrowed size effect if they are as close as possible to another city. For example, Partridge et al. (2008) show that with every kilometre farther away a town is from a core city, the population growth rate decreases. However, it is not entirely clear whether geographical proximity itself or if interactions induced by geographical proximity foster the borrowed size processes. Another group of scholars considers network dynamics to be the determining factor for whether a place is able to acquire functions and performance. Phelps, Fallon & Williams (2001) believe that interactions between places are crucial for borrowing size, and Polèse & Shearmur (2006) show that in order to enable face-to-face interactions, the travel time between places should not be too long. Camagni, Capello & Caragliu (2015) claim that small towns can benefit if they have access to the networks of cities and their functions. However, in contrast to the borrowed size concept, the network concept considers physical proximity to be less important and assumes that network activities and flows can replace physical proximity between towns (Camagni, 1993; Capello, 2000).

Overall, smaller towns are not the only ones that can benefit from interactions with other places; the whole region can. Empirical evidence demonstrates that the level of integration of towns within a metropolitan region influences the number of metropolitan functions of the whole region (Meijers, Hoogerbrugge, & Cardoso, 2017). However, metropolitan integration is not an easy task. As empirical results show, large socio-economic differences between the powerful core and its surrounding towns jeopardise the willingness of cities and towns to cooperate (Cardoso, 2016; Rayle & Zegras, 2013).

Hence, the borrowed size and network concepts reveal that urban size and density are not the only way to stimulate urban functions and performance. Nevertheless, the literature on the possible outcomes of borrowed size or engaging in network activities remains limited, and it is unclear how towns influence these dynamics. This dissertation aims to shed light on factors and mechanisms that influence the ability of SMSTs to borrow size and develop networks. It seeks to do so by presenting four articles submitted or published by the author on the topic of SMSTs. Two of these four articles directly focus on the issue of the factors and mechanisms that influence the ability of SMSTs to borrow size and develop networks. Article 1 shows how the economic characteristics of SMSTs relate to geographical linkages, and Article 4 asks how much local policies play a role in determining the local economic characteristics (and are able to influence a borrowed size process) of SMSTs inside metropolitan regions.



## Innovation mechanisms beyond agglomeration advantages

Urban size and the consequential geographical concentration of firms, employees and different public and private institutions in urban areas lead to a so called ‘local buzz’ that scholars believe facilitates the diffusion of knowledge and information and therefore leads to innovations (for example Bathelt, Malmberg, & Maskell, 2004; Glaeser et al., 1992; Jacobs, 1969; Krugman, 1998; Marshall, 1890). Hence, cities and large urban agglomerations are generally seen as ‘innovation machines’ (Florida, Adler, & Mellander, 2017). Florida, Adler & Mellander (2017, p. 87) argue that “innovative activities are the products of cities or regions”, where they explain that the term region is “used throughout to refer to urban agglomerations or metropolitan areas”. This definition implies that smaller places are non-innovative, and as a result, there is a strong urban bias in studies that focus on innovation (Shearmur, 2017). Notwithstanding the high density of innovative firms in urban areas, Fitjar & Rodríguez-Pose (2017, p. 22) are among the scholars that doubt the general relationship between high-density environments and innovation, and they use empirical data to show “that there may be ‘much less in the air’ than is generally assumed in the literature”. They argue that firms’ innovation networks have little to do with their being located in a city.

Hence, the second theoretical block of this dissertation focuses on the innovation processes of firms in SMSTs. As recent empirical evidence shows, firms in regions with different characteristics are not less innovative per se: they just innovate differently (Grillitsch, Tödtling, & Höglinger, 2015; Shearmur & Doloreux, 2016). For example, Shearmur & Doloreux (2016) show that firms in less urbanised regions predominantly use non-market sourced information (such as universities or conferences), whereas firms in urban areas also use clients and consultants.

In economic geography and innovation studies, scholars acknowledge that the characteristics of a location influence its innovation activities. Different regions have different innovation advantages and constraints, such as institutional thinness in the case of peripheral regions or fragmentation in the case of core regions (Tödtling & Trippel, 2005). Hence, firms in different regions may develop specific characteristics in response to innovation obstacles. Capello (2017, p. 8) claims that there is a “complex interplay between phases of the innovation process and spatial context or territorial conditions”. Not every region has the same capacity to be successful during every phase of the innovation process. Therefore, Capello (2017, p. 10) distinguishes between different territorial patterns of innovation and the level of endogenous potential and linkages to external partners:

- Endogenous innovation pattern: local conditions can support the creation of knowledge, its local diffusion and its transformation into innovations. The region belongs to an international scientific network.
- Creative application pattern: presence of creative actors who look for knowledge elsewhere and apply it locally to innovation needs.
- Imitative innovation pattern: imitative processes and adaption of existing innovations.

Regions’ characteristics may influence which territorial innovation pattern is dominant among local firms. The balance between the importance of ‘local buzz’ and global pipelines may vary and different forms of proximity and knowledge sources may also be more important outside core regions (Boschma, 2005; Fitjar & Rodríguez-Pose, 2011; Lorentzen, 2008; Shearmur & Doloreux, 2015; Tödtling & Grillitsch, 2014). Unfortunately, there is little information about how geographical factors in less urbanised towns influence firms’ ability to access external sources of knowledge. Article 2 of this dissertation strives to contribute to the geographies of innovation literature by analysing how small-town characteristics favour or hinder firms that access external knowledge.

However, external knowledge sources, and the mechanisms for acquiring them, are not the only types of differences in less urbanised regions. Additionally, the literature seldom discusses the actual endogenous mechanisms that lead to innovation. The way people innovate, and their creativity processes, may be different when compared to cities, as Gibson states

“Researchers have looked for creativity in fairly obvious places (big cities, cities making overt attempt to reinvent themselves through culture, creativity and cosmopolitanism); have found it there; and have theorised about cities, creative industries and urban transformations as if their subsequent models or logic were universally relevant everywhere” (2012, p. 3).

Hence, little work exists on theorising creativity beyond big cities. Diversity and heterogeneity – two crucial factors for creativity, innovation and economic progress (Duranton & Puga, 2004) – in small towns may differ in comparison to highly urbanised areas and may also contribute differently to innovation dynamics. However, the idea of “diverse diversities” is lacking in the innovation literature. Article 3 will focus on this aspect and challenge current assertions about location size, diversity and innovation.

### Economic development policies

The third block consists of studies that focus on the strategies that SMSTs apply in order to compensate for their small size and gain a competitive advantage. There are many studies that focus on the local policies or strategies that SMSTs employ in order to influence their development processes.

In this context, one of the main topics in the literature on SMSTs is the strategies used to enhance creativity inside towns (for example James, Thompson-Fawcett, & Hansen, 2015; Lewis & Donald, 2010; Lorentzen & van Heur, 2012; Lysgård, 2016; Mayer & Knox, 2010). Studies on creativity in SMSTs focus on the ways that they can influence their quality of life and their potential for creativity and development. They highlight that creativity can mean different things in small towns compared to cities. Authors interested in creativity and culture in small towns mainly criticise the dominant definition of creativity, introduced by Florida (2002), which leaves SMSTs as default losers. In small towns, heritage, traditions, liveability and sustainability seem to be more important for increasing creativity than in big cities, where Florida’s three Ts (Tolerance, Talent, Technology) seem to be the main factors (Borén & Young, 2013; Lewis & Donald, 2010; Lysgård, 2016). Place making, promoting the experience economy and advertising their cultural heritage, natural beauty or tranquillity can help SMSTs find a niche, which functions as a local development driver and attracts creative people (Kelly, Ruther, Ehresman, & Nickerson, 2017; Lazzeroni, Bellini, Cortesi, & Loffredo, 2013; Lorentzen, 2009). Other creative strategies that SMSTs pursue in order to stand out is specialisation in specific markets, such as Highpoint, in the United States, which hosts a large international home furniture market or festivals (Bradley & Hall, 2006; Schlichtman, 2006).

Notwithstanding the dominance of literature on economic development policies that focus on creativity in small towns, SMSTs also pursue strategies that are not directly linked to creativity. SMSTs pursue active place promotion strategies and seek to attract firms and inhabitants through attractive tax rates or cheap land (Nyseth & Tønnesen, 2017). Moreover, SMSTs can influence their development through land-use planning. Selling land to the highest bidder, elaborating a comprehensive land-use plan or enforcing building rules lead to different outcomes and may also accordingly influence their development process (Berli, 2018; Devecchi, 2016; Serrano & Hamdouch, 2017). It seems that SMSTs’ main advantages in comparison to large metropolises are high liveability and the affordability of real estate (Hildreth, 2006). Overall, as Mainet & Edouard (2017) state, strategies that concern the economic development of SMSTs should focus on the uniqueness of the

towns and should not attempt to reproduce the characteristics of the nearby city. In order to avoid a level playing field with other, potentially more economic powerful towns and cities, it is essential that a town positions itself according to attributes that are difficult to imitate elsewhere (Kaufmann & Arnold, 2017). Governance, the quality of institutions and power relations play a crucial role in such development and transformations processes (James, Thompson-Fawcett, & Hansen, 2015; Rodríguez-Pose, 2013).

However, not much research on the effects of such strategies exists. SMSTs located inside a metropolitan region seem especially likely to be highly influenced by the regional context, and the effects of local policies may have little influence on their economic characteristics and development processes. However, weak metropolitan integration could also provide local polities with more power. As the European Commission and UN-Habitat claim is “municipal fragmentation the rule in most European urban areas” and “local governments, including cities, play a greater policy role than regions do” (2016, pp. 182, 201). Unfortunately, SMSTs inside metropolitan regions have yet to receive much attention. So far, the literature treats metropolitan regions as one entity, without considering the places that constitute the region. Article 4 of this dissertation seeks to respond to this lack of information on local policies in SMSTs and their effects by focusing on their local development policies inside metropolitan regions and by investigating the effect of these policies on the economic structure of SMSTs.

## Context of the empirical analysis: Small and medium-sized towns in Switzerland

The empirical analyses in the four articles that compose this dissertation focus on SMSTs in Switzerland. 152 of the 162 officially defined cities/towns in Switzerland have less than 50,000 inhabitants and can, according to European definitions, be called SMSTs. In 2016, the 152 SMSTs in Switzerland hosted 30.5% of Swiss inhabitants (BFS, 2018). With its 402,762 inhabitants (in 2016), Zurich is the biggest city in Switzerland. Harkening back to older theories, the distribution of cities/towns in Switzerland does not comply with the optimal rank-size-rule, which says that every rank of a city multiplied by the numbers of inhabitants should be the same number as the biggest city (Auerbach, 1913). The distribution of the size of cities in Switzerland shows that Zurich does not dominate the whole city system, and therefore, no primate city exists size-wise. The Swiss urban system is polycentric and has three officially assigned metropolitan regions and one capital city region (Schuler, Dessemontet, Joye, & Perlik, 2005; Schweizerischer Bundesrat, KdK, BPUK, SSV, 2012). 90 SMSTs are located inside these four urban regions. The other 62 SMSTs are regional centres in less urbanised regions in Switzerland. Figure 1 shows the location of the 152 SMSTs in Switzerland.

I chose Switzerland as a suitable country to conduct my dissertation for several reasons. First, Switzerland has a polycentric urban system in which SMSTs play a crucial role as regional centres for economic activities and living – similarly to Germany or the Netherlands. Hence, the results of this dissertation can be to a certain extent be generalised to a European context. Second, as outlined above, Swiss SMSTs are located in different regional contexts and are therefore exposed to different exogenous development dynamics. This way, the interplay between exogenous and endogenous development factors can be analysed. Third, in Switzerland SMSTs have decision-making power, are in charge of their economic development strategies, tax base, etc., and can thus influence their fate to a certain extent.

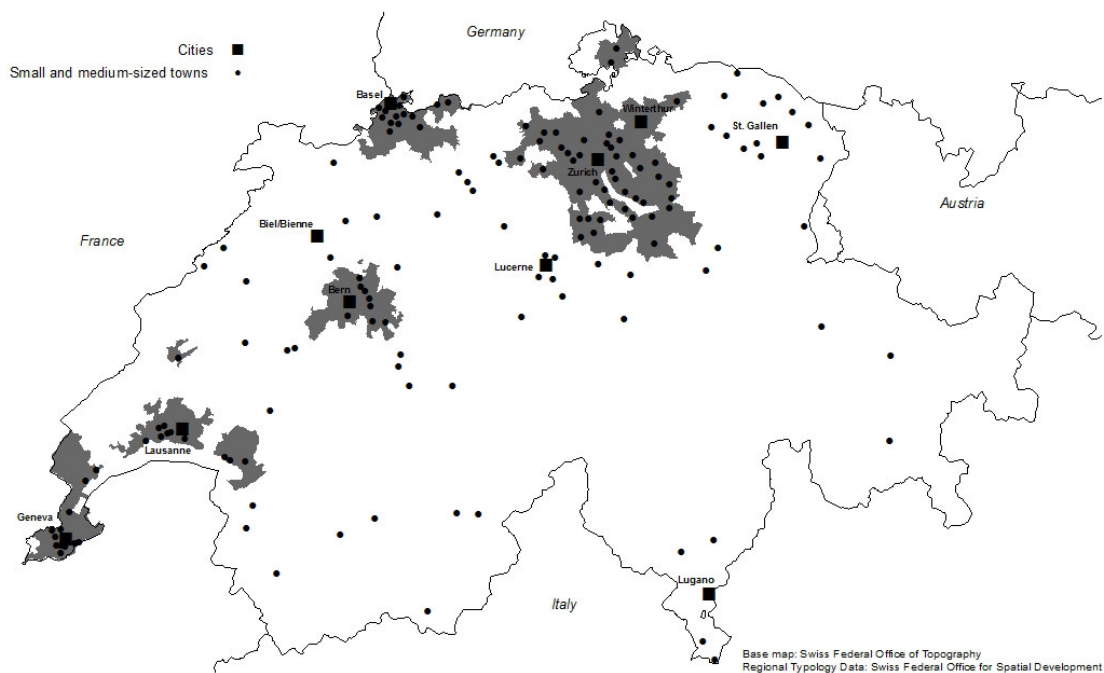


Figure 1 Map of Switzerland with cities and SMSTs (author's production)

This dissertation defines SMSTs by using the city/town definition provided by the Swiss Federal Statistical Office (Goebel & Kohler, 2014). In German, there is no difference between the word city or town – there is only the one word *Stadt*. To be a *Stadt* in Switzerland, it is necessary to have a continuous zone of inhabitants, jobs and equivalent for overnight stays (IJO) with a sum higher than 500 per km<sup>2</sup> in a grid cell with an edge length of 300m. This zone has to combine a total of at least 12,000 IJO. Moreover, the zone has to have a high density core with an IJO of more than 2,500 IJO per km<sup>2</sup>. The core zone has to have an absolute size of at least 5,000 IJO and more than half of the whole town's IJO. The Swiss Federal Statistical Office bases this method on the *Eurostat* methodology for defining a city/town and in order to make Swiss cities/towns more comparable to other European cities/towns. To make European studies comparable to Swiss SMSTs, I chose the most recent population threshold for European SMSTs by the ESPON TOWN Project, which defines SMSTs as towns that have between 5,000 – 50,000 inhabitants. However, studies that focus on SMSTs in the last couple of years have not always used the same definitions. Studies on SMSTs conducted in Germany or the Netherlands define small towns as places with between 5,000-20,000 inhabitants and medium-sized towns with 20,000 – 100,000 inhabitants (Gatzweiler et al., 2012; Van Leeuwen & Rietveld, 2011).

Despite the lack of urban 'local buzz', and the related shortage of skilled labour, limited cultural amenities, education and research institutions, SMSTs have other advantages, such as affordable living and working space, natural amenities and a high quality of life (Lorentzen & van Heur, 2012, p. 5). Most SMSTs in Switzerland are not totally peripheral. They mostly have good access to cities and, hence, to urban infrastructure. However, they must find strategies to cope with these advantages and disadvantages, and they cannot only rely on their size. Hence, these circumstances make them an interesting case for studying economic and innovation dynamics beyond urban size.

The literature mostly discusses the development of SMSTs in the context of urbanisation processes, such as counter-urbanisation or re-urbanisation (Daniels, 1989; Davies, 1990; Geyer & Kontuly, 1993; Hodge, 2007). These publications discuss the growth processes of small towns with regard to general

national urbanisation processes. Geyer & Kontuly (1993) claim that small towns mainly benefit from counter-urbanisation processes and that smaller towns close to cities may grow first, whereas their counterparts in the periphery experience growth at a later stage. Ultimately, small towns have higher growth rates than larger cities. This growth process should reduce large core-periphery differences. Once the net migration rate tends towards larger urban areas again, it induces a new metropolisation process. Different factors, such as economic innovation dissemination or the development of growth poles, which influence people's living environments, and hence their decisions to move, influence these migration processes (Geyer & Kontuly, 1993). Krzysztofik et al. (2016) introduce the term 'urban hibernation' to describe the state of small towns between two stages of growth. They claim that if a small town is in a state of multifaceted decline, the small town retains its potential and this may lead to a new development at another moment. While these studies mainly focus on migration processes, they do not explain the mechanisms behind the economic dynamics that might induce these processes. Such studies also lack an in-depth understanding of the economic activities that occur in SMSTs, and they do not illustrate what economic role they play and how they specialise within the larger urban system. Additionally, the central place theory posited by Christaller (1933) does little to contribute to the explanation of SMSTs' current economic characteristics and development processes. This is because it does not reflect the globalised economic, social and technical environment that we live in today, and it also does not seek differences between towns of the same hierarchy level. Generally, economic geography has so far done little to theorize specific economic activities occurring in SMSTs. We know that different regional contexts and SMSTs' positions within an urban system, as well as their endogenous potentials, lead to a great diversity of SMSTs (Servillo et al., 2014). As Servillo et al. (2014) show, national context highly influences the development and economic characteristics of SMSTs. Their analysis shows that most SMSTs in Europe have a greater proportion of industry employment, a higher proportion of children and pensionable adults and that their economy is more specialised compared to cities. However, the authors also claim that SMSTs' proximity to a bigger city, or location as part of an agglomeration, do not always explain the performance of SMSTs. More information about the heterogeneity among SMSTs and how different economic specialisations and development dynamics interrelate could help us gain a better understanding of polycentric urban systems and development trends that occur in places that stand between metropolitan centres and the periphery.

Finally, the innovation literature does not focus on the special situation that SMSTs are in. The empirical literature on innovation beyond core regions does not differentiate between various types of non-core regions (Tödtling & Trippl, 2005; Shearmur, 2012). The distinction between urban and peripheral is too rough in the innovation literature. The term non-core extends to small villages, including places with only a small accumulation of houses or towns that functions as regional centres. Small towns, with 25,000 inhabitants, that are outside the growth poles of the national economy provide a different innovation context compared to small villages with 500 inhabitants that have weak transportation connections to the next urban centre. A specific local and regional context could influence the kind of external knowledge that firms use and the way in which they acquire information. To understand innovation processes beyond core regions in more detail, it is necessary to go beyond the urban-rural dichotomy.

## Dissertation structure

The dissertation consists of four articles that each offer a different focus on the study of SMSTs. All four articles examine how SMSTs, despite their small size, develop certain economic characteristics and attract successful firms. Table 1 provides an overview of the different articles.

*Article 1* provides an overview of the economic heterogeneity of Swiss SMSTs and shows how different types of SMSTs are integrated into their surrounding areas. Using the cluster analysis method, Heike Mayer and I define seven types of SMSTs that have different economic characteristics and socio-economic dynamics. To analyse the relationships between these different types of SMSTs, and their linkages to neighbouring urban centres, we conducted an analysis of variance. This article contributes to the discussion on the influence of the regional context on the economic characteristics of SMSTs by demonstrating the heterogeneity of SMSTs inside the same regions and their linkages to their surrounding areas. The results also support arguments for the borrowed size concept (Meijers & Burger, 2015) and raise questions about other factors, such as policies or firm-level dynamics, that might influence the economic characteristics of SMSTs. We employ the typology developed in this article for the case selection in Article 4.

*Article 2* examines factors, other than regional context or size, which influence the economic characteristics of SMSTs and addresses the question of how firms are able to innovate in a small-town context. More specifically, I ask how small-town characteristics affect firms' open innovation processes. I examine whether multinational firms experience the same obstacles as single domestic firms. For the empirical investigation, I use a multiple case study design with qualitative interview data from five multinational high-tech firms and two single domestic high-tech firms for the theoretical replication. The article discusses the role of specific small-town characteristics, such as a thin labour market, a lack of urban amenities and the availability of transportation connections, in regard to how firms access external knowledge. The results show that a small size is not always an obstacle for acquiring external knowledge and that opportunities can also be an obstacle for some kinds of external knowledge sources. This article extends the existing literature on open innovation and innovation beyond core regions by shedding light on how specific location characteristics influence whether or not firms are able to access knowledge.

*Article 3* employs the same empirical material as Article 2, but it investigates how firms are able to generate and find diversity in a small town context. This article is the first in the economic geography literature that attempts to introduce a more differentiated view on diversity in a SMST context, and it argues that the highly discussed 'urban diversity' should not be taken for granted. Based on theories from the literature on sociology, Richard Shearmur and I attempt to introduce different dimensions of diversity. The empirical analysis demonstrates that firms in small towns are indeed able to draw on diversity, although they do so in dimensions that differ from those that characterise urban areas.

*Article 4* investigates the impact of local policies on the economic specialisation of SMSTs inside metropolitan regions. SMSTs inside metropolitan regions are mostly seen as being highly dependent on the dynamics that occur in the region. This article aims to analyse SMSTs' ability to steer their own economic development. David Kaufmann and I use a case study design that compares four SMSTs that are located within the metropolitan region of Zurich. Within these cases, we are able to control for regional contexts. With the help of 25 interviews and document analysis, we find that SMSTs inside metropolitan regions have trouble steering their economic development. Indeed, land-use planning seems to be the only way to influence the structure of SMSTs inside metropolitan regions.

Table 1 Overview of the articles in the dissertation

Research article	Research questions	Research method	Unit of analysis	Authorship	Status
1 – Small and medium-sized towns in Switzerland: Economic heterogeneity, socioeconomic performance and linkages	How can we group Swiss SMSTs according to their economic characteristics and their socio-economic dynamics?  What is the relationship between these different types of SMSTs and their linkages to the regional context?	Quantitative: Cluster analysis and analysis of variance	Swiss SMSTs	Rahel Meili Heike Mayer	Published in <i>Erdkunde</i> , 2017, Vol 71, No.4
2 – Open innovation in small towns: the effect of small town context on access to external knowledge	What obstacles and opportunities do multinational high-tech firms face when accessing external knowledge in small towns due to their location?  Is there a difference when compared to single-domestic high-tech firms?	Qualitative: Multiple case study design	7 high-tech firms	Rahel Meili	Submitted to <i>Entrepreneurship &amp; Regional Development</i>  Status: Revised and resubmitted
3 – Diverse diversities: Open innovation in small towns and rural areas	Are smaller towns and remote regions in fact as homogenous as the discourse on urban diversity would have us believe?	Qualitative: Multiple case study design	7 high-tech firms	Rahel Meili, Richard Shearmur	Submitted to <i>Growth &amp; Change</i>  Status: Under review
4 – Leaves in the wind? The impact of local policies on the economic specialization of small and medium-sized towns in metropolitan regions	Can SMSTs located inside metropolitan regions influence their economic development via local policies?	Qualitative: Pair-wise comparison, most similar system design logic	4 SMSTs	Rahel Meili, David Kaufmann	Submitted to <i>European Planning Studies</i>  Status: Revised and resubmitted

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# Article 1

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## **Small and medium-sized towns in Switzerland: economic heterogeneity, socioeconomic performance and linkages**

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**Abstract:** Knowledge about economic characteristics and development dynamics of small and medium-sized towns (SMSTs) is scarce. The aim of this article is to present insights into economic characteristics and development dynamics of SMSTs in Switzerland and to conceptualize the linkages of SMSTs with neighboring centers and hinterlands. SMSTs in Switzerland are independent jurisdictions that are in charge of their economic development strategies, tax base, etc, which can shape their socio-economic characteristics independently of the larger urban agglomeration they belong to. This circumstance makes them especially interesting for research particularly regarding the economic heterogeneity, socioeconomic performance and functional linkages these SMSTs have. The article presents seven types of SMSTs that have different economic characteristics and socio-economic dynamics. The types were built using cluster analysis. The typology shows that SMSTs can have different economic characteristics and development dynamics despite being embedded in the same regional context. For analyzing relationships between cluster membership and linkages to neighboring centers, we carried out an analysis of variance. It can be inferred that the intensity of linkages of SMSTs vary according to the type of SMSTs.

## SMALL AND MEDIUM-SIZED TOWNS IN SWITZERLAND: ECONOMIC HETEROGENEITY, SOCIOECONOMIC PERFORMANCE AND LINKAGES

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With 1 figure, 2 tables, 1 appendix and 1 supplement

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**Summary:** Knowledge about economic characteristics and development dynamics of small and medium-sized towns (SMSTs) is scarce. The aim of this article is to present insights into economic characteristics and development dynamics of SMSTs in Switzerland and to conceptualize the linkages of SMSTs with neighboring centers and hinterlands. SMSTs in Switzerland are independent jurisdictions that are in charge of their economic development strategies, tax base, etc, which can shape their socio-economic characteristics independently of the larger urban agglomeration they belong to. This circumstance makes them especially interesting for research particularly regarding the economic heterogeneity, socioeconomic performance and functional linkages these SMSTs have. The article presents seven types of SMSTs that have different economic characteristics and socio-economic dynamics. The types were built using cluster analysis. The typology shows that SMSTs can have different economic characteristics and development dynamics despite being embedded in the same regional context. For analyzing relationships between cluster membership and linkages to neighboring centers, we carried out an analysis of variance. It can be inferred that the intensity of linkages of SMSTs vary according to the type of SMSTs.

**Zusammenfassung:** Obwohl klein- und mittelgroße Städte (SMSTs) wichtige Funktionen in nationalen urbanen Systemen haben, ist wenig Wissen über sie vorhanden. Dieser Artikel hat daher das Ziel, einen Einblick in wirtschaftliche Charakteristiken und Entwicklungsdynamiken von SMSTs in der Schweiz zu geben und deren Verbindungen zu den benachbarten Städten und Umland zu konzeptualisieren. SMSTs in der Schweiz können Strategien zur wirtschaftlichen Entwicklung, Steuersätze, etc. selber festlegen und somit ihre sozioökonomische Entwicklung auch unabhängig von grösseren städtischen Agglomerationen beeinflussen. Dieser Umstand macht die Schweizer SMSTs hinsichtlich wirtschaftlicher Heterogenität, sozioökonomischer Charakteristiken und funktionellen Verbindungen spannend für die Forschung. Mit Hilfe einer Cluster Analyse wurden sieben SMST Typen gebildet, welche verschiedene wirtschaftliche Charakteristiken und sozioökonomische Dynamiken aufweisen. Die Analyse zeigt, dass SMSTs trotz Einbettung in derselben Region, unterschiedliche wirtschaftliche Charakteristiken und Entwicklungsdynamiken haben. Um die Beziehung zu benachbarten Städten und dem Umland zu analysieren, wurde eine Varianzanalyse durchgeführt. Die Ergebnisse deuten darauf hin, dass je nach Typ von SMST die Intensität der Verbindungen zu anderen Orten unterschiedlich ist.

**Keywords:** small and medium-sized towns, urban-rural linkages, Switzerland, urban development, metropolitan area, economic geography

### 1 Introduction

Over the last decades, economic specialization patterns and dynamics of small and medium-sized towns (SMSTs) have mostly gone unnoticed (BELL and JAYNE 2009; LORENTZEN and VAN HEUR 2012; SCHNEIDEWIND et al. 2006). On the one hand, scholars and policy-makers emphasized the role of metropolitan regions as engines of growth (THIERSTEIN et al. 2008; HALL and PAIN 2006) and on the other hand, they analyzed peripheral economies (NORTH and SMALLBONE 1996; TERLUIN 2003; ANDERSON 2000). Yet, towns that neither could be identified as metropolitan centers nor as periphery were mostly

neglected even though they account for a significant share of population in many countries (MAYER and KNOX 2010) and particularly in Europe (HAMDOUCH et al. 2017). Very recent research has taken up the challenge of examining smaller urban areas more systematically. The ESPON TOWN project, for example, analyzed European small and medium-sized towns (ATKINSON 2017; SÝKORA and MULÍČEK 2017; SMITH 2017; SERVILLO and PAOLO RUSSO 2017; SERVILLO et al. 2017; HAMDOUCH et al. 2017). Another set of publications focuses on development patterns in smaller urban settlements and on the fact that these cannot be explained focusing solely on agglomeration economies (BURGER et al. 2015; PARKINSON et al. 2015;

CAMAGNI et al. 2015). SCHNEIDEWIND et al. (2006, 101) note that “at a time when polycentric development is an issue for Europe, small and medium-sized towns represent an important reserve for urban development”. Others state that it is also “important to consider the economic diversity of the local economy in the SMSTs” (SERVILLO et al. 2014, 32). Different regional contexts and positions of SMSTs within an urban system as well as their endogenous potentials lead to a great diversity of SMSTs. Hence, one of the core conclusions of this recent research on SMSTs is that they are characterized by a diverse pattern of economic specialization (HAMDOUCH et al. 2017). Furthermore, the cited works show that it is important to consider SMSTs and their relationships within a polycentric urban system. The ways in which SMSTs are able to specialize economically and how they form linkages with other parts of the urban system seem to determine their success. Although economic specialization of SMSTs is acknowledged, it has not been examined systematically in the context of the heterogeneity of SMSTs. We note that the literature presents selective evidence (for example HAMDOUCH et al. 2017; HILDRETH 2006; GATZWEILER et al. 2012), yet it is missing a broader and above all empirically grounded overview of the economic situation and socio-economic dynamics of SMSTs within a polycentric national context. Moreover, the relationships of SMSTs with their regional context and their functional linkages within the polycentric urban system exert major influence on their economic characteristics. The relative distance to a city in particular can influence the flows occurring between SMSTs and their respective neighboring city. However, studies that focus on flows and linkages, manifested through e.g. commuting patterns and transportation linkages, do not try to find a relationship between the economic characteristics of a town and its linkages. SÝKORA and MULÍČEK (2017) for example looked at the relationship between inter-urban networks and performance in terms of population and jobs. Other studies focus on national or international networks and how these can positively influence metropolitan functions in small and medium sized towns within a functional urban area or in second tier cities, especially in regard to top firms, international institutions, cultural activities and science (CAMAGNI et al. 2015; MEIJERS et al. 2016; BURGER et al. 2015).

Based on the research gaps, this article focuses on SMSTs in Switzerland and aims at gaining a broader understanding of the economic heterogeneity and socio-economic performance of SMSTs as well as their geographical links with their sur-

rounding area. As Switzerland is often not included in European-wide analyses, it is important to examine SMSTs in this context, particularly also as the country represents a classic polycentric context similar to Germany or the Netherlands. With the help of a cluster analysis, we develop a typology of small and medium-sized towns in Switzerland that groups towns with similar economic features and socio-economic dynamics. To analyze the relationship between these different types of SMSTs and variables describing linkages of the towns, we carried out a one-way analysis of variance with the help of the Kruska-Wallis-Test. In doing so, we are conducting an exploratory study that is guided by the following research questions:

- How can the Swiss SMSTs be grouped regarding their economic characteristics and their socio-economic dynamics?
- What is the relationship between these different types of SMSTs and linkages with the regional context?

We follow the most recent population threshold for SMSTs by the ESPON TOWN project and define SMSTs as towns having between 5,000 and 50,000 inhabitants. Such a typology is useful for researchers and policy-makers because of the prevalence of spatial development concepts that have emphasized the role of metropolitan regions in a polycentric context while rather neglecting smaller settlements – regardless whether they are located inside metropolitan regions or outside. This is, for example, the case in Switzerland, where the so-called “Raumkonzept Schweiz” defines the strategic framework for polycentric spatial development (BR et al. 2012). The concept identifies networks of small and medium-sized towns but it does not emphasize or even highlight their economic roles, which stands in strong contrast to the well-defined economic functions of Switzerland’s major metropolitan areas Zurich, Basel and Geneva. Switzerland does not stand alone with this oversight as SERVILLO et al. (2017, 11) suggest when they note that most national and regional levels of governance “failed to consider the role(s) and function(s) of SMSTs”. In this article, we advance the argument that a profound understanding of metropolitan regions and a national urban systems requires to see metropolitan regions as more than a single urban entity and consider the strong autonomy of SMSTs.

The article is organized as follows: The next section presents the definition of SMSTs and their embeddedness in the urban context of Switzerland.



This section is followed by the literature review that connects the literature on SMSTs with insights from studies that help us understand contemporary SMST economy. The fourth section discusses the methodology of the study. We then present the SMST typology and the results from our analysis of linkages of the different SMST types with their respective regional context. The last section draws conclusions.

## 2 Small and medium-sized towns in Switzerland

The literature on small and medium-sized towns is characterized by a great variety of definitions that seem to be employed depending on the national context. German and Dutch authors define small towns as towns having between 5,000 and 20,000 inhabitants and medium-sized towns as towns having between 20,000 and to 100,000 inhabitants (GATZWEILER et al. 2012; VAN LEEUWEN and RIETVELD 2011). Studies examining SMSTs in the European Alps define them as “municipalities with at least 10,000 inhabitants or 5,000 jobs” (PERLIK et al. 2001, 245). The aforementioned definitions, however, are based merely on population thresholds and do not include morphological, functional and administrative aspects. These aspects were included in the most recent definition developed by the Swiss Federal Statistical Office (BFS) in 2014. It is based on the latest definitions of cities and rural areas developed by the European commission (DIJKSTRA and POELMAN 2014) but has been adapted for the Swiss spatial context<sup>1)</sup> (GOEBEL and KOHLER 2014). The BFS identifies a total of 162 towns in Switzerland. The population of these towns ranges from 5,067 to 396,955 (2015). The ten largest towns in Switzerland range from 54,163 to 396,955 population (2015). We call these ten towns cities in this article. As stated above, we follow the most recent population threshold for SMSTs by the ESPON TOWN project and define SMSTs as towns having between 5,000 and 50,000 inhabitants. Hence, we define 152 towns in Switzerland as SMSTs that range from 5,067 to 43,500 inhabitants in 2015.

<sup>1)</sup> To be defined as *town*, each town in Switzerland has to have a continuous zone of inhabitants, jobs and equivalent for overnight stays (IJO) which sum is higher than 500 per km<sup>2</sup> in a grid cell with an edge length of 300 m. This zone has to combine a total of at least 12,000 IJO. Moreover, the zone has to have a high density core with a IJO of more than 2,500 IJO per km<sup>2</sup>. The core zone has to have an absolute size of at least 5,000 IJO. This zone has to have more than half of the IJO of the whole town.

SMSTs in Switzerland are independent jurisdictions that are in charge of their economic development strategies, tax base, etc, which in turn can shape their socio-economic characteristics independently of the larger urban agglomeration they belong to. That means SMSTs have residual power in the Swiss political system of Switzerland, which consist of three institutional levels (municipalities, cantons, confederation). Besides the cantons that also have strong subsidiary powers, the confederation has a less important role than in other states (KAUFMANN et al. 2016). Hence, it is not necessary for a town to be isolated or separated from an urban agglomeration in order to be classified as a SMST, particularly because in a small-scale and polycentric context as is the case of Switzerland, SMSTs both inside and outside metropolitan regions play a crucial role in the urban system.

Nevertheless, the position of SMSTs within the national urban system must be considered to understand functions, characteristics and development dynamics (SCHNEIDEWIND et al. 2006). Switzerland is a classic example of a polycentric nation, in which metropolitan regions like Zurich, Basel, Geneva and Bern exert strong forces of urban concentration. The BFS bases the definition for metropolitan regions on commuting statistics. If agglomerations fulfill the threshold of minimum of 8.3 % out-commuters to the core agglomeration of the metropolitan region, then it is assigned to a metropolitan region<sup>2)</sup> (SCHULER et al. 2005). SMSTs that are located within an agglomeration that belongs to a metropolitan region are considered as being inside a metropolitan region. SMSTs can be located inside or outside these metropolitan regions. The BFS defines 49 urban areas as agglomerations. A location belongs to an agglomeration when at least on third of the employed inhabitants commute to the agglomeration center. The agglomeration center has to have a certain density and minimum size of inhabitants, employees and overnight stays (GOEBEL and KOHLER 2014). SMSTs can also be located within these agglomerations. In contrast to the agglomerations, periurban rural areas have moderately good access and the travel time with the motorized private transport to the next agglomeration center is less than 60 minutes (ARE 2013). There

<sup>2)</sup> Parts of the canton Schaffhausen belong to the metropolitan region of Zurich due to the number of inhabitants commuting to the core agglomeration of the metropolitan region of Zurich, even though there is a periurban rural area between the metropolitan region of Zurich and Schaffhausen. The high quality of transport infrastructure between Zurich and Schaffhausen could be a reason for that.



are six SMSTs located in the periurban rural areas in Switzerland. Finally, there are peripheral rural regions that are characterized by their rather large distance to agglomerations and metropolitan regions. Only three SMSTs are located in these areas (ARE 2013). Figure S2 (supplement) shows the location of SMSTs in relation to the various urban types we discussed above.

We chose Switzerland as a suitable country to conduct this study for three reasons. First, Switzerland is a country with a polycentric urban system in which – as outlined above – the vast majority of cities are SMSTs that are situated in different contexts and that fulfill different functions. Nearly two thirds of SMSTs are located within larger metropolitan regions such as Zurich, Geneva, Basel and Bern. Yet, SMSTs outside these metropolitan regions (that can be located in smaller agglomerations, periurban rural or peripheral rural areas) also fulfill important functions within the polycentric context. For example, in the western part of Switzerland we can find traditional watchmaking towns in the Jura region. Other towns include well-known tourist destinations in the Alps. Further, there are towns that are located at the intersection of two or more metropolitan regions that serve as important locations for industries. Second, due to the federal system, towns have a great deal of decision-making power and can influence their development dynamics for the most part independent of the cantonal and national administration (e.g. tax base). Third, even though Switzerland is a comparably small country, SMSTs are embedded within very different regional contexts that can also be found in other European countries (e.g. border regions, different language and cultural contexts, etc.).

### 3 Literature review

Although SMSTs are a crucial part of urban systems, little is known about their economic characteristics or development processes and an empirically grounded typology of SMST economies will be valuable. While the literature discusses the ways how towns can gain functions and improve their performance or which economic structures and geographic location lead to good performance, most studies are case-based and do therefore not discuss the heterogeneity of SMSTs in depth (e.g. BELL and JAYNE, 2006; OFORI-AMOAHI, 2007). Empirical studies of small and medium-sized towns tend to focus on a limited number of cases and sectors. For example, HAMDOUN (2017) distinguish three economic profiles of European SMSTs: residential economy (main-

ly public sector, local retail and personal services), productive economy (roughly equivalent to industrial and agriculture activities) and a mixed type that is influenced by the creative and knowledge economy (professional services and the creative economy). The 31 case study towns are from 10 European countries, not including any towns from Germany or Switzerland. Whereas this typology provides a good overview of different profiles, it is too general and does not explain specialization in more detail. Other studies of SMST specialization differentiate slightly more. HILDRETH (2006) groups English small and medium-sized towns into industrial towns, gateway towns, heritage/tourism towns, university towns, towns of a larger city-region and regional service towns. By mixing sectoral specialization and functional embeddedness within a territorial context, HILDRETH's (2006) study does little to advance our understanding of SMST specialization and its relationship to SMST linkages. Other studies provide general overviews of towns in different national or regional contexts (GATZWEILER et al. 2012; SERVILLO et al. 2014) or present in-depth case studies focusing on socioeconomic characteristics (often biased towards the creative economy) and development strategies SMSTs are pursuing (KNOX and MAYER 2013; LORENTZEN and VAN HEUR 2012).

There are also a few studies that answer the question how the SMST economy develops and changes over time. A number of those can be found for German SMSTs. Most of these studies, however, deal with towns situated in East Germany and they discuss primarily how SMSTs are affected by processes of shrinkage (LÜTKE 2004; GATZWEILER et al. 2012; WIRTH et al. 2016). None of these studies, however, relates development dynamics to SMSTs' economic specialization. Yet, the economic specialization influences development. Studies show that towns with an economy dominated by industry are less dynamic as towns with a knowledge based economy. According to HAMDOUN et al. (2017) the majority of SMSTs with a dominant industrial employment structure had to deal with lower employment growth rates since 2000. The same study found that around a third of the case study towns diversified their economic profile and were thus more successful regarding employment rate and number of businesses per capita. In addition, ERICKCEK and MCKINNEY (2006) illustrate that US towns with a dominant research, government or business sector have had higher growth rates than expected during the 1990s. In sum, these studies show that economic specialization and dynamics need to be examined in parallel.

### 3.1 Economic specialization of SMSTs

SMSTs may specialize in different economic sectors or economic functions. Recent developments in the literature encompass greater attention to local consumption and knowledge-based activities besides the traditional production-oriented focus.

An important economic sector for SMSTs is the residential economy (HAMDOUCH and BANOVAČ 2014). Residential economy includes economic activities that serve local or regional markets. Residents normally consume the products. Grocery stores and educational institutions are two examples of the residential economy. Firms that produce products for extra-regional demand do not belong to this sector. Towns with a high share of employment (SOE) in the residential economy can be expected to be towns with a central place function for their hinterland or towns that function as attractive residential places for people working in another town or city and spending their income where they live (SEGESSEMAN and CREVOISIER 2015). Hence, a high percentage of out-commuters facilitated by efficient transportation linkages to a nearby city may characterize these towns. The geographic context is especially relevant for such residential economy towns since shops and services in SMSTs inside metropolitan regions might face competition with other towns in the region or cities, whereas SMSTs in more rural locations are able to provide a wider array of services in the absence of strong competition from the hinterland (FERTNER et al. 2015).

Research about knowledge intensive business services and knowledge intensive financial services (KIBS/KIFS) in the context of SMSTs is rare. Yet, structural changes in the economy such as those towards a more knowledge-oriented economy also affect SMSTs. Most research on KIBS/KIFS focuses on the industry's central location within metropolitan regions. The dominant view focuses on internationally recognized (global) cities, such as London, Munich or Zurich that function as nodes in global economic networks and that ensure the exchange of capital, knowledge and talent (GLANZMANN et al. 2006). Businesses that provide knowledge intensive business and financial services form these networks (SASSEN 2001; TAYLOR 2004). While the mainstream literature on KIBS/KIFS and global cities has not focused on SMSTs as locations for this type of economy, SMSTs that are located within metropolitan regions can also be attractive locations for KIBS and KIFS. In this case, the image and the functions of the metropolitan center may be "borrowed"

(MEIJERS and BURGER 2015) by the SMSTs and close connections and fast transportation linkages to the center are crucial.

Nevertheless, the industrial or productive economy is still an important characteristic of many SMSTs (ARE 2008; HAMDOUCH et al. 2017). The productive economy, however, is not a homogeneous sector. Rather, it can be distinguished into high tech (for example machine industry) and low tech (for example textile) industry based on the respective innovation performance (EUROSTAT 2016). Nowadays globalization processes tend to challenge industrial locations. However, HAMDOUCH et al. (2017) found that most SMSTs hold on to their industrial specialization and consequently orient their development strategies towards those sectors. Evolutionary processes and path dependency may play a key role regarding the industrial specialization of SMSTs. New and technologically related industries are more likely to develop in areas with an already existing industry base (NEFFKE et al. 2011). Besides historical trajectories, SMSTs also offer specific location factors that differ from larger urban agglomerations: Cheap and available land, suitable workforce, and availability of raw materials were often the reason why towns were chosen as a production location. Yet, often there is a lack of employees with a tertiary degree working and living in these areas (HAMDOUCH and BANOVAČ 2014; HENDERSON 1997; HEMESATH et al. 2009). Nevertheless, towns with research-intensive industries, so called high tech industries, are important value creators and demand highly educated employees as well as knowledge and sales networks (FRIEDMANN 2002; HALL and PAIN 2006; CASTELLS 2010; KRÄTKE 2007).

SMST research has focused to a limited extent on the role of these towns as locations for business headquarters. Small and medium-sized firms and regionally embedded headquarters are seen as crucial factors for economic success and economic stability of SMSTs (KNOX and MAYER 2013; ADAM 2006). The presence of headquarters increases the share of skilled employees and can positively influence the wage level of a town (SHILTON and STANLEY 1999). SMSTs hosting business headquarters may have good transportation linkages to the next city or airport and a favorable tax system. Headquarters with a long history in the area are less likely to change location (STRAUSS-KAHN and VIVES 2009; HEMESATH et al. 2009).

Finally, particular SMSTs in regions with scenic landscapes base their economy heavily on the tourism sector (GATZWEILER et al. 2012). Towns located in mountain regions seem to be unfavorable to locating industrial or service activities. Yet, particularly in the

context of Switzerland, these towns mostly dispose of efficient train or road connections to urban areas. Hence, these towns can function as recreational areas for national metropolitan regions as well as for international guests. Consequently the tourist sector helps these towns gain importance as regional centers and also integrates them in international networks (PERLIK et al. 2001). The dependence on international markets and currency fluctuations however influence the growth paths of these towns (SCHMID 2010).

### 3.2 SMSTs and their linkages

While the aforementioned studies about the SMST economy present valuable insights into diverging specialization patterns, they offer limited insights into the ways in which the linkages between towns and their regional context may or may not influence these economies. Not only geographical proximity is crucial, but also linkages and connectivity to other places play an important role. Towns with different economic characteristics have special connectivity requirements (COX and LONGLANDS 2016). ŠÝKORA and MULÍČEK (2017) focus on the functional context towns are embedded in. Depending on the number of in- and out-commuters, SMSTs can either be defined as agglomerated (commuting flows that are significant only for themselves), networked (commuting flows that are significant for the destination center and for themselves) or autonomous (no significant out- or incoming flow of commuters). However, regarding job and population growth, no differences could be found in this study between the different functional types of towns. Yet, HAMDOUCH et al. (2017) note that the most dynamic SMSTs are rather agglomerated or networked than autonomous. Especially towns with a residential profile show higher population and employment growth rates if they are agglomerated or networked. Hence, the relative distance to the next core city can exert major influence on the flows occurring between SMSTs and their respective core city. Empirical evidence from different countries suggests that towns closer to larger cities grow faster and are also more specialized than towns further away from metropolitan centers (GATZWEILER et al. 2012; HAMDOUCH et al. 2017; POLÈSE and SHEARMUR 2006; SMITH 2017; VAISHAR et al. 2015). Yet, how a certain type of SMST and its linkages to the next city (e.g. in form of public transport, commuting time, etc.) relate has not been examined so far.

The concept “borrowed size” introduced by ALONSO (1973) provides another fruitful way to explain the influence a core city can have on SMSTs. ALONSO

(1973, 200) notes that a “small city or metropolitan region exhibits some of the characteristics of a larger one if it is near other population concentrations”. This concept has recently been refined and empirically tested by MEIJERS and BURGER (2015). They found that the borrowing size process is more likely to happen in polycentric metropolitan regions and between cities of the same size. If smaller cities borrow size, they mostly borrow performance whereas larger cities borrow functions. Cities that did not manage to borrow size can experience a so called “agglomeration shadow”. This means that close proximity to a core city can lead to the presence of fewer functions and a lower level of performance than expected regarding the size of the town.

In contrast to borrowing size, network concepts state that physical proximity can also be replaced by network activities and flows between towns (CAPELLO 2000; CAMAGNI 1993; CAMAGNI et al. 2015). Networks can help SMSTs organize their activities with the help of other locations, access functions and borrow benefits from larger urban agglomerations. As a result, they are able to overcome diseconomies of scale (PHELPS et al. 2001). Hence, network activities and linkages can determine the function and specific position of an SMST in an urban hierarchy. MEIJERS et al. (2016) conclude that “network connectivity is crucial and sometimes even more important than local size” (195). McCANN and ACS (2011) also confirm that global connectivity, especially through multinational companies, has gained importance and the size of a town has become less important in industrialized countries. In sum, while the borrowed size and network concepts concentrate on the effects larger urban areas can have on SMSTs, they have done little to explain how SMST economic characteristics relate to various forms of linkages.

## 4 Methodology

To be able to identify the heterogeneity of economic features and socio-economic performance of SMSTs and gain an overview about the relationship between these two attributes we carried out a cluster analysis. The cluster analysis groups SMSTs with similar characteristics in these two attributes. This way we could gain knowledge about the diversity of SMSTs regarding their economic and socio-economic performance. To analyze the relationship between cluster membership and variables describing linkages of the towns, we carried out a one-way analysis of variance with the help of the Kruska-Wallis-Test. In the following, we describe the two methods in detail.

#### 4.1 Cluster Analysis: Grouping SMSTs with similar economic features and socio-economic performance

Wards' minimum variance clustering method together with the squared Euclidean distance coefficient was chosen as the most suitable method to cluster SMSTs. This method is one of the two most often used statistical clustering methods (ROMESBURG 2004) and has also been applied in similar research projects (HEDLUND 2016; SCHMID 2010). The goal of Ward's method is to build homogenous and realistic clusters. The advantage of this method compared to other clustering methods is that after every merge of clusters a distance coefficient is calculated. The larger the distance coefficient is the more different are the towns that are being merged. Hence, it makes it easier to decide on the number of clusters (BACKHAUS et al. 2016; ROMESBURG 2004). With this method, it is possible to build a realistic number of clusters of towns with similar characteristics.

We chose 10 variables<sup>3)</sup> to describe both economic characteristics and socio-economic performance of SMSTs. A correlation analysis was carried out to exclude possible correlated variables. The variables have not shown correlations. Hence, no variables had to be excluded (BACKHAUS et al. 2016).

Five variables give information about the employment structures of the towns: Share of employment (SOE) in the high tech/medium-high tech industry, low tech/medium-low tech industry, knowledge intensive business services (KIBS) & knowledge intensive financial service (KIFS), residential economy, and accommodation & food/beverage service activities. These variables have been chosen because they determine economic specialization. We also expect geographical differences regarding these five variables. The high tech industry as well as the KIBS/KIFS variables play an important role in the metropolization process. Since both of these sectors rely on global networks and well educated people, the towns with a high SOE in these sectors depend strongly on places that function as global nodes or "global gateways" (GLANZMANN et al. 2006). Hence, we expect that these towns are located around the metropolitan centers (FRIEDMANN 2002; HALL and PAIN 2006; CASTELLS 2010; KRÄTKE 2007). In contrast, the low-tech industry might be

more represented in towns located outside metropolitan regions. A high SOE in the accommodation & food and beverage service activities is expected in the alpine tourist towns. The residential economy sells products and services needed for daily life and the products are not exported (SEGESSEMAN and CREVOISIER 2015). Hence, it can be assumed that towns with a dominant residential economy are either attractive living places or they may function as centers for their hinterlands.

In order to show economic growth or decline, changes in full time equivalent employment (FTE) between 1995 and 2008 were also included in the cluster analysis. Due to a change in the survey methodology<sup>4)</sup> in 2008, the numbers regarding FTE after 2008 cannot be compared to the numbers before 2008. The starting year 1995 has been chosen because it is a sufficient time period to detect development dynamics and the data from 1995 onwards has been adapted to the revised NOGA (Nomenclature générale des activités économiques definitions). Hence, 1995 was the earliest year and 2008 was the latest years we could use for a dynamic analysis regarding FTE.

In addition to change in employment, we also wanted to focus on entrepreneurial dynamics, large firms and human capital. Thus, we included on the one hand the cumulative number of new established firms 2009-2013 in our analysis. On the other hand, the number of top 500 industry, trading or service firms in Switzerland shows how attractive a town is for headquarters of large firms. The share of population over 25 years old with a tertiary education degree depicts the human capital available in these towns.

Finally, the percentage change in population development between 1995 and 2013 illustrates positive or negative demographic development. Variables that represent geographical information and relations, such as commuting statistics were deliberately left out. These data would depict the geographical locations and distract the cluster analysis from building types with a distinct economic profile. However, we use such data to find relationships between different SMST types and their linkages to the regional context.

<sup>3)</sup> All data could be obtained from the BFS, except the list of the number of top 500 industry, trading or service firms in Switzerland for the year 2013 was obtained from Handelszeitung and Bisnode Schweiz AG.

<sup>4)</sup> The BFS changed the survey methodology regarding business statistics in 2008. Hence, data before 2008 and after 2008 cannot be compared. For this reason, we can only analyze development dynamics from a given year until 2008, or from 2008 onwards. The new methodology includes very small businesses with one or two employees that have not been considered in the statistics before 2008.



We are aware that the different time periods of the variables are not optimal. However, the data show development trends over the last 20 years that help to characterize towns and are thus for the nature of a cluster analysis sufficient. Table S1 (supplement) provides a detailed overview of the variables and data used.

Due to the big range of values between the cluster variables, the data was standardized with the z-score standardizing function before starting the cluster analysis. Otherwise the variables with great ranges have more influence in determining the clusters (ROMESBURG 2004). Nevertheless, outliers can still heavily influence the outcome of a Ward's minimum variance cluster analysis. Hence, the Single Linkage Method was applied in order to eliminate them (BACKHAUS et al. 2016). As a result, we identified four outliers.

The number of clusters was determined by the width of range of the resemblance coefficient (ROMESBURG 2004). A large heterogeneity indicates that the cluster procedure should be stopped. A significant change in the distance coefficient occurred after the seventh cluster solution (see Fig. S1 in supplement). The discriminant analysis confirmed the seven-cluster solution with 91.9 % probability.

#### 4.2 One-way analysis of variance: Analyzing relationships between cluster membership and linkages

For analyzing relationships between cluster membership and linkages, we carried out an analysis of variance. Two linkages were derived from the literature review:

Commuting linkages: percentage of out-commuters as a share of the working population and percentage of commuters to the town from the surrounding area as a share of the working population (BFS 2010–2012).

Public transport linkages: The time it takes to travel to the next center, meaning either to the core cities Basel, Bern, Geneva, Lausanne, Lugano or Zurich or to the next agglomeration center or center without an agglomeration<sup>5)</sup> (whichever is closer) by public transport emphasizes the intensity of flows occurring between an SMST and a neighboring center. (ARE and SWISSTOPO 2011).

<sup>5)</sup> Definition for core cities, agglomeration center or center without an agglomeration bases on the definition by SCHULER et al. (2005). Agglomeration centers can also be inside a metropolitan region, each agglomeration has a center.

As the Shapiro-Wilks test confirmed, these variables are not normally distributed among the seven SMST types. Hence, in order to compare means, the Kruska-Wallis Test had to be carried out. Differences among the types could only be found for the out-commuting and public transportation linkages. No differences exist between the types for the number of in-commuters (see Tab. 1). To see which types differ significantly in the two left variables we carried out a post-hoc test (Dunn-Bonferroni-Test) (see Tab. 2).

#### 5 Economic heterogeneity, socioeconomic performance and linkages of Swiss SMSTs

The cluster analysis shows that seven distinct types of SMSTs regarding economic characteristics and socioeconomic performance can be built with the 10 used variables. The towns within a cluster are more similar to each other than to other SMSTs but can still have certain characteristics that they do not share with other members of the same cluster. Towns with above average employment and population growth rates have mostly a knowledge intensive economy or a residential economy and are located inside metropolitan regions.

In the following, we present the different types of SMSTs. Each of the types is given a name derived from the dominant characteristic of the cluster. Table A1 (appendix) as well as figure S2 (supplement) show the locations of the different types. Also cluster mean values and standard deviations can be found in table S2 (supplement). The different types of SMSTs will be presented according to the numbering of the hierarchical cluster analysis.

**Residential economy towns:** A large majority of small and medium-sized towns in Switzerland specializes in the residential economy. With an average of 65 % SOE in the residential economy and a small SOE in the industry, KIBS/KIFS and accommodation/food sector, they classify as typical towns with an economy that primarily serves local, residential needs. Nearly two thirds of these towns are located inside a metropolitan region and another 34.1 % belong to an agglomeration. The towns that belong to an agglomeration outside a metropolitan region are important regional centers, such as Brig-Glis or Thun. The data shows however, that this type experienced below average growth rates in terms of inhabitants, and FTE. The reason for this could be that these towns are to a certain extent saturated due to earlier growth processes not included in this analysis.

Tab. 1: Result of the Kruska-Wallis Test

	Out-commuters	In-commuters	Travel time by public transport to the next core city
Chi-Quadrat	24.795	8.969	36.250
df	6	6	6
Asymptotic Significance	.000	.175	.000

Level of significance: 0.05

### Prospering residential economy towns:

The type *prospering residential economy towns* combines sixteen towns with the highest growth rates in either population or FTE among all the 148-clustered towns. However, the cumulative number of new firms is below average compared to all other towns. Hence, we assume that public services have grown and already existing firms have expanded. Noticeably, the one town of this type that is situated in the agglomeration around Bern (Ittigen) experienced high employment growth benefitting from Bern's capital city function (KAUFMANN et al. 2016). All of these SMSTs are located close to a city with 11 of them belonging to a metropolitan region and five to an agglomeration. These towns are located around Zurich, Basel and Geneva.

**Business hub towns:** The type *business hub towns* includes towns that stand out due to their high number of headquarters of top firms, such as is the case of the airport town Kloten in the Zurich metropolitan region. They also stand out for their high number of new established firms, as shown in the example of Montreux. These towns have high SOE in the residential economy and at the same time an above average SOE in the KIBS/KIFS sector. Top firms located in these *business hub towns* may benefit from the towns' residential economy but also from the presence of a KIBS/KIFS economy. Top firms are often historically embedded in the towns and are able to draw on a specialized labor pool. However, there is evidence that multinational firms located in a SMSTs are more orientated towards Zurich or the whole of Switzerland and that they see the town in which they are physically located as less important (GALLATI and PÜTZ 2010). The *business hub towns* have average population and FTE growth rates. Geographically, the majority of *business hub towns* are inside a metropolitan region with a bias towards Zurich. This might be due to the need of international firms to be close to the airport in Zurich, to benefit from good public transport system and high quality of life (GALLATI and PÜTZ 2010). Additionally, towns outside metropolitan regions group in the Swiss plateau around

Zurich. Only a few of the *business hub towns* function as regional centers outside metropolitan regions, namely they are Chur and Neuchâtel. This type seems to indicate that a selected number of Swiss SMSTs fulfill an important role as locations for top 500 firms.

**Knowledge intensive towns:** This type reveals characteristics that are typical for metropolization processes: the towns within this type have a high SOE in the KIBS/KIFS sector. All towns of this type belong to a metropolitan region and have above average growth rates in new firms, FTE, and inhabitants. Two towns located in the Zurich metropolitan region stand out as good examples of KIBS/KIFS towns: Adliswil and Opfikon are located about nine km from downtown Zurich and both are less than 30 minutes by public transport away from the main train station and the airport. Adliswil is home to two major insurance companies whereas Opfikon is the location of a major Swiss bank. Both towns experienced high population growth and a high increase in total employment. Moreover, the towns of this type stand out due to their high share of inhabitants with a tertiary education degree, such as Küsnacht (Zurich) or Chêne-Bougeries (Geneva) that can be found close to the metropolitan centers in attractive urban areas.

**High Tech Towns:** As its name suggests, this type is characterized by specialized high tech industries. This type shows a weak residential economy compared to all other SMSTs in Switzerland. Towns of this type have mainly below average population and FTE growth rates. However, high tech industry towns inside the metropolitan region of Zurich have a high increase in the number of inhabitants. Two towns, namely Stans and Baden, experienced a high increase in population and FTE. Le Locle, a specialized watchmaking town, stands out compared to other towns of this type with a SOE of 53.2% in the high tech industry. The increase of FTE between 1994 and 2008 is also significantly higher than for all other towns, and finally the number of top 500 firms is the highest within this type. 11 of the 18 *high*

*tech towns* are located in an agglomeration outside a metropolitan region. Seven are located inside a metropolitan region. No *high tech towns* can be found in periurban or peripheral rural regions. Other examples of towns belonging to this type are Uzwil and Stäfa. Uzwil industrialized in the 19<sup>th</sup> century and was home to firms specialized in the production of mechanical looms and iron foundry at the time. One of these firms still exist today and is world leader in the machinery industry. Stäfa on the other hand is the location of a leading exporter of hearing aids, which was founded in 1947. These two examples illustrate the importance of historically embedded firms (HEMESATH et al. 2009).

**Low Tech towns:** This type is characterized by a high SOE in the low tech industry. 25 towns within this type have a small share of the population with a tertiary education degree as well as below average population growth and a low increase in total employment. These findings support SERVILLO et al. (2014) who note that industrially dominated towns had to deal with lower employment rates during the last decade than towns with different economic structures. Geographically, these towns are located either in an agglomeration outside a metropolitan region, especially in the eastern part of Switzerland, or inside a metropolitan region. Only three are in periurban rural regions and one in a peripheral rural region. *Low tech towns* may experience the agglomeration shadow (MEIJERS and BURGER 2015) of nearby cities and thus may not be able to profit from urban areas nearby. Most of the towns belonging to this type were industrialized in the early 19<sup>th</sup> century through the mechanization of the cotton spinery and belong to the first industrialized towns in Switzerland (ODERMATT and WACHTER 2004). Glarus is one example of a town belonging to this type as it is located at the outskirts of the metropolitan region of Zurich in a peripheral rural area and has a long tradition in textile production.

**Alpine tourism towns:** As its name suggests, this type groups well-known tourist towns. Three of the four towns are internationally known ski destinations (St. Moritz, Zermatt, and Davos). The other town (Interlaken) is close to famous mountains and mountain villages in the Bernese Oberland. These towns are not only nationally significant tourism centers but they also fulfil a crucial role for their rural hinterland. Their economy is characterized by a small share of industrial and KIBS/KIFS employment. Due to the strong tourism sector, the residen-

tial economy may strongly depend on the number of visitors. Regarding the dynamic variables, these towns have very low values and are for the most part far below the average.

**Outliers:** Three out of the four outliers, namely Zug, Baar, and Risch, are tax-friendly towns with dominant KIBS/KIFS (Zug and Baar) respectively high tech sectors (Risch). They are located in the canton of Zug, which is known for its fast transportation connections to Zurich and Luzern. These outliers show a high number of newly established firms between 2009 and 2013, many top 500 firms, a high share of inhabitants with a tertiary education degree and high growth rates of FTE and population. These three towns are globally connected through the presence of multinational companies. As a result, they gained functions (such as being a global node) that cannot be explained by their size (McCANN and ACS 2011). The second outlier is the town of Plan-les-Ouates, which is located very close to the French border and lies inside the Geneva metropolitan region. Plan-les-Ouates experienced the highest increase in population and total employment compared to all other SMSTs in Switzerland. Land availability, the location near the border to France, the motorway and airport connection as well as the favorable tax conditions for multinational companies are among the reasons for these development dynamics.

The Kruska-Wallis Test shows that SMST types only differ significantly in terms of their commuting and transportation linkages when the economy of SMSTs has completely different characteristics (see Tab. 2). SMSTs that specialize in tourism have significantly lower number of out-commuters compared to *residential economy towns*, *prospering residential economy towns* and *knowledge intensive towns*. *Residential economy towns*, *high tech towns*, *low tech towns* and *alpine tourism towns* have significantly longer travel times to the neighboring center compared to the *knowledge intensive towns* and might thus be subject to less intensive commuting linkages and hence different development trajectories. Whereas those towns that specialize in KIBS/KIFS benefit from their proximity to a neighboring center and are characterized by intensive exchange.

Synthesizing the existing literature on SMSTs with our results, different types of SMSTs and different kinds and intensity levels of linkages are illustrated in figure 1. While we only assessed the relationship between SMST types and linkages such as

commuting and transportation empirically, there are other types of linkages that need to be considered such as knowledge spillovers, gateway functions and the provision of basic supplies, education, health services, etc.

All SMST types are connected to the hinterland and neighboring centers. However, the kind and intensity of linkages a town has differ depending on the type of SMST. Figure 1 illustrates how *prospering residential economy towns*, *residential economy towns*, *knowledge intensive towns* and *business hub towns* depend on the one hand on linkages directed towards neighboring centers, such as out-commuters and fast transportation (arrows on the left directed towards neighboring center).

On the other hand, we have functions of neighboring centers that can be accessed by these SMSTs, such as gateway functions and knowledge linkages (arrows with direction toward SMSTs). That indicates that these types of SMSTs are mostly agglomerated with the neighboring center and profit from its functions and economic performance. Hence these towns are able to “borrow size” in form of population and FTE growth in the case of the *prospering residential economy towns* or also functions such as the presence of KIBS and KIFS in the case of the *knowledge intensive towns* (MEIJERS and BURGER 2015). Besides their KIBS/KIFS activities, *knowledge intensive towns* represent residential areas in accessible locations and thus show a high de-

**Tab. 2: Comparison of commuting statistics and travel times with public transport to the next center**

		M	SD	Types with significant different means*
Residential economy towns N: 44	Out-commuters	60.2%	12.1%	
	In-commuters	55.2%	8.8%	
	Time to the next center	33.7min	23.9min	
Prospering residential economy towns N: 16	Out-commuters	67.1%	9.3%	
	In-commuters	53.6%	11.7%	
	Time to the next center	24.8min	16.4min	Alpine tourism towns
Business hub towns N: 31	Out-commuters	57.0%	13.3%	
	In-commuters	53.9%	10.0%	
	Time to the next center	26min	22.4min	Alpine tourism towns
Knowledge intensive towns N: 10	Out-commuters	67.6%	5.3%	
	In-commuters	55.1%	6.5%	
	Time to the next center	9.3min	8min	Residential economy towns, High tech towns, Low tech towns, Alpine tourism towns
High tech towns N: 18	Out-commuters	55.9%	13.5%	
	In-commuters	55.8%	11.1%	
	Time to the next center	45.9min	28min	
Low tech towns N: 25	Out-commuters	56.3%	12.8%	
	In-commuters	48.7%	11.9%	
	Time to the next center	44min	26.9min	
Alpine tourism towns N: 4	Out-commuters	18.8%	17.7%	Residential economy towns, prospering residential economy towns, knowledge intensive towns
	In-commuters	27.7%	25.4%	
	Time to the next center	139.3min	64.3min	

\*All of these differences show medium to high efficiency, according to the classification by COHEN (1992)



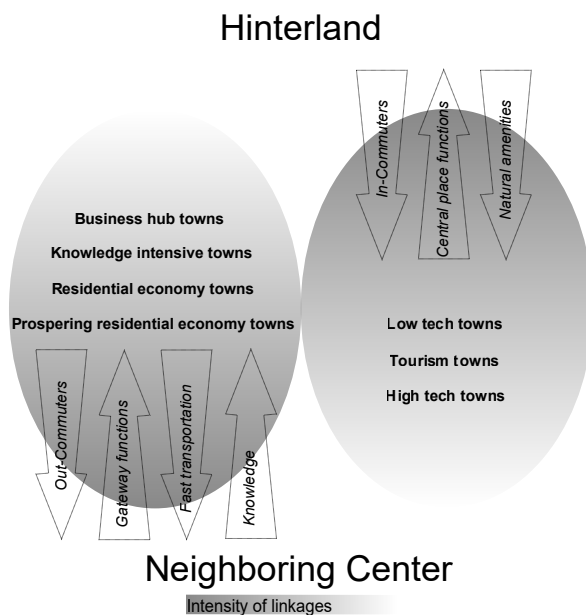


Fig. 1: Conceptualizing SMSTs and their linkages to centers and hinterland

gree of out-commuters, yet they depend on knowledge exchange with institutions and firms and also on the gateway functions of neighboring centers. It takes inhabitants of the *residential economy towns* significantly longer time to reach neighboring centers when compared to the inhabitants of the *knowledge intensive towns*. However, as is the case with *prospering residential towns* and *knowledge intensive towns*, *residential economy towns* also depend on employment possibilities for their inhabitants in neighboring centers. In contrast, the linkages with the hinterland (arrows on the right side), such as in-commuter, natural amenities for recreation, and central place functions, are more intense for *high tech towns*, *low tech towns* and *alpine tourism towns*. These types of towns are therefore more isolated from the neighboring center than the aforementioned and might be too far away from them to be able to “borrow size”. *Alpine tourism towns* base their economy on the natural amenities their hinterland has to offer, whereas the natural amenities for *low tech* and *high tech towns* might be valuable for attracting people to live and work in these towns. The longer it takes to reach the neighboring centers, the more important will be the towns’ central place functions and the jobs available for their hinterland. It seems that towns with an economic structure that is more similar to cities such as Zurich or Geneva are more closely aligned to core regions, while towns that depend less on center’s characteristics are more closely aligned with the hinterland in terms of their functions.

## 6 Conclusion

The results show that SMST economies specialize in a wide variety of sectors including industry, knowledge intensive sectors, residential economy, tourism and that they can be important locations of business headquarters. Moreover, geographic patterns as well as different dependence on commuting and public transportation linkages regarding the typology of towns could be found. Our results support on the one hand the observations by SERVILLO et al. (2014) as well as ERICKCEK and MCKINNEY (2006) that service-oriented towns have higher growth rates compared to industry dominated towns. Hence, considering the borrowed size concept (MEIJERS and BURGER 2015), these towns may be able to benefit from the economic dynamics in the metropolitan center and borrow performance in terms of population, employment and new firm growth. On the other hand, this result confirms also the finding of HAMDOUCH et al. (2017) that agglomerated and networked towns are more successful in terms of population and employment growth. However, we also saw that the landscape of SMSTs and their linkages to neighboring centers are more diverse as suggested in other studies before and moreover that different types of SMSTs do not significantly differ in terms of regional context, commuting and transportation linkages. One explanation for the presence of *high tech towns* relatively far away from universities in Switzerland and close to *low tech towns* can be the evolutionary processes of individual firms over many years. The multinational high tech firms in SMSTs in the eastern part of Switzerland, for example, have been in these towns since the early industrial age and they have developed from rather low-tech suppliers for the textile industry to world leading high tech firms. The reason for some towns to be *prospering residential economy towns* might lie in the availability of housing and high levels of quality of life. At this stage, we did not investigate the relationship between low communal tax rate for natural persons and *prospering residential economy towns*. However, this could be another explanation for prospering residential economy towns.

The results of this study point towards two interesting lines of inquiry for future research. First, because there are indeed different types of SMSTs in the same regional context, we need to consider SMSTs as single urban entities also in the context of metropolitan regions. Second, it is necessary to examine the influence of economic development policies and local politics to better understand dif-

ferences in economic specialization, dynamics and linkages. Third, evolutionary processes and temporal changes in the economic structure should be analyzed more deeply. This study has not focused on changes in the economic profiles of SMSTs. Overall, this study showed that SMSTs in the same regional context are heterogeneous in terms of economic characteristics, dynamics and linkages and their different needs must be acknowledged when designing place based economic development policies.

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## Appendix

**Tab. A1: Swiss SMSTs: Typology, number of inhabitants and location**

ID	SMST	Economic Type	Population 2013	Location*
2	Affoltern am Albis	Residential economy towns	11,276	1
52	Bassersdorf	Prospering residential economy towns	11,243	1
53	Bülach	Residential economy towns	17,975	1
62	Kloten	Business hub towns	18,402	1
66	Opfikon	Knowledge intensive towns	16,116	1
69	Wallisellen	Business hub towns	14,188	1
96	Regensdorf	Business hub towns	16,975	1
117	Hinwil	High tech towns	10,615	1
118	Rüti (ZH)	Low tech towns	11,968	1
121	Wetzikon (ZH)	Prospering residential economy towns	23,274	1
131	Adliswil	Knowledge intensive towns	18,037	1
133	Horgen	Business hub towns	19,282	1
138	Richterswil	Low tech towns	12,832	1
141	Thalwil	Business hub towns	17,340	1
142	Wädenswil	Residential economy towns	20,967	1
154	Küsnacht (ZH)	Knowledge intensive towns	13,518	1
155	Männedorf	High Tech towns	10,470	1
156	Meilen	Low tech towns	12,816	1
158	Stäfa	High tech towns	13,876	1
161	Zollikon	Knowledge intensive towns	12,163	1
174	Illnau-Effretikon	Residential economy towns	16,117	1
177	Pfäffikon	High Tech towns	11,027	1
191	Dübendorf	Business hub towns	25,341	1
198	Uster	Business hub towns	32,748	1
199	Volketswil	Prospering residential economy towns	17,768	1
243	Dietikon	Business hub towns	24,843	1
247	Schlieren	Business hub towns	17,199	1
250	Urdorf	Business hub towns	9,471	1
306	Lyss	Low tech towns	14,080	2
329	Langenthal	Residential economy towns	15,184	2

ID	SMST	Economic Type	Population 2013	Location*
355	Köniz	Business hub towns	39,375	1
356	Muri bei Bern	Knowledge intensive towns	12,675	1
361	Zollikofen	Residential economy towns	9,977	1
362	Ittigen	Prospering residential economy towns	10,997	1
363	Ostermundigen	Low tech towns	15,871	1
404	Burgdorf	High tech towns	15,659	2
546	Münchenbuchsee	Low tech towns	9,749	1
581	Interlaken	Alpine tourism towns	5,504	2
616	Münsingen	Residential economy towns	11,566	1
768	Spiez	Low tech towns	12,549	2
861	Belp	Low tech towns	11,108	1
939	Steffisburg	Residential economy towns	15,515	2
942	Thun	Residential economy towns	42,735	2
1024	Emmen	Residential economy towns	28,701	2
1054	Ebikon	High Tech towns	12,571	2
1058	Horw	Residential economy towns	13,618	2
1059	Kriens	Residential economy towns	26,751	2
1103	Sursee	Business hub towns	9,079	3
1201	Altdorf (UR)	Residential economy towns	8,981	4
1301	Einsiedeln	Low tech towns	14,632	1
1322	Freienbach	Knowledge intensive towns	15,758	1
1362	Arth	Low tech towns	10,924	3
1372	Schwyz	Low tech towns	14,663	2
1407	Sarnen	Low tech towns	9,959	3
1509	Stans	High tech towns	8,112	2
1630	Glarus Nord	Low tech towns	17,198	3
1632	Glarus	Low tech towns	12,312	4
1701	Baar	Outlier	22,355	1
1702	Cham	Business hub towns	15,020	1
1707	Risch	Outlier	9,779	1
1708	Steinhausen	Residential economy towns	9,213	1
1711	Zug	Outlier	27,537	1

ID	SMST	Economic Type	Population 2013	Location*
2125	Bulle	Prospering residential economy towns	20,177	2
2196	Fribourg	Business hub towns	36,633	2
2228	Villars-sur-Glâne	Prospering residential economy towns	11,975	2
2546	Grenchen	High Tech towns	16,173	2
2581	Olten	Business hub towns	17,133	2
2601	Solothurn	Residential economy towns	16,465	2
2703	Riehen	Residential economy towns	20,699	1
2761	Aesch (BL)	High tech towns	10,220	1
2762	Allschwil	Business hub towns	19,898	1
2763	Arlesheim	Residential economy towns	9,073	1
2765	Binningen	Residential economy towns	14,817	1
2766	Birsfelden	Low tech towns	10,277	1
2769	Münchenstein	Residential economy towns	11,715	1
2770	Muttenz	High Tech towns	17,339	1
2771	Oberwil (BL)	Residential economy towns	10,721	1
2773	Reinach (BL)	Residential economy towns	18,661	1
2829	Liestal	Residential economy towns	13,708	1
2831	Pratteln	Residential economy towns	15,282	1
2937	Neuhausen am Rheinfall	Residential economy towns	10,220	1
2939	Schaffhausen	Business hub towns	35,413	1
3001	Herisau	High tech towns	15,222	2
3215	Rorschach	Low tech towns	8,918	2
3251	Altstätten	Low tech towns	11,075	2
3271	Buchs (SG)	Residential economy towns	11,536	2
3340	Rapperswil-Jona	Business hub towns	26,354	1
3402	Flawil	Low tech towns	10,126	2
3408	Uzwil	High Tech towns	12,726	2
3427	Wil (SG)	Low tech towns	22,985	2
3443	Gossau (SG)	Low tech towns	17,941	2
3787	St. Moritz	Alpine tourism towns	5,147	2
3851	Davos	Alpine tourism towns	11,156	2
3901	Chur	Business hub towns	34,087	2

ID	SMST	Economic Type	Population 2013	Location*
4001	Aarau	Business hub towns	20,103	2
4012	Suhr	Prospering residential economy towns	9,673	2
4021	Baden	High tech towns	18,522	1
4040	Spreitenbach	Prospering residential economy towns	10,930	1
4045	Wettingen	Residential economy towns	20,135	1
4082	Wohlen (AG)	Residential economy towns	14,879	1
4095	Brugg	Residential economy towns	10,611	1
4201	Lenzburg	Residential economy towns	8,626	1
4254	Möhlín	Prospering residential economy towns	10,455	1
4258	Rheinfelden	Residential economy towns	12,174	1
4280	Ofringen	Prospering residential economy towns	12,939	2
4289	Zofingen	High tech towns	10,824	2
4401	Arbon	High tech towns	14,012	2
4436	Romanshorn	Low tech towns	10,353	2
4461	Amriswil	Residential economy towns	12,619	2
4566	Frauenfeld	Business hub towns	24,119	1
4671	Kreuzlingen	Residential economy towns	20,520	2
4946	Weinfelden	Business hub towns	10,699	3
5002	Bellinzona	Residential economy towns	17,744	2
5113	Locarno	Residential economy towns	15,483	2
5250	Chiasso	Business hub towns	7,933	2
5254	Mendrisio	Low tech towns	14,499	2
5401	Aigle	Prospering residential economy towns	9,703	2
5583	Crissier	Prospering residential economy towns	7,402	1
5589	Prilly	Residential economy towns	11,709	1
5590	Pully	Knowledge intensive towns	17,368	1
5591	Renens (VD)	Residential economy towns	20,232	1
5624	Bussigny	Low tech towns	8,122	1
5635	Ecublens (VD)	Residential economy towns	11,427	1
5642	Morges	Residential economy towns	14,994	1
5721	Gland	Prospering residential economy towns	11,693	1
5724	Nyon	Knowledge intensive towns	19,170	1



ID	SMST	Economic Type	Population 2013	Location*
5822	Payerne	Residential economy towns	9,146	3
5886	Montreux	Business hub towns	25,456	1
5889	La Tour-de-Peilz	Residential economy towns	10,828	1
5890	Vevey	Business hub towns	18,594	1
5938	Yverdon-les-Bains	Residential economy towns	28,486	1
6002	Brig-Glis	Residential economy towns	12,728	2
6136	Martigny	Business hub towns	16,897	2
6153	Monthey	Residential economy towns	16,880	2
6248	Sierre	Low tech towns	15,945	2
6266	Sion	Business hub towns	32,167	2
6297	Visp	High tech towns	7,281	2
6300	Zermatt	Alpine tourism towns	5,786	4
6421	La Chaux-de-Fonds	High tech towns	38,267	2
6436	Le Locle	High tech towns	10,208	2
6458	Neuchâtel	Business hub towns	33,474	2
6608	Carouge (GE)	Knowledge intensive towns	20,375	1
6612	Chêne-Bougeries	Knowledge intensive towns	10,530	1
6623	Le Grand-Saconnex	Prospering residential economy towns	11,847	1
6628	Lancy	Business hub towns	28,909	1
6630	Meyrin	Business hub towns	21,718	1
6631	Onex	Prospering residential economy towns	17,851	1
6633	Plan-les-Ouates	Outlier	10,250	1
6640	Thônex	Low tech towns	13,587	1
6643	Vernier	Business hub towns	33,744	1
6644	Versoix	Prospering residential economy towns	12,879	1
6711	Delémont	Residential economy towns	11,809	2

List of Towns: Federal Statistical Office (BFS) (2014). *Statistische Städte 2012 [Statistical Towns 2012]*. Neuchâtel: BFS.

Source of population data: Federal Statistical Office (BFS) (2013). *STATPOP, 31.12.2013*. Neuchâtel: BFS.

\*Location:

1: Metropolitan region

2: Agglomeration outside metropolitan region

3: Periurban rural region

4: Peripheral rural region

Tab. S1: Cluster variables

Variable	Deinition	Data source
Share of Employment (SOE) in the high tech/medium-high tech industry 2013	Nomenclature générale des activités économiques (NOGA) Ref. 2: 20-21, 26-30 (EUROSTAT 2016)	Bundesamt für Statistik ( <i>Federal Statistical Office</i> ) (BFS) (2013). <i>STATENT 2013</i> . Neuchâtel: BFS.
SOE in the low tech/medium-low tech industry 2013	NOGA Ref. 2: 10-19, 22-25, 31-33 (EUROSTAT 2016)	
SOE in the KIBS & KIFS sector 2013	NOGA Ref. 2: 62-66, 69-73 (EUROSTAT 2016; SCHNABL and ZENKER 2013; SCHRICKE et al. 2012)	
SOE in the Residential Economy 2013	NOGA Ref. 2: 36-39,41-43, 45-47, 49-53 (without 501, 502), 58, 60, 68, 74, 75, 77-82, 842, 843, 85, 86-88, 90-96 (SEGESSEMANN and CREVOISIER 2015) <sup>1)</sup>	
SOE in the accommodation and food & beverage service activities 2013	NOGA Ref. 55, 56	Handelszeitung and Bisnode Schweiz AG (2015). <i>Die grössten Industrie-, Handels- und Dienstleistungsunternehmen in der Schweiz 2015 [The biggest Industry, Trading or Service Firms in Switzerland 2015]</i> . Urdorf: Handelszeitung & Bisnode.
Number of top 500 industry, trading or service firms in Switzerland 2013	Ranking according to the consolidated revenue	
Share of population over 25 years old with a tertiary education degree 2010-2014 cumulative		
Change of number of total full time equivalent 1995 - 2008		Bundesamt für Statistik (BFS) (1995 - 2008). <i>Betriebszählung 1995-2008 [Business census]</i> . Neuchâtel: BFS.
Cumulative number of new established firms 2009-2013		Bundesamt für Statistik (BFS) (2009 - 2013). <i>UDEMO 2009 - 2013</i> . Neuchâtel: BFS.
Population Development 1995 - 2013	% Change of number of inhabitants	Bundesamt für Statistik (BFS) (1995 - 2013). <i>STATPOP 1995-2013</i> .Neuchâtel: BFS.

<sup>1)</sup> In contrast to SEGESSEMANN and CREVOISIER(2015) the NOGA Ref. 33, 62-66, 69 and 55-56 have not been included, because they have been assigned to the Low tech/medium-low tech industry, KIFS/KIFS or accommodation/food-beverage service activities variables. Also only the codes were taken into account that belong regardless of size of business (number of jobs) to the residential economy (for more information see SEGESSEMANN and CREVOISIER (2015))

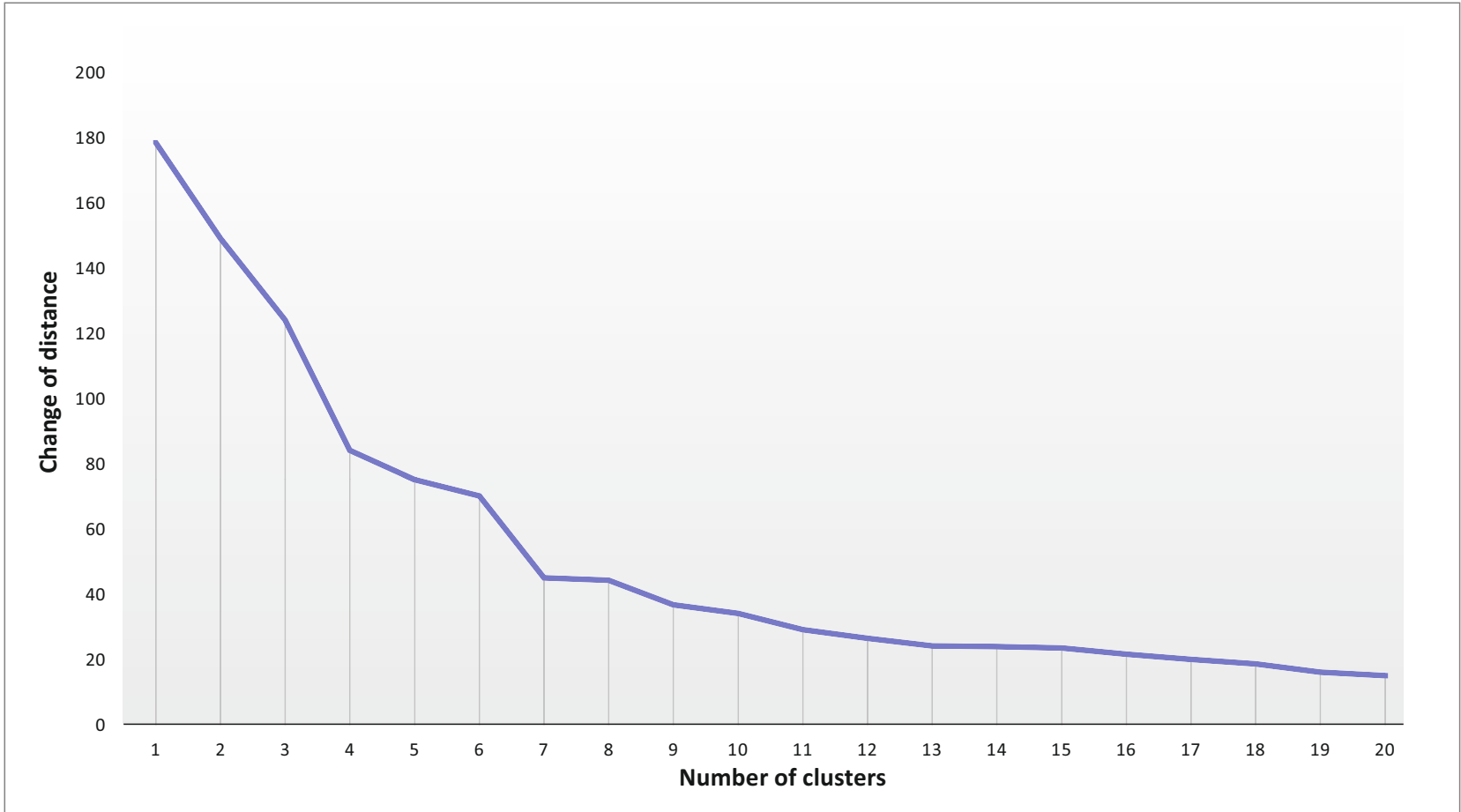
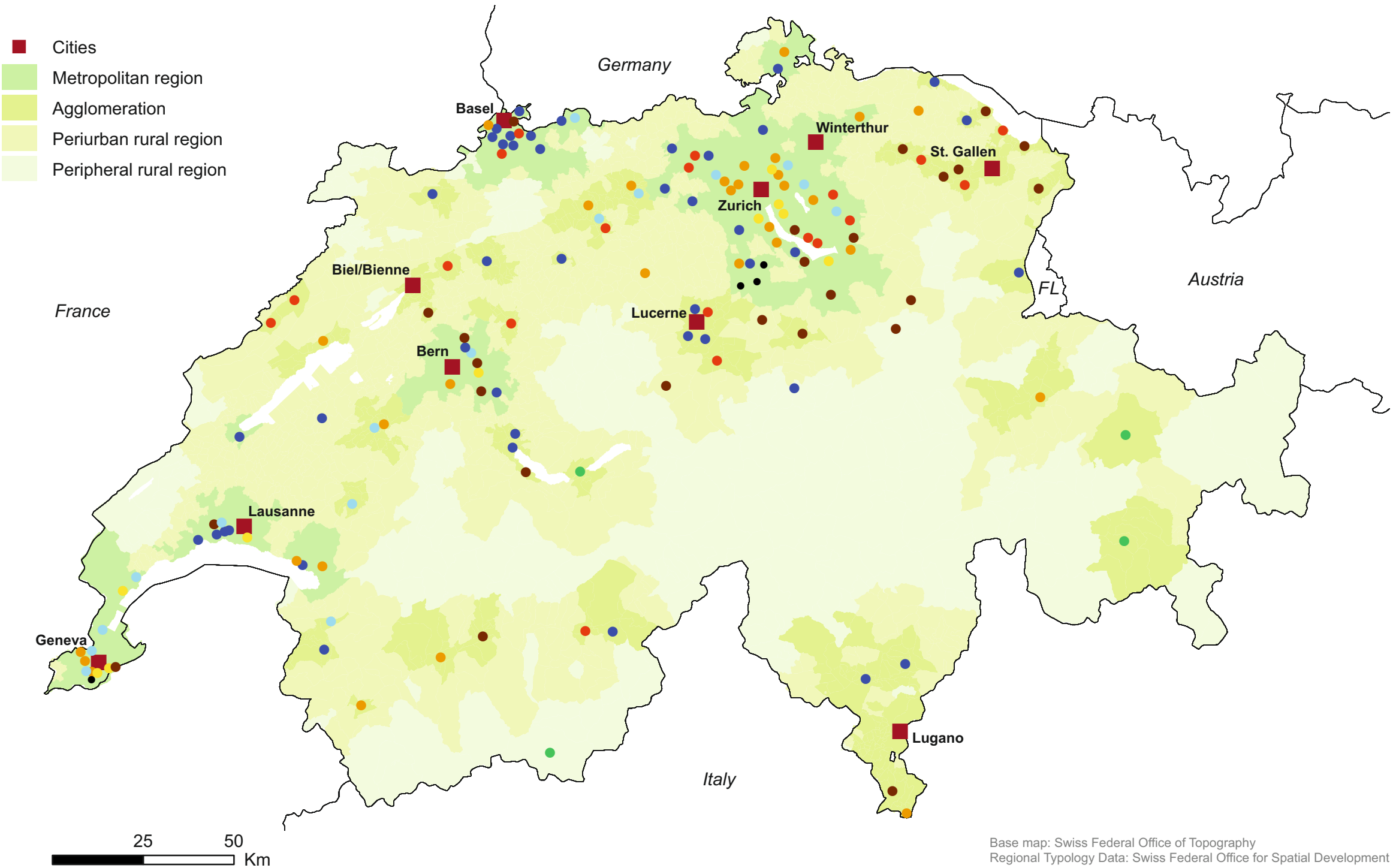


Fig. S1: Change in the distance coefficient between merged clusters

Tab. S2: Cluster mean values, standard deviations and location

Type	N		Change in number of inhabitants 95-13	Change in number of full time equivalent 95-08	SOE High Tech 2013	SOE Low Tech 2013	SOE KIBS/ KIFS 2013	SOE Accom/ Food 2013	SOE Residential Econ. 2013	Cumm. Nr of new firms 2009 - 2013	Number of top500 firms 2013	Share of inhabitants with a tertiary education degree	% of towns in Metro	% of towns in Agglomeration	% of towns in Peri-urban rural	% of towns in Peripheral rural
1 Residential economy towns	44	M	12.1%	8.7%	8.4%	6.8%	12.9%	3.3%	64.6%	96.6	0.3	20.4%	61.4%	34.1%	2.3%	2.3%
		SD	7.7%	11.3%	5.8%	3.5%	5.8%	1.2%	7.7%	39.0	0.4	5.1%				
2 Prospering residential economy towns	16	M	36.6%	32.0%	6.6%	8.1%	9.6%	4.0%	66.9%	87.2	0.9	20.6%	68.8%	31.3%	-	-
		SD	18.0%	27.3%	5.5%	4.9%	2.7%	2.9%	7.7%	35.2	1.0	6.3%				
3 Business hub towns	31	M	15.5%	15.5%	5.2%	6.0%	17.2%	3.9%	63.6%	196.5	2.1	21.0%	67.7%	25.8%	6.5%	-
		SD	8.3%	14.7%	3.5%	3.2%	5.5%	2.1%	5.5%	88.9	1.4	4.1%				
4 Knowledge intensive towns	10	M	17.8%	28.4%	2.1%	3.3%	31.6%	3.3%	57.0%	201.9	0.4	31.8%	100%	-	-	-
		SD	12.8%	13.1%	1.7%	2.0%	9.9%	1.1%	10.2%	142.8	0.7	9.0%				
5 High tech towns	18	M	12.7%	7.1%	28.0%	8.9%	9.6%	2.7%	47.6%	87.6	1.4	20.7%	38.9%	61.1%	-	-
		SD	12.6%	13.1%	11.6%	4.6%	5.0%	0.6%	8.8%	52.8	1.1	5.5%				
6 Low tech towns	25	M	12.4%	8.3%	6.4%	18.3%	10.0%	3.5%	57.5%	83.7	0.2	18.3%	40%	44%	12%	4%
		SD	9.7%	15.7%	5.1%	4.9%	3.5%	1.4%	7.4%	43.6	0.4	5.1%				
7 Alpine tourism towns	4	M	2.7%	-4.7%	0.2%	3.3%	8.0%	37.7%	48.5%	49.0	0.0	15.0%	-	75%	25%	-
		SD	6.1%	8.1%	0.1%	0.9%	2.9%	13.7%	9.5%	12.0	0.0	2.3%				
Total	148	M	15.7%	13.4%	8.9%	8.6%	13.8%	4.4%	60.1%	119.1	0.8	20.9%	58.1%	35.8%	4.1%	2.0%
		SD	13.0%	17.6%	9.5%	6.0%	7.7%	6.1%	9.8%	80.8	1.2	6.2%				
Outliers	4	M	54.7%	79.1%	23.7%	4.1%	18.8%	2.3%	48.9%	607.5	4.8	27.8%	100%	-	-	-
		SD	31.3%	52.2%	17.3%	2.2%	7.4%	0.8%	8.4%	612.7	5.9	5.8%				



- Prospering residential economy towns

● Residential economy towns

● Low tech towns

● Alpine tourism towns

● High tech towns

● Business hub towns

● Knowledge intensive towns

● Outliers

Fig. S2: Geographical distribution of the different types of SMSTs

# Article 2

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## **Open innovation in small towns: the effect of small town context on access to external knowledge**

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Journal: Entrepreneurship & Regional Development

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**Abstract:** The lack of variety and density of people, companies and knowledge institutions in small towns compel companies to seek new knowledge beyond their location. However, there is only scant research explaining the local characteristics that influence companies' ability to access external knowledge. In this article, we focus on the obstacles and opportunities that arise due to companies' locations in small towns and that emerge when they seek to access external knowledge sources. Moreover, we would like to examine whether or not multinational companies experience the same obstacles that single domestic-companies do. We use a multiple case study design with qualitative interview data from five multinational high-tech companies in small towns in the eastern part of Switzerland. We also conduct a theoretical replication of the case study by investigating two single domestic high-tech firms. The results show that a thin labour market, a lack of urban amenities and the availability of transportation connections to bigger cities are most important for accessing the knowledge of new employees, collaborating with universities and for attending workshops or conferences. On the whole, multinational companies in small towns face the same obstacles and opportunities as single domestic firms in small towns.

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## Introduction

Innovative companies pursue an open innovation model, meaning that they search for ideas and knowledge beyond their boundaries (Chesborough 2003). Open innovation includes a wide range of activities that encourage firms to expand their innovation activities by obtaining new inputs from external sources (Huizingh 2011). The literature considers urban areas to be the most favourable environments for open innovation due to their high diversity and their density of different actors, companies and institutions. In this perspective, geographical proximity to other actors fosters rapid and easy knowledge exchange within urban areas and creates a so-called ‘local buzz’. The lack of this variety and density of people, companies and knowledge institutions in small towns makes it necessary for companies to search for new knowledge beyond their locations. Fitjar and Rodriguez-Pose (2011), as well as Grillitsch and Nilsson (2015), show that innovative companies in small towns access external knowledge, meaning knowledge that is not inherent within their companies’ boundaries, through different non-local sources.

In this article, we seek to extend the literature on open innovation to small towns and we concentrate on two aspects. First, we focus on the obstacles and opportunities that companies face when they access external knowledge sources due to their location in small towns. As Tödting and Trippel (2016, 151) claim, local characteristics influence the knowledge accessing process:

“They [companies] face different challenges sourcing and acquiring such knowledge depending on their location. Also, the potential to get access to and combine different knowledge bases varies between metropolitan, specialized industrial and organizationally ‘thin’ contexts.”

Shearmur and Doloreux (2016) show that companies in non-core regions use infrequent interactions and non-market-sourced information, such as universities, more often, whereas companies in core regions more often use frequent interactions and market-sourced information, such as consultants. Hence, companies in different environments may be more likely to access certain knowledge sources than others. While the literature acknowledges the importance of external knowledge and the influence of local characteristics on the open innovation process, there is little research explaining which local characteristics influence companies’ ability to access external knowledge. For this reason, we focus on companies located in small towns<sup>1</sup> in the eastern part of Switzerland. The small towns examined function as central places outside core-regions, and they provide basic supplies, education and health services and have good transportation connections to core regions (Christaller 1933). Natural amenity-rich environments and good transportation connections to core regions may attract highly-educated employees that bring along knowledge and networks to companies located in non-core regions (Keeble and Tyler 1995; Mayer, Habersetzer, and Meili 2016; Moss 2006). Thus far, the literature on economic development, and on innovation in particular, has ignored the category of small towns (Bell and Jayne 2009). A thin labour market, the presence of a limited amount of

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<sup>1</sup> To be defined as a town in Switzerland a settlement must have a density of inhabitants, jobs or equivalent for overnight stays, whose sum is higher than 500 per km<sup>2</sup> in a grid cell with an edge length of 300 meters (see Goebel and Kohler 2014 for more information on the definition).

companies and the absence of research institutions result in a local environment where companies have few opportunities to obtain new ideas and knowledge. Nevertheless, companies in these towns are not in the absolute periphery. Instead, they are embedded in a medium-interaction environment. This means that while companies do not have immediate access to innovation partners, they do have easy access to non-local factors of innovation (Shearmur 2012). Consequently, we acknowledge the difference between small towns and more remote villages when we discuss innovation outside core regions. The urban-rural dichotomy in the innovation literature seems too general to provide an appropriate understanding of the different obstacles and opportunities that companies face when accessing knowledge beyond core regions.

Second, we investigate whether or not multinational companies (MNCs) experience the same obstacles as single domestic-companies (SDCs) when accessing external knowledge. MNCs perceive obstacles to innovation in their geographical location as less relevant than SDCs do (Iammarino, Sanna-Randaccio, and Savona 2009). This is because their subsidiaries in other locations can access local knowledge and transfer it to headquarters and the companies' global network (Cantwell and Iammarino 2003; Mattes 2016). Hence, multinational companies have other opportunities to compensate for the lack of local knowledge in their hometowns than single domestic companies (Regnér and Zander 2011). The literature on open innovation beyond core regions only marginally discusses how companies' global scopes affect the kind of non-local knowledge used. Differentiating between multinational and national companies when analysing non-local sources of knowledge seems to be crucial for understanding innovation mechanisms, particularly when we focus on these dynamics in non-core regions. In fact, in this age of globalization and outsourcing, small towns in Switzerland seem to persist as the locations of multinational high-tech companies.

This article seeks to explain how small town context affects companies access to external sources of knowledge. The key argument proposed in this article is that a better understanding of the open innovation processes in non-core regions requires an in-depth understanding of how specific location characteristics can either be an obstacle or opportunity for companies' open innovation process. To extend the literature on this issue, we conduct a multiple case study with five multinational high-tech companies (MNCs) with headquarters and R&D departments in small towns in Switzerland. For the theoretical replication, we investigate two single domestic high-tech companies in Switzerland. This approach allows us to obtain a higher external validity and to test if small town characteristics affect the extent to which multinational and domestic companies access knowledge. The following research questions drive the multiple case study:

*What obstacles and opportunities do multinational high-tech companies face when accessing external knowledge in small towns due to their location? Is there a difference when compared with single-domestic high-tech companies?*

Bearing these research questions in mind, the next section summarises the literature on open innovation beyond core regions and MNCs. Afterwards, we introduce our research approach and outline our multiple case study. We then present our results and focus on the location characteristics that affect high-tech companies' open innovation process and the difference between MNCs and SDCs. Finally, we summarize the findings and draw conclusions.

## Literature review

### Open innovation in small towns

A number of economic geographers show that, although there are fewer innovative companies in less urbanized regions, innovation occurs in small towns and is not only a result of inter-company competencies, but also of linkages to external knowledge sources (Aslesen and Isaksen 1998; Fitjar and Rodríguez-Pose 2011; Grillitsch and Nilsson 2015; Keeble and Tyler 1995; Lee and Rodríguez-Pose 2013; Shearmur and Doloreux 2016). Hence, open innovation is also the key to success for companies in more rural regions. However, the lack of ‘local buzz’ in small towns makes it necessary for companies to look beyond their local and regional borders in order to find new ideas and knowledge outside their local environment (Bathelt, Malmberg, and Maskell 2004). Empirical evidence shows that innovative companies in non-core regions have a higher probability of using international knowledge sources and are more likely to participate in national and international collaborations than their counterparts in core regions (Grillitsch and Nilsson 2015; Lorentzen 2007; Teirlinck and Spithoven 2008; Tödtling, Grillitsch, and Höglinger 2012). Capello (2017) distinguishes between different territorial patterns of innovation on the level of endogenous potential and linkages to external partners and emphasizes that ‘local buzz’ is a prerequisite for innovation in every case. Besides the endogenous innovation pattern, which draws on local conditions for the creation of knowledge, the creative application pattern relies on creative actors who search for knowledge outside the local environment and apply it locally to innovation needs. Cappello’s argument also supports Grillitsch and Nilsson’s (2015) conclusion that collaboration and networks allow innovative companies in non-core regions to compensate for the lack of local knowledge spillovers.

The open innovation process functions over large distances because not all innovations require constant face-to-face interactions between innovation partners, other forms of proximity can substitute geographical proximity for certain kinds of innovations and different companies require different knowledge sources (McCann 2007; Tödtling and Grillitsch 2014; Tripl 2009). Torre (2008) argues that geographical proximity is only necessary during certain stages of the innovation process and that mobility can temporarily organize geographical proximity. In line with these insights, Shearmur and Doloreux (2016) note that companies in non-core regions more often make use of non-market-sourced information (universities, community colleges, government-run laboratories, conferences, fairs and the Internet), and they thus call them ‘slow innovators’. In contrast, companies in core regions more often require frequent interactions and market-sourced information (clients, suppliers, consultants, commercial laboratories and research institutions). Furthermore, Lorentzen (2007) found that low- and medium-tech companies in non-core regions most often use customers and media as their sources.

Generally, in-house capabilities, knowledge intensity, knowledge base, the attitudes and values of managers and the company’s age and size influence access and acquisition of external knowledge (Aslesen and Freel 2012; Fitjar and Rodríguez-Pose 2011; Grillitsch and Nilsson 2015, 2017; Malecki and Poehling 1999). Research also shows that industries that rely on slowly decaying technological information or analytical knowledge are less dependent on geographical proximity for the acquisition of new scientific knowledge, and they choose interlocutors that are mostly not local (Martin and Moodysson 2011; Morrison and Rabellotti 2009). Depending on a company’s product lifecycle, as well as its knowledge base, it is more or less likely to engage in national or international knowledge exchange. Companies with a short product lifecycle and an analytical knowledge base (transformation of scientific knowledge) are

most likely to engage in international collaborations, whereas companies with a long product lifecycle and synthetic knowledge base (application of existing knowledge, applied research) are least likely to work with extra-regional partners (Aslesen and Freel 2012; Herstad, Aslesen, and Ebersberger 2014). Hence, as these empirical results illustrate, small towns are not a default hostile environment for innovation – at least for certain innovations. Indeed, an overflow of external partners – as may occur in urban regions – can even make companies less innovative, since they may no longer be able to identify and absorb crucial information (Laursen and Salter 2006). Although we have an idea of the kind of external sources of knowledge different companies in non-core regions may use, the literature reveals little about the location characteristics that influence the knowledge accessing process.

Most studies that analyse open innovation processes in small towns focus on the type and amount of external knowledge sources that companies use but neglect the obstacles or opportunities that companies face while attempting to access these sources. Hence, we know little about how local circumstances in small towns may foster or hinder companies' open innovation process. The labour market in small towns is rather thin, these regions are less attractive to young and well-educated people since there are fewer opportunities for occupational progression (Gordon 2015). Accordingly, the lack of skilled personnel and the cost of innovating are some of the most important barriers to innovation for most companies (Galia and Legros 2004; Madrid-Guijarro, Garcia, and Van Auken 2009). Additionally, the lower availability of financial capital in small towns may influence companies' financial opportunities, and their ability to access non-local knowledge sources (Cowling 1998).

However, the specific characteristics of locations, as well as their distance to core regions, can influence how companies are able to access external knowledge and how they can use other local companies or institutions as cooperation partners (Capello 2017; Shearmur 2012; Tödtling and Trippl 2016; Trippl, Grillitsch, and Isaksen 2017). In this article, we focus on how the context of small towns in medium-interaction environments affect companies' access to external knowledge sources. Medium-interaction environments have good access to core areas but lack a 'local buzz' (Bathelt, Malmberg, and Maskell 2004). As Shearmur (2012, 121) suggests, "the location of a region relative to other regions is a key determinant of employment, population and income growth (and, I suggest, of innovation dynamics) irrespective of other factors." Small towns with good connections to core areas may be able to attract commuters and 'borrow' functions and performance from neighbouring cities, thereby compensating for their size (Alonso 1973; Meijers and Burger 2015). Empirical evidence shows that the relative distance to other cities or towns influences the flows of people between small towns and bigger cities (Sýkora and Mulíček 2017). In fact, the mobility of labour is seen as one important carrier of knowledge between regions (Tödtling and Trippl 2016). Accordingly, the missing 'local buzz' may be less important for locations that are easily accessible than for more remote locations. However, geographical proximity to a core region itself is not the only benefit of a small town. Economic, cultural or social networks that connect different institutions and actors can also provide small towns with access to different functions and assets and may help companies to access external knowledge (Camagni, Capello, and Caragliu 2015; McCann and Acs 2011; Phelps, Fallon, and Williams 2001; Shearmur 2012). Small towns in a medium-interaction environment are neither totally peripheral nor highly urbanized. As a result, they represent a category that the literature rarely discusses, particularly in innovation studies (Bell and Jayne 2009).

## MNCs and the geography of innovation

As research shows, the global reach of a company influences whether or not it perceives constraints to innovation in its environment (Iammarino et al. 2009). Studies mostly investigate the innovation processes of companies outside core-regions without discussing their respective global scopes. Whether a company is multinational or not can influence its capability to access external sources of knowledge. Subsidiaries in different national contexts allow MNCs to more easily access knowledge from outside the seat of their headquarters and to access international innovation networks (Cantwell and Iammarino 2003; Iammarino and McCann 2015; Mattes 2016; Regnér and Zander 2011). Cantwell and Iammarino (2003) differentiate between three types of MNC innovation networks. The first type, the intra-company network, includes knowledge flows between parent company and its subsidiaries. The second type consists of the network between subsidiaries and indigenous companies. Lastly, the third type is a network with knowledge exchange between the parent company and other companies.

Research shows that knowledge exchange and innovation cooperation between subsidiaries and their headquarters is not an automatic process. MNCs tend to concentrate their main activities in one place and subsidiaries might only exchange knowledge within their boundaries, not with the rest of the company (Mattes 2016). Contrary to popular believe, MNCs are often reluctant to disperse their innovation activities and they develop most innovation projects at one location. Therefore, innovation in MNCs remains bound in space, as Mattes (2016, 408) concludes:

“the co-location of critical activities remains a driving factor, it facilitates interaction and it helps to maintain control. On the other hand, the dispersed configuration of the MNC itself, with subsidiaries spread across various countries, means that there exist possibilities to draw upon knowledge from all over the world (...). This means that MNCs are not in all respect as global as we tend to think.”

Nevertheless, subsidiaries embed MNCs in different institutional and business environments and hence make them ‘neither completely footloose nor completely embedded companies’ (Heidenreich et al. 2012, 2). If a MNC decides to disperse its innovation activities among its subsidiaries and counts with appropriate strategies for knowledge exchange, it has the opportunity to obtain knowledge from different places (Heidenreich et al. 2012). However, even if a company does not disperse its innovation projects, it still depends on, and can benefit from, its intra-company network as a source of learning. Organizational proximity is, however, an important precondition for a well-functioning network among different subsidiaries (Aslesen, Hydle, and Wallevik 2017).

These results reveal that MNCs have other opportunities available when compared with SDCs. Therefore, it is not surprising that MNCs perceive obstacles to innovation to be less significant than SDCs and are thus also less sensitive to their local context (Iammarino et al. 2009). By combining the literature on innovation beyond core regions and the literature on MNCs, we assume that a small town context affects MNCs differently than SDCs.

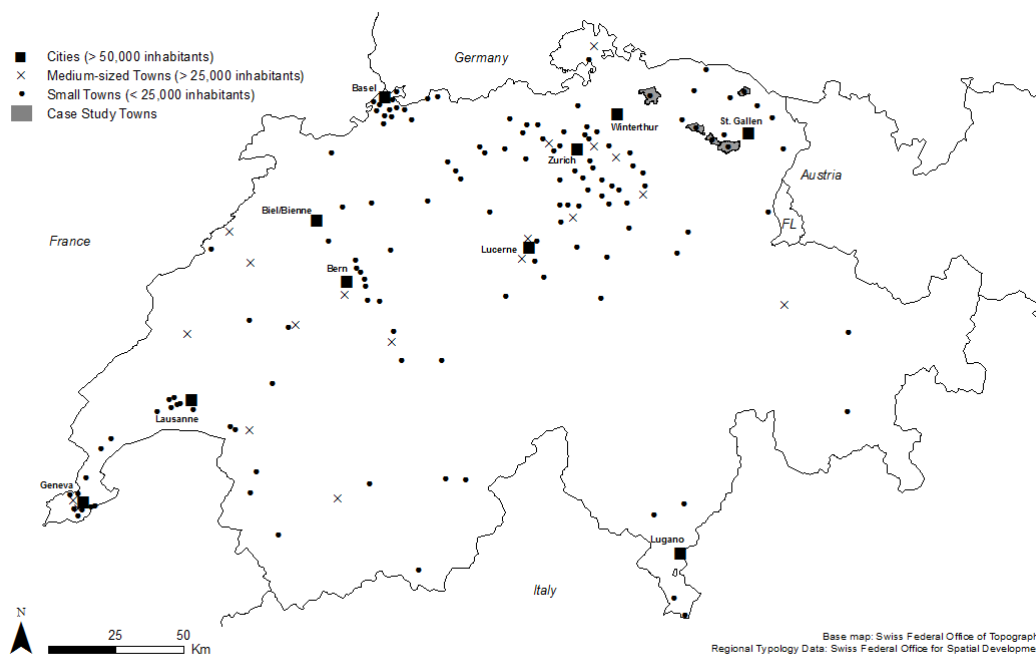
## Research setting and method

To understand how a small town context affects Swiss multinational high-tech companies that access external knowledge, we choose to apply a multiple case study design (Yin 2009). In addition to the literal replication of five MNCs, we conduct a theoretical replication with two



companies located within the same regional context but without international subsidiaries. This method increases the external validity of the study and allows us to observe how a company's specific characteristics— in this case its global scope— influence how it experiences obstacles or opportunities when accessing external knowledge.

The study area includes small towns in the eastern part of Switzerland that lie between 40km and 80km from Zurich (see Figure 1). This article defines small towns as towns that have between 5000 and 25 000 inhabitants. The small towns in this study area are in the agglomeration around the city of St.Gallen (75 538 inhabitants), and they ranged in size from 9214 to 24 864 residents in 2015 (BFS 2017). The periurban-rural region that embeds these small towns is a medium-interaction environment with good access to core regions in Switzerland and Europe but without immediate access to local innovation partners. Universities that specialise in technical sciences (particularly engineering) are absent in this part of Switzerland.



*Figure 2 Study Area*

This region has a long industrial history. The textile industry emerged around the 1860s and the machine industry developed alongside it as its major suppliers. While the textile industry significantly declined and almost disappeared, some of the suppliers in the machine industry could diversify their products and became important in their respective niches. Today, approximately one third of employees in the eastern part of Switzerland work in the secondary sector, two thirds in the tertiary sector and less than ten percent in the primary sector (BFS 2015). The 2008 location coefficients show that the high-tech industry predominantly resides outside of Swiss core regions, such as Zurich or Geneva, in the eastern part of Switzerland close to the Lake Constance and in the western part of Switzerland in the Jura region (BFS 2008).

We primarily chose this regional context due to the presence of a number of multinational high-tech companies in small towns. For this study, we use high-tech companies as the units of

analysis, and we define the high-tech industry according to its technology intensity<sup>2)</sup>. We calculate the technology intensity as R&D expenditure relative to value added (Eurostat 2016). Among high-tech companies in the eastern part of Switzerland, we select MNCs that have their headquarters in small towns. Most of these companies have a long history in their hometowns (20 years or more). By focusing on companies that have been in small towns for a longer time, we can also find reasons for why these companies persistently remain in small towns in the current age of globalization and outsourcing. Moreover, by focusing on older firms we can be sure that the companies in question had to obtain new knowledge in order to further develop their products over the years, and that they therefore have experience in how the context of small towns affects accessing external knowledge. Companies may only recognize the advantages and disadvantages of their locations when they meet them during their activities (Galia and Legros 2004).

Five companies in four different small towns comply with these criteria and were willing to participate in this study. For the theoretical replication, we select two high-tech companies that also export their products worldwide, but which only have one national location for production and development. These two cases allow us to test and compare the results obtained from the MNCs (Yin 2009).

Table 1 provides an overview of the companies and the interview partners. Table A1 in the Appendix lists the participants and the durations of the interviews in more detail. In total, we conduct 28 semi-structured interviews. In contrast to traditional studies on companies, we conduct three to six in-depth interviews for each company. To understand how a small town context affects companies, we interview different people with different functions. The initial request for company participation and the subsequent first interview with the companies' point of contact allowed us to access important people in the companies. We consult CEOs, innovation managers, production managers and human resource managers. Additionally, we also conduct a set of interviews with public officials from the small towns to ensure that we obtain insights into companies' development context. Hence, we speak to directors of industry organizations and local authorities that are responsible for companies in these towns. The interviews last from 14 to 84 minutes and we conducted them between February and June 2017. We fully transcribed the interview recordings and analyse them using the MAXQDA software, using codes to categorise the data. We also consult company brochures, webpages and corporate reports to prepare the interview questions and to crosscheck the information that the interviewees provide us. We ensure data triangulation through interviews with different key people in the companies and the document analyses.

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<sup>2)</sup> High-technology includes the manufacturing of basic pharmaceutical products and preparations and the manufacturing of computer, electronic and optional products.

High-medium technology includes the manufacturing of chemicals and chemical products, the manufacturing of electrical equipment, the manufacturing of machinery and equipment, the manufacturing of motor vehicles, trailers and semi-trailers, and the manufacturing of other transport equipment

Table 1 Sample Characteristics<sup>\*)</sup>

Firm	Nr. of countries/continents represented in with a subsidiary	Town	Nr. of Interviews	Function of Interviewees	Mean interview duration
Literal Replication: MNHTs					
Firm 1	13/4	A	6	Head of Innovation, Head Human Resources, Director Business Development, Director Operations, Chairman of the town`s trade association, Chairman of the town`s industry association	30min
Firm 2	76/6	B	4	Head of Human Resources, former CEO, Regional location adviser, Director of the cantonal chamber of commerce and industry	53min
Firm 3	20/6	C	3	Head Global Training, Head Product Management & Development, Head Mechanics / Tool Shop	49min
Firm 4	42/6	C	3	Head of Production, Head of Development, Head of Human Resources	22min
Firm 5	19/5	D	4	CEO, Plant Manager/Managing Director, Head of Development, Director of the Cantonal Chamber of Commerce and Industry	31min
Theoretical replication: NHTs					
Firm 6	1	E	5	Executive Manager, Analytical Development Manager, Senior Manager R&D, Quality Assurance Manager, Deputy Head of Production	30min
Firm 7	1 (+ 1 subsidiary in Germany for trading purpose)	C	3	Head of Operations, Head of Human Resources, Director of town`s economic and local promotion department	28min

<sup>\*)</sup>In order to secure the anonymity of the firms in this study, the firms cannot be characterised in more detail.

## Results

The overarching result of our study is that MNCs and SDCs in small towns do not source external knowledge from their local environment. In this context, this study confirms the claim that the local environment in a non-core context does not contribute to the innovativeness of high-tech companies.

In fact, MNCs, as well as SDCs, actively obtain new knowledge and information outside their towns or region. All interviewees inform us that they are very much aware of the importance of non-local contacts, particularly in terms of the development of international innovation-, production- and sales networks, as the following citation illustrates:

‘From the beginning, we could not rely on local or regional markets or partners – we always had to go beyond local borders.’ (Company 3, Interviewee 11)

With regard to Capello’s (2017) territorial patterns of innovations, our results show that the creative application pattern prevails. The MNCs and SDCs interviewed could grow because they were able to hire employees that knew where and how to look for non-local knowledge and to integrate it into the companies’ innovation process. Without these creative actors, innovation outside core regions would not be possible (Capello 2017). We also observe that the majority of the innovation activities of the MNCs interviewed occur at their headquarters, as this citation illustrates:

‘It happens that a subsidiary from China sends us a drawing after they have talked to a client. Here at the headquarter, three people look at it and either say “that won’t work” or “it will be too expensive”. We do not have this ability at subsidiaries worldwide.’ (Company 3, Interviewee 18)

This finding supports Heidenreich et al.’s (2012) conclusion that companies concentrate their innovation activities at certain locations.

The analysis of the interview data reveals that MNCs in small towns use four main sources of external-knowledge: 1) clients feedback, 2) recruitment of new national and international employees, 3) research institutions and universities, 4) fairs, conferences and workshops. The MNCs interviewed mention market-sourced information, such as clients, as well as non-market-sourced information, such as universities. These companies have characteristics of so-called fast innovators, which confirms the results of Shearmur and Doloreux (2016). The results of the theoretical replication show that SDCs mention the same main sources of external knowledge, except for client feedback. All of the companies interviewed have clients spanning the globe. Accordingly, they would also have to design strategies to acquire client feedback over long distances, if they would be located in a core region. However, the results show that MNCs have less trouble accessing feedback from their clients due to their subsidiaries’ geographic proximity to them. We do not expect a company located in a core region to possess other strategies for acquiring information from clients. Concerning the companies’ exchange with clients, we can, therefore, support Shearmur’s (2010) results that conclude that accessibility does not matter to high-tech companies. Hence, the small town context does not seem relevant in this regard and we will therefore not discuss it further.

For the remaining three external knowledge sources, the MNCs and SDCs interviewed highlight two small town characteristics that provide opportunities for accessing external knowledge, namely natural amenities and rapid transportation connections. They also mention two obstacles, namely, missing agglomeration economies and the distance to the core city. Evidently, natural amenities and the absence of agglomeration economies differ from each other since natural amenities often require the absence of agglomeration economies. Hence, the results show that an opportunity can also be an obstacle for different sources of access to non-local knowledge. Furthermore, rapid transportation connections to the core city make it possible for companies to access certain external knowledge sources, however the results also show that the distance to the core can still be an obstacle for accessing some knowledge sources.

### Natural amenities versus absence of agglomeration economies

Natural amenities in small towns, and the absence of agglomeration economies, are especially important for accessing knowledge from new employees. Local environment characteristics help persuade certain kinds of employees to move to a given region. Natural amenities and lower costs of living are especially attractive to employees older than 30 or employees with children. As one interviewee says:

‘You have space, you have air to breath, you easily find living space. We live close to the wood where you can go for a run. We are in the country but still connected with the world.’ (Company 1, Interviewee 23)

Currently, the literature on natural amenities concentrates on tourism towns or residential economy towns (Segessemann and Crevoisier 2015; Moss 2006). There is no research on the potential of natural amenities to attract highly qualified employees to high-tech industries. Despite this gap in knowledge, natural amenities can be a location advantage, and they may motivate qualified individuals to work in a company located in a small town. Additionally, the fact that the small towns in which the companies are located are not in the absolute periphery and have good infrastructures facilitates the search for non-local employees:

‘The town is nice (...). There is a harbour area with a pedestrian area with restaurants, which is important. I think, if we were in a smaller village with only a small restaurant and nothing else, it would not seem very professional. I think that is the difference between a town and a village or even a green field. The green field does not create positive associations, but our town does.’ (Company 6, Interviewee 2)

This citation sums up the importance of thinking about the ‘periphery’ differently. Smaller towns provide an environment that includes urban features, such as the presence of restaurants and cultural activities, as well as rural features, such as proximity to untouched nature or farming land. Together, these characteristics evolve into a special work and innovation environment that is significantly different from that of core regions or the absolute periphery.

However, the lack of urban amenities, such as a dense job market, universities or an urban atmosphere, makes it difficult for these companies to attract a freshly graduated work force to the small towns. New graduates with degrees from universities in core cities mostly do not prefer to work in the eastern part of Switzerland straight away, even if they grew up there:

‘Our young people go to Zurich and do not come back. We have a real problem, and it is a challenge’ (Company 9, Interviewee 2)

MNCs are able to ease this problem through intra-company transfers. This means transferring employees from a subsidiary to the headquarters for a given period of time. Intracompany transfers are one way to bring new knowledge to companies in small towns, and it is a way that the literature on innovation outside core-regions does not mention. Cantwell and Iammarino (2003) mention that intra-firm networks are a type of innovation network available to MNCs. This type of innovation network may be especially important for MNCs in small towns, which are able to bring new employees from outside the region to the headquarters to work as creative actors. The results from the theoretical replication show that SDCs do not mention intra-company transfers as a way of finding new employees because they do not have subsidiaries. This suggests that MNCs are better able to react to labour shortages than SDCs due to established international intra-company networks and experience with subsidiaries abroad. Therefore, we can verify our assumption that the global scope of a company influences how companies are able to access non-local knowledge in a small town context. Moreover, operating on a global scale helps to attract employees who wish to work in a global environment. Regarding the theoretical replication, these two strategies are the only advantages MNCs have compared with SDCs. So far, the literature does not mention the fact that the global orientation of companies outside core regions may attract employees to small towns and may even foster innovation activities.

### Good transportation connections versus distance to core city

Good transportation connections to the core city help to make small towns attractive as a work place for the employees and make it possible to reach partners at universities, as well as workshops and conferences, in Switzerland in a bearable amount of time. Moreover, rapid transportation connections to core regions and natural amenities together with modern company infrastructures drive decisions to locate workshops in small towns:

‘People also like to come to us. We have a nice laboratory and nice venues for meetings. We have committee meetings that are normally in Bern or Zurich. They like to come to us from time to time’ (Company 6, Interviewee 4)

Being well-known in the industry as a reliable cooperation partner also encourages partners to work with companies located in small towns. It does not matter if the company is multinational or not. Attracting different actors to small towns can temporarily create a local buzz (Bathelt, Malmberg, and Maskell 2004).

The mental distance to the core region seems to be a greater problem than the physical distance (Boschma 2005). The absence of technological universities in the eastern part of Switzerland and the feeling of ‘not belonging to the core region’ makes cooperation with, for example the ETH in Zurich, one of the leading technical universities worldwide, uncommon, as one interviewee tells us:

‘You always have to travel, and everyone says, ‘Ah, he was again at the ETH!’ It is nearly like a ceremonial act.’ (Company 1, Interviewee 20)

We do not argue that the approximately one-hour train ride from these small towns to Zurich hinders companies from cooperating with the ETH. However, company culture and the mental distance to universities might outweigh the physical distance. To establish cooperation with universities or research institutions, the managers of the companies, as well as the employees, must be open to cooperation. Although many of the companies interviewed work with

universities or technical colleges, two people from different companies in the same town told us that the individualistic attitude regarding technical problems is in the DNA of the company.

‘We are in a small town, and we are a little bit ‘eigenbrötlerisch’<sup>3)</sup>. I’m only allowed to spend 3% of the operation output for external development. I have to justify myself every time for external cooperation.’ (Company 4, Interviewee 7)

This result shows that some companies in small towns have a rather introverted position regarding external knowledge (Malecki and Poehling 1999). This supports Fitjar and Rodríguez-Pose’s (2011) results that the open-mindedness and attitude of managers influence the range of cooperation activities, even though in some cases like the quote suggests they may structurally be constrained. However, there is still the question of how a small town context influences the culture in companies in regard to external cooperation. Notwithstanding, we did not identify any differences between MNCs and SDCs in regards to collaborations with universities and colleges. The reason for this could be that the R&D departments that are responsible for collaborations reside in small towns and not abroad.

We notice that the distance to the core city is not a problem for pre-arranged meetings. However, despite the good transportation connections, the distance seems too far for spontaneous exchanges or meetings or for the use of rapid innovation sources (Shearmur and Doloreux 2016).

‘If I want to go to a seminar or speech for example in Zurich, then it takes at least half a day. I have to take the train or the car to go there, be there, and travel back. Then you think about it twice, if you want to do that.’ (Company 6, Interviewee 5)

Employees’ willingness to be mobile is crucial for companies in small towns. To attend fairs, conferences and workshops, companies must motivate their employees to travel (Torre 2008). Concerning Capello’s creative application pattern, companies in small towns are highly dependent on employees who want to go beyond the local environment and acquire knowledge from participation in fairs, conferences and workshops. However, other than the study conducted by Fitjar and Rodríguez-Pose (2011), which discusses the importance of the open-mindedness of managers, the literature on external knowledge sourcing does not investigate the willingness of employees to travel to acquire knowledge. In future studies, we must focus more on the characteristics that economic actors have in non-core regions since they may influence if and how non-local sources of knowledge are used.

## Conclusion

External knowledge from non-local sources is crucial for high-tech companies in small towns that are embedded in a medium-interaction environment. As these results and previous research show (Fitjar and Rodríguez-Pose 2011; Grillitsch and Nilsson 2015; Shearmur and Doloreux 2016), companies in small towns actively pursue the open innovation model and access knowledge from different locations. However, the literature does not extensively discuss how the small town context affects access to different knowledge sources. This article aims to extend the available literature on the role of small towns’ characteristics on companies’ access to external knowledge sources. Interviews with a variety of actors in each company allows us to

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<sup>3)</sup> Meaning: individualistic

capture different perspectives inside each company and to appreciate the different facets of the process of knowledge acquisition. We investigate five multinational high-tech companies in small towns in the eastern part of Switzerland and compare these results with two national high-tech companies in the same region. The results show that small town context matters (in a positive as well as in a negative sense) most for accessing the knowledge of new employees, collaborating with universities and for attending workshops or conferences. Additionally, companies perceive clients as important external knowledge sources. However, the majority MNCs' and SDCs' clients span the globe. Hence, the small town context does not matter in this regard, and we assume that companies in urban regions have the same issues when accessing knowledge from their global clients. How companies transmit knowledge from their clients, universities or conferences to their headquarters as well as the difficulties they experience while acquiring it is an issue that goes beyond the scope of that article.

The empirical results lead to two main conclusions:

First, a small town within a medium-interaction environment is not at the complete periphery nor is it in a completely urban location. Our results show that companies in such medium-interaction environments must cope with obstacles, such as the lack of local buzz, a thin labour market or no urban amenities. However, they still have good transportation connections to bigger cities and central place functions that include schools, medical care, restaurants, etc. These central place functions, a lower cost of living and natural amenities are especially attractive to families and people older than 30. It takes companies in these types of locations less time to reach a research institute or to visit a workshop than for companies that are located in more peripheral areas. However, the missing urban amenities and the longer distance to core cities can be an obstacle to finding new employees, going to workshops or conferences or meeting face-to-face with collaboration partners. Spontaneous exchanges with employees from other companies or scientists are not possible. Consequently, companies must plan visits, and employees must be mobile (Torre 2008). Despite rapid connections and relatively short distances, the mental distance to the core centre may sometimes prevail and universities, or other sources of knowledge located in core cities, may seem further away than they physically are (Boschma 2005). This could also be the result of the narratives that dominate Switzerland's spatial organization. Overall, despite good transportation connections to core centres, medium-interaction environments seem to affect companies' open innovation processes.

Second, although MNC might be more able to find employees through intra-company transfer and due to their global scope, they face the same obstacles and opportunities in small towns as SDCs. As Heidenreich et al. (2012) already shows, this is due to the concentration of the most important innovation activities at company headquarters and not at globally distributed subsidiaries. Hence, the most relevant factor for open innovation seems to be a companies' culture and attitude towards it rather than whether it is a multinational or a single domestic company. It is crucial that companies have creative employees who know what kind of external knowledge is important and are willing to travel from time to time, and that they have the supporting culture for exchanging knowledge (Capello 2017; Torre 2008). When accessing client feedback, multinational orientation plays a role due to its globally distributed subsidiaries. However, the small town context does not matter in that respect.

In policy terms, the driving question is how small towns can support the innovativeness of MNCs and SDCs located in them. The companies in the small towns investigated are familiar with looking beyond the regional context to acquire knowledge. Encouraging companies to establish their networks abroad and to create an attractive living and working environment that



is alluring to new employees and visitors may improve companies' abilities to develop knowledge networks. Moreover, frequent and rapid transportation connections to core regions and airports are essential for facilitating occasional face-to-face meetings.

While this article analyses how small town characteristics affect access to the main external knowledge sources that companies use, it does not investigate whether or not companies fail to access certain external knowledge sources at all due to their local circumstances. However, since it is only possible to see most obstacles or opportunities when companies access knowledge, it can be difficult for them to assess whether or not certain location characteristics would be problematic. Future studies could, however, seek to analyse the location characteristics that may impede certain external knowledge sources and hinder companies from accessing them at all.

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## Appendix

*Table A1 Anonymized list of interviewees*

<b>Interviewee Nr.</b>	<b>Firm Nr.</b>	<b>Function</b>	<b>Date</b>	<b>Duration</b>
1	6	Executive Manager	15.02.2017	57min 21sec
2	6	Senior Manager R&D	16.02.2017	25min 20sec
3	6	Quality Manager	17.02.2017	14min 14sec
4	6	Analytical Development Manager	18.02.2017	29min 13 sec
5	6	Deputy Head of Production	19.02.2017	25min
6	4	Head of Production	17.03.2017	22min 13sec
7	4	Head of Development	17.03.2017	19min 41sec
8	4	Head of Human Resources	17.03.2017	22min 41 sec
9	2	Director of the cantonal chamber of commerce and industry	22.03.2017	40min 05sec
10	1	Chairman of the town`s trade association	24.03.2017	36min
11	3	Head Global Training	24.03.2017	66min 05sec
12	7	Head of Operations	24.03.2017	31min30sec
13	7	Head of Human Resources	24.03.2017	14min 43sec
14	7	Director of town`s economic and local promotion department	27.03.2017	38min 45sec
15	5	Director of the cantonal chamber of commerce and industry	28.03.2017	48min 27sec
16	1	Chairman of the town`s industry association	29.03.2017	67min 43sec
17	2	Regional location adviser	19.04.2017	84min 15sec
18	3	Head Product Management & Development RF	19.04.2017	35min 29sec
19	3	Head Mechanics / Tool Shop	19.04.2017	47min
20	1	Head of Innovations	03.05.2017	21min
21	1	Head of Business Development	03.05.2017	19min 54sec
22	1	CEO & Head of Production	03.05.2017	15min 33sec
23	1	Head of Human Resources	03.05.2017	16min 09sec
24	5	CEO	11.05.2017	33min 23sec
25	5	Plant Manager/Managing Director	11.05.2017	20min 46sec
26	5	Head of Development	30.05.2017	21min 15sec
27	2	Head of Human Resources	14.06.2017	73min 32sec
28	2	Former CEO, Share holder	19.06.2017	15min 22sec

# Article 3

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## **Diverse diversities – Open innovation in small towns and rural areas**

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**Abstract:** It is generally accepted that cities and other forms of geographic agglomeration are conducive to innovation because their density and variety of firms, sectors and individuals create a diverse environment. However, a growing body of work shows that innovation also occurs in peripheral regions and small towns. Furthermore, work in sociology shows that diversity is multi-dimensional, and that along certain dimensions networks developed in rural areas are more diverse than those observed in cities. In this paper we develop these arguments, then report our observations of seven successful firms in Swiss small-towns. These firms benefit from at least three types of diversity: internal diversity; multiplexed interactions between workers at different hierarchical levels; and external diversity as firms reach beyond the region. We conclude that diversity (i.e diversity conducive to firm-level innovation) is not a specifically urban attribute: at least some of its dimensions are present in small towns and more peripheral areas.

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## Introduction

Innovation is not a closed process: open innovation – i.e. the gathering, compiling and use of information and knowledge derived from external sources, and collaboration with external partners in view of innovating - is key to high performance (Chesbrough 2003; Huizingh 2011). This idea has been explored by a wide variety of researchers, and is now entrenched in many economic development policies (Canada 2015; OECD 2015).

As open innovation has been better understood and applied, one consequence has been to reinforce the belief that dense – usually urbanised – areas are most conducive to innovation: the geographical co-location of many potential information sources fosters exchange of knowledge and information that can be rapid, intense and deep (Bathelt, Malmberg, and Maskell 2004; Boschma 2005). Indeed, cities have been referred to as "machines for innovation" (Florida, Adler, and Mellander 2017), echoing a strong current in the economic geographic literature that stretches back many decades (Glaeser, Kallal, Scheinkman, and Shleifer 1992; Jacobs 1969): "the city with its greater levels of density and diversity is the more eternally conducive environment for generating the human creativity that underpins innovation, entrepreneurship and economic growth." (Florida, Adler, and Mellander 2017, 93).

Notwithstanding the apparent convergence of economic geographic and innovation theory, there has for a long time been evidence that diversity and multiple sources of information also have their limits. For instance, research in management literature reveals that there exists optimum levels of diversity, and that too many external partners can reduce innovativeness (Laursen and Salter 2006). Work on related variety has qualified diversity, pointing out that in some cases it is *within-sector* or *within-value-chain* local variety that is associated with firm performance (Frenken, van Oort, and Verburg 2007). Evidence from psychology shows that, at the level of the individual, creativity and innovation rest as much on isolation as they do on intense interactions – the two need to be combined, and each plays a role at different moments in the creative and innovative process (Cain 2012; Little 2016). Furthermore, sociologists observe a tendency towards network homophily (McPherson, Smith-Lovin, and Cook 2001), which has been modelled by economic theorists such as Fujita (2009): these sorting processes mean that people tend to interact with similar people and, over time, initial (geographic) diversity tends to dissipate as initially different people begin to mirror each other's traits.

These observations and results mean that any straightforward connection between urban density, local context and diversity of interactions should be questioned. The assertions of Florida, Adler, and Mellander (2017), Jacobs (1969) and others, whilst plausible on the surface, do not sit comfortably with them. Furthermore, there is a small but growing body of work showing that there are highly successful and innovative firms in non-core regions, regions with few opportunities for local external interaction because they are small (i.e. lack of critical mass) and/or sparse (i.e. lack of physical proximity between actors). This research has begun to explore how open innovation – of which it accepts the premise – can occur in environments which are not dense or urban, and which benefit from no local diversity, related or unrelated. At least three overlapping processes are suggested: firms in more peripheral environments compensate by networking beyond the region (Grillitsch and Nilsson 2015); firms in peripheral environments are more introspective and rely more on slow-decay technical information (Shearmur and Doloreux 2016); firms in peripheral regions identify problems that are specific to

the region and draw upon local knowledge and culture to find innovative solutions (Petrov 2011; Cooke 2011; Shearmur 2015).

Whilst acknowledging that these processes contribute to explaining how firms can engage in open innovation when located in peripheral environments, in this paper we explore a fourth possibility complementary to these three: we examine whether smaller towns and remote regions are in fact as homogenous as the discourse on urban diversity would have us believe. Indeed, we argue that economic geographers have put forward a relatively one-dimensional view of diversity – places are positioned along a single spectrum ranging from diverse to not diverse, with diversity considered as either related or unrelated. However, if diversity is understood as multi-dimensional, then it is feasible – and indeed has been shown to be so by sociologists – that networks in rural areas are more diverse along some dimensions, and less so along others, than networks in cities (Wellman and Wortley 1990). These ideas have rarely been explored by economic geographers in the context of innovation studies since the common working assumption is that diversity is assessed by examining the number and variety of different economic actors within the region being studied. This approach provides information on the *potential* for economic actors to engage in diverse local networks, but does not provide information about the *actual* networks engaged in, or about whether these networks are necessarily local.

In this paper, we begin to address this gap by performing an in-depth examination of seven successful high-tech firms in five small towns<sup>1</sup> in the eastern part of Switzerland. The analysed firms are national or worldwide leaders in their niche industries. We explore whether, and how, these firms can operate in a diverse environment whilst being located in apparently homogeneous small-town contexts. Although isolation, quiet and internal processes can also be important for innovation (Shearmur and Doloreux 2016), we do not investigate these, as we assume that firms operating in small towns are able to provide these conditions to their employees when necessary: thus, we are especially interested in how these firms stimulate diversity and/or overcome the lack of it.

We explore three different processes: First, we examine whether the size of the firm, as well as its prominence in the niche industry, help to generate internal diversity to substitute for external diversity (Cohen and Levinthal 1990). Second, notwithstanding the apparent lack of external diversity, firms might also benefit from external diversity along some dimensions (Wellman and Wortley 1990). Third, following Fitjar and Rodríguez-Pose (2011), Grillitsch and Nilsson (2015) and Shearmur and Doloreux (2016), we explore the extent to which firms seek external knowledge from sources (local or not) that diversify their networks and knowledge sources.

Our research is qualitative in nature: it explores the extent to which evidence can be found that these small-town firms benefit from diversity. Whilst observation of elements of diversity within the networks and behaviours of case-study firms would not mean that they are general, it would provide a solid basis for conducting a more systematic search for these types of diversity. It would also serve to question the idea that – partly by virtue of their diversity - urban areas are

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<sup>1</sup> In an European setting, small towns are defined as having between 5000 – 25,000 inhabitants and a density of between 300 to 1500 people per km<sup>2</sup> (based cells with 1km edge length). However, the definition of small towns in Switzerland differs somewhat: the size criteria rests not only on population, but also on the density of inhabitants, jobs or equivalent for overnight stays, which must sum to greater than 500 per km<sup>2</sup> in a grid cell with an edge length of 300 meters (see Meili and Mayer 2017, for a discussion of these definitions). The European definition is easier to conceptualize and small towns in Switzerland are of similar size.



quintessentially innovative (and that, by extension, smaller towns and more remote areas are not) by qualifying the idea that diversity is the preserve of the city and of regions which benefit from local related or unrelated variety. It is important, at the outset, to clarify that we are not arguing that there do not exist some specifically urban processes that lead to innovation, nor do we deny that the marketing and diffusion of innovation rely heavily on urban resources: our argument is, rather, that innovation *also* occurs in small towns whose knowledge bases and industrial profiles do not reflect diversity or variety, and that one of the elements that explains this is that firms in small towns actually have access to more diversity than is currently thought.

## Literature Review and theoretical framework

### Open Innovation

The idea of open innovation, and the consequent importance of diversity of knowledge and information sources for innovation processes, has underpinned two relatively independent research traditions. From the management tradition, the seminal work of Chesbrough (2003) brought attention to the open innovation concept, a term used to describe firm strategies that aim at finding knowledge, partners and ideas beyond their boundaries. Firms invest time and money to appropriate ideas and knowledge held by research institutions, competitors, customers, suppliers or other organizations in different industries (Chen 2008; Huizingh 2011). Dahlander and Gann (2010) provide an overview of this research, showing that firms can adopt either an outbound strategy - revealing their ideas to the external environment (with or without financial reward) to further develop one of their innovations - or an inbound strategy - they scan the external environment for knowledge or purchase it to further develop their innovation internally. Each of these strategies has its advantages and disadvantages. Whilst the outbound strategy is useful for finding partners who can exploit or market an innovation, and for generating a reputation for innovation, openness and cooperation, there is a risk of opportunistic behavior on the part of external actors who may appropriate information and knowledge without providing any return. The inbound strategy, for its part, involves an active search for knowledge and interlocutors: if conducted strategically this can complement a firm's internal capacities, but can also, if unfocussed, lead to information overload (i.e. to a volume of information that the firm cannot process) or to search costs that are not justified by the returns.

In this context, each firm needs to identify a suitable open innovation strategy, since not every firm has the same capabilities and requirements regarding knowledge and new ideas, and not every type of innovation requires the same type and degree of openness (Shearmur and Doloreux 2016). To identify a strategy of open innovation and to decide upon suitable collaboration partners, firms might either apply a backward-looking or a forward-looking strategy, meaning that they either base their decision to interact with certain partners on experience or on the evaluation of potential outcomes (Gavetti and Levinthal 2000). The decision to interact with external partners might happen at different stages of the innovation process. Fetterhoff and Voelkel (2006), for example, see the knowledge-seeking process at the very beginning, whereas Walling and von Krogh (2010) see it happening after an innovation process has begun. However, as Gassmann, Enkel, and Chesbrough (2010, 216) conclude, open innovation is “still more trial and error than a professionally managed process.” The key items of relevance to this paper that emerge from the management literature are that open innovation can have various configurations, is a continuous process, and is multi-dimensional (Dahlander and Gann 2010; Huizingh 2011).

The other tradition from which the idea of open innovation has emerged is geographic. Indeed, although the term 'open innovation' was coined and elaborated in the management literature, Marshall's (1890) contention that there were 'mysteries in the air' of successful industrial districts in nineteenth century Britain referred to the circulation of ideas and know-how within these districts, and to the collaborative nature of production processes therein. Marshall was not, of course, a geographer: however his theories have been influential in economic geography (Dicken and Lloyd 1990; Asheim, Boschma, and Cooke 2011), and are congruent with the work of urban theorists who argue that cities (and other dense environments such as localized clusters) are where innovation most readily occurs because their density and diversity (related or unrelated) enable knowledge externalities to develop. For instance, Jacobs' (1969) seminal work on the economies of cities suggests that dense urban areas allow diverse people to interact, leading to clashes of ideas that lead to novelty. Work on related variety, more closely aligned with research on regional innovation systems and districts (which require a certain density of local institutions, workforce and infrastructure), suggests that the local presence of a wide variety of inter-related firms (i.e. which share overlapping knowledge bases or participate in similar value chains) is conducive to firm performance and growth (Frenken, van Oort, and Verburg 2007; Asheim, Boschma, and Cooke 2011). Innovation is further enabled because of the resources and local markets available in cities or dense industrial regions, which allow for experimentation, access to specialized suppliers and sub-contractors, and to discerning clients (Duranton and Puga 2001). The high density of diverse people is thought to encourage interactions - whether serendipitous (Olma 2016) or planned (Fitjar and Rodriguez-Pose 2017) - within the boundaries of cities, which in turn is supposed to foster innovation and economic growth. Influential scholars such as Florida and Glaeser have developed and popularized this understanding of the role of cities. Florida (2014, 190) claims that "cities are host to a wider variety of talents and specialists, the broad diversity of which is a vital spur to creating things that are truly new". Glaeser et al. (1992, 1126) could empirically show that "local competition and urban variety, but not regional specialization, encourage employment growth in industries." Also, the "local buzz" concept, which suggests that geographical proximity among actors favors unintended as well as an intended exchange by virtue of face-to-face interactions (Storper and Venables 2004) contributes to the prevalent understanding that dense and highly urbanized regions are more likely to produce innovations compared to non-core regions.

Hence, there is a dominant tendency in the literature on the geography of innovation that posits urban areas as the type of place hosting sufficient diversity (whether within the same industry, within related industries, or more generally) to foster and sustain innovative processes. It has recently been argued, however, that this tendency now amounts to a bias. We will now examine some of the reasons for questioning this dominant narrative, with particular focus on the issue of diversity.

## Diverse diversities

When appropriate data are used, and when researchers are open to teasing out non-clustered innovative establishments<sup>2</sup>, innovation is observed in remote locations and small towns.

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<sup>2</sup> One of the problems with much research on the geography of innovation is that it searches for clusters and/or regional concentrations of innovative actors. The paucity of innovative clusters in low-density and remote regions is taken as evidence of lack of innovation there. However, a low-density cluster is a contradiction in terms: the search for innovation in low-density areas should cast a wide net, and not start with the expectation that it will be geographically focussed in a few locations, an expectation that reflects urban bias inherent in the discipline (Shearmur 2017).

Innovative firms in non-core regions rely strongly on external knowledge linkages and use different knowledge sources compared to their urban counterparts (Fitjar and Rodríguez-Pose 2011; Grillitsch and Nilsson 2015; Shearmur and Doloreux 2016). They tend to focus more on internal resources and technical knowledge (Shearmur and Doloreux 2016), they compensate for lack of local partners by relying more on social networks (Grillitsch and Nilsson 2015), and their information and partner searches are strategic, relying on targeted contacts with well-researched interlocutors rather than on serendipity (Fitjar and Rodríguez-Pose 2017). Furthermore, some know-how and knowledge is geographically specific – thus, certain problems cannot be understood in abstraction from particular local contexts, and innovative solutions to these problems emerge where they occur, be it cities or remote areas (Shearmur 2015). None of these processes are closed – all innovators rely to some extent on information external to the firm, and all researchers confirm that, up to a point, a variety of different knowledge inputs is essential. However, firms outside core-regions are located in a less dense and diverse environment and might, therefore, have different opportunities and constraints regarding open innovation.

As we have seen, one of the key arguments put forward to justify that dense or urban regions are inherently innovative is that they foster diversity. However, there exists a body of work – somewhat remote from economic geography - that questions the positive relationship between diversity and innovation. The management literature itself has started to question whether diversity (or breadth) of information sources and collaborators is always conducive to innovation. Laursen and Salter (2006), for instance, show that there is an inverted U-shape relationship between the number of external partners and firm performance. Likewise Katila and Ahuja (2002) show that too many linkages to the external environment can negatively influence innovation performance, and, Mors (2010) shows that innovation can decline if managers are overloaded with information. If a firm exposes itself to too many external ideas and knowledge, it might be difficult to manage and approach these with the necessary focus (Koput 1997).

If these observations are transposed to geography, they suggest that – for some firms at least - the levels of diversity available in small towns might not only be sufficient, but might also protect them from knowledge overload. As Fitjar and Rodríguez-Pose (2017) show, if more partnerships or information are required, firms in this type of environment can strategically seek them out. Furthermore – and this has been a fundamental change over the last twenty years (McPherson 2008) – geographic isolation no longer implies isolation from the news-cycle, from technical changes or from scientific discovery: quasi-ubiquitous access to the Internet means that, except for firms whose innovations rely on the immediate exploitation of knowledge, the small time lag that now exists between its production and wide availability has negligible effect (Shearmur 2015). This line of reasoning is consistent with Puga's (2010) questions concerning the nature of agglomeration economies: whereas static agglomeration externalities (linked to the division of labour, to shared infrastructure and to labour availability) have been well documented empirically, dynamic externalities – and in particular the connection between diversity of larger cities and firm-level learning – have not been observed so unequivocally (Fitjar and Rodríguez-Pose 2017). A further key change brought about by Internet is the capacity of firms in remote areas to effectively identify shortlists of potential information sources and collaborators, thereby targeting communications and contacts, and generating sizeable efficiency gains when travelling for face-to-face encounters (McPherson 2008). Once collaboration or information exchanges are established (which often requires face-to-face – Bathelt 2011), they can be maintained at a distance (McPherson 2008).

In this context, it is also useful to consider arguments and observations made by sociologists concerning the nature of inter-personal networks and how they vary between urban and rural areas. It has been well established, since the earliest days of sociological study, that people interact differently depending on whether they live in a city or small town. City characteristics, such as large numbers of people with different socio-economic characteristics, increased mobility, segregation of people according to language, income and race, can lead to impersonal, homogenous and short-term relationships between people (Tönnies 1881; Wirth 1938), which contrast with the deeper and more heterogeneous interactions in rural areas. Oddly enough, some support can be found for this in Florida's (2014) work on the creative class: according to him cities foster talent, technology, and tolerance. Tolerance is a form of low-level acceptance of the other, that can emerge because social groups are isolated from each other in cities, self-organising into mutually exclusive groups (McPherson, Smith-Lovin, and Cook 2001). The capacity of people, when faced with overwhelming diversity, to self-organize into homogenous groups is also evidenced today in the debates about post-truth, partisanship and information silos (Suiter 2016; McIntyre 2018). Whether in cities, social networks or cyberspace, there is little evidence that connection exists between the diversity of actors within a particular space and the actual diversity experienced by individuals within that space. Indeed, it is this confusion between statistical measures of potential diversity (which appear common sensical) and actual diversity experienced by individuals that is at the core of our dissatisfaction with Jacob's (1969), Florida's (2014), Glaeser's et al. (2011) and others' claims about the connection between urban diversity and innovation processes.

Some recent empirical evidence lends support to Tönnies' and Wirths' early ideas about the differences between urban and rural social networks. Beggs, Haines, and Hurlberg (1996) show that the interpersonal networks of nonmetropolitan residents are based more upon on long-term relationships, are smaller and are denser than those of urban dwellers. However, they are more likely to cut across social classes and to occur in a wider variety of settings (they are more multiplex). Furthermore, they find no significant differences of network diversity with respect to age, gender or education between urban and rural dwellers. These results not only reveal diversity's multidimensional nature, but show that – depending on the dimension considered – the social networks of metropolitan dwellers are not necessarily more diverse than those of rural dwellers. Going further, White and Guest (2003) find that urbanization encourages highly voluntarist ties, which lead to more segmentation and less interconnection than found in rural regions. This is in keeping with the work on silos and on network homophily – i.e. that people who share characteristics are more likely to connect (McPherson, Smith-Lovin, and Cook 2001). Indeed, as Wellmann and Wortley (1990, 589) put it, city dwellers are more likely to “shop for support at specialized interpersonal boutiques rather than at general stores.”

Thus, evidence from sociology casts doubt on the idea that cities and dense regions are necessarily more 'diverse' than small towns or remote areas. Whilst this is of course true from a statistical perspective – diversity indices almost always reveal greater heterogeneity in larger regions – these statistics tell us nothing about the actual diversity that individuals experience. To the extent that evidence can be marshalled, it reveals theoretical and empirical arguments that do not corroborate the idea that individuals in cities or concentrated industrial districts are necessarily evolving in more diverse environments than individuals in smaller towns and remote areas. If this is also true of firms – which are made up of individuals, though not reducible to them – then one of the central arguments about the connection between innovation and cities needs to be re-evaluated.

In the light of these questions and concerns, our research takes a close look at seven successful firms that operate out of small towns in Switzerland, exploring how they generate diversity despite their location. The towns they are located in are approximately an hour or more from large metropolitan areas such as Zurich. Whilst an hour is not much by some standards, the cultural distance between localities in Switzerland is often much greater than road distances imply: it is this relative geographic and cultural remoteness that characterises their location. The lack of variety and density of people, companies and knowledge institutions in the investigated small towns – the lack of “local buzz” (Bathelt, Malmberg, and Maskell 2004) or related variety - distinguish them from cities.

## Method

### Research setting

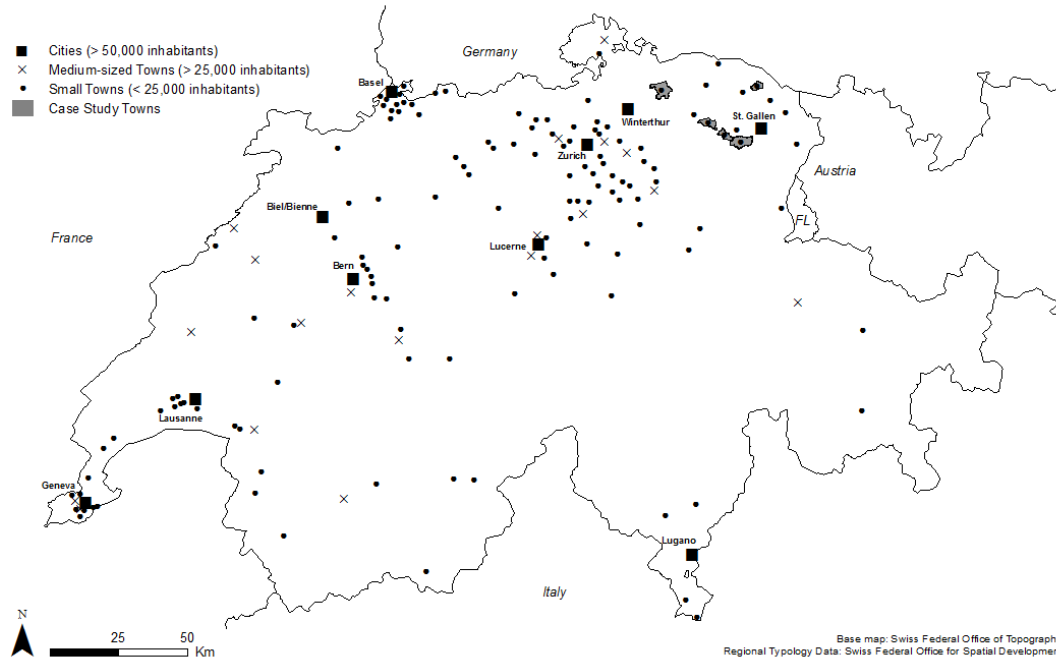
Our empirical analysis draws on the case of high-tech firms in small towns in the eastern part of Switzerland. The eastern part of Switzerland – which does not belong to the metropolitan region of Zurich – has a long industrial history and is the location of a number of high-tech firms. Most large firms in this region were established in small towns in the early 1900s as suppliers for the textile industry concentrated in this region. After the textile industry’s decline these firms reinvented themselves, thereby staying competitive. Hence, the region has continued its industrial heritage, today gathering a large share of the nation’s high-tech industry (BFS 2008). This means that the eastern part of Switzerland is important to the Swiss economy. Indeed, the high-tech industry (such as precision optics, communications equipment and automotive engineering) has been an engine of the Swiss economy’s growth between 2000 – 2012 (BAK Basel Economics 2014). However, high-tech firms require constant new knowledge in order to remain competitive and innovative: the high levels of salaries and other costs in Switzerland make it critical for high-tech firms to be, technically and qualitatively, top players in their industry.

It is important to distinguish the metropolitan region of Zurich from the region of east Switzerland, a distinct NUTS2 region which extends to the East and South-East of Zurich. It is Switzerland’s largest region, and has a relatively low population density (93 inhabitants per km<sup>2</sup>), well below the Swiss average of 212. Population is concentrated to the east of Zurich, along the valley to Saint-Gallen and along the shores of Lake Constance; the middle and Southern (more mountainous) parts have low levels of population, even in the valleys. The region – characterised as “Zurich’s quiet neighbour” by Fodors (nd) - has remained sparsely urbanized and has attracted few knowledge-intensive service firms or start-ups. The absence of technological university, coupled with a sparse labour market, make it harder to train employees within the region and difficult to prevent the drain of ambitious young people. Firms in the region face a thin labour market, low levels of firm density and diversity, and few opportunities for local or regional knowledge exchange. However, fast transport connections to the city of Zurich (the interviewed firms are in towns 40 to 80 minutes from Zurich), and also with Germany or Austria, facilitate meetings with external actors (without, however, the convenience of co-location or the possibility of serendipity which, it is argued, facilitate interactions in cities). Hence, towns in Eastern Switzerland can be characterised as medium-interaction environments, meaning that they have little possibility for local knowledge exchange but easy access to non-local factors of innovation (Shearmur 2012).

## Data collection and analysis

This research investigates how firms in a less urbanized region compensate for, or deal with, the apparently limited diversity of their immediate surroundings. We hypothesize that diversity has various dimensions, some of which are not related to urban density. In our analysis we have sought to identify different types of diversity mentioned by interviewees in order to provide corroborative evidence supporting the claims made recently by some economic geographers, as well as the observations by sociologist (which were unconnected to economic or innovation concerns). Furthermore, to the extent that we do identify various dimensions of diversity in small-town firms, these will be described and discussed, thereby extending the sociological work into the sphere of economic geography.

For the identification of different dimensions of diversity, we rely on an in-depth multiple case study (Yin 2009). A multiple case study design allows cross-case analysis and hence greater external validity than is possible with a single case study. For the literal replication, we chose high-tech firms in small towns. In every small town that lies between Winterthur (last city inside the metropolitan region of Zurich) and St.Gallen (Kreuzlingen, Romanshorn, Arbon, Rorschach, Amriswil, Frauenfeld, Wil, Uzwil, Flawil, Herisau, Gossau, Weinfelden) we looked for high-tech firms that have their headquarters as well as R&D departments in the small towns. We intentionally chose small towns in the same region in order to control for the local context. Conditions in smaller villages or medium-sized towns as well as in different regions might provide a different environment for creating diversity. To identify high-tech firms, we applied Eurostat's (2016) high-tech industry definition, which groups sectors according to their technology intensity, calculated as R&D expenditure relative to value added. We then selected firms according to their NOGA (*Nomenclatur générale des activités économiques*) codes. Moreover, we wanted to find firms that have been in the towns for some years to ensure that the firms are actually able to survive and be successful in this environment. By focusing on high-tech firms that are in need of up-to-date knowledge to stay competitive, we can begin to understand how these companies can be successful in small towns despite their small size. An initial group of 13 firms was identified. We contacted firms that complied with this definition, either directly or through an enabler. Seven firms in five different small towns agreed to take part in the study. Figure 1 shows the geographical location of the small towns the case study firms are located in.



*Figure 3 Geographical location of the small towns the case study firms are located in*

To understand the different dimensions of diversity that firms draw upon, we spoke to several key persons in each firm, each holding a different function but responsible - in some capacity - for ensuring the firm's innovativeness and competitiveness: we spoke to CEOs, innovation managers, production managers, and human resource managers. Additionally, we also performed in-depth interviews with directors of industry organizations in each town. This enabled us to obtain an external viewpoint and to develop a feeling for the general situation in each location. In total, we interviewed 28 people. With these interviews we reached theoretical saturation, meaning that towards the end of this run of interviews no new information was being gathered: interviewees were repeating information we had already heard. Table 1 provides an overview of the firms and Table 1A in the appendix of the people interviewed.

Interviews were semi-directed. Our questions first covered the general climate for innovation in each town. They then addressed how new knowledge from different sources is generated or obtained, how exchanges between employees and managers within the firm occurs, and how exchanges with outside actors occur. Interviews lasted from 14 minutes to 84 minutes (with fourteen lasting over 30 minutes) and were conducted between February and June 2017. Interviews, conducted in German, were recorded, fully transcribed and analysed with the MAXQDA software. The first round of coding was performed inductively, and characterised how firms access different knowledge and how interactions among employees take place. After the first round, a theoretical framework was developed leading to a second round of deductive coding, focused on different forms of diversity firms draw on externally or generate internally.



Table 1 Details of case study firms

Firm	Number of employees	Town	Duration from the town's train station to the city centre of Zurich (Zurich main station) (calculated with google maps on the 9 <sup>th</sup> of Mai 2018)		Nr. of Interviews
			By train	By car	
Firm 1	> 250	A	60	60	6
Firm 2	>250	B	60	55	4
Firm 3	>250	C	80	60	3
Firm 4	>250	C	80	60	3
Firm 5	>250	D	40	40	4
Firm 6	<250	E	75	75	5
Firm 7	<250	C	80	60	3

## Results

In the presentation of results which follows, we focus on different dimensions of diversity reported by the interviewees. To identify these dimensions, we explored interaction patterns, different knowledge sources used by the firms, and the extent to which firms are able to diversify their knowledge base. Three broad dimensions of diversity emerge from the interviews: i. internal diversity of employees; ii. interactions between employees across formal boundaries; and iii. external knowledge sources. The following sections describe what each of these dimensions consist of.

### Dimension 1: Diverse employees

The first dimension relates to the internal diversity generated within firms. The thinness of the regional labor market and the need for many well-educated, highly specialized employees, force firms to recruit people nationally and internationally. Hence, the interviewed firms create – intentionally or not - a diverse internal employment structure with people from different national backgrounds:

*“We combine production and development at one location. To do that, we are in need of many specialists – we need chemists and engineers. That’s a challenge; the local market is too small to find them.” (Firm 4, Interviewee 8)*

*“We have an autumn market [in this town]. I think, if you would sit down at a table there, it is more international than a table at a market in Zurich (...). Our people are from everywhere in the world and come to our town and participate.” (Firm 2, Interviewee 27)*

These citations support the idea of the sociologists Beggs, Haines, and Hurlbert (1996) who argue that small towns are not necessarily less diverse – along some dimensions - than cities. The necessity for firms to have a wide range of employees brings people to the town, and the town's small size enhances interactions in diverse contexts. Indeed, interactions at the individual level may be more diverse given the lower possibilities for selective networking: the autumn market in a small town ‘forces’ interactions between different types of people.

As interviewees told us, people that work in small-town firms are attracted by different firm characteristics, such as good reputation, belonging to the leaders in their niche industry, global orientation and firm size that makes job progression possible. Less globalized firms may experience greater difficulty in diversifying the structure of their employees.

*“International, innovative, challenging jobs – we have that.” (Firm 1, Interviewee 23)*

*“We are able to attract employees with our interesting jobs, firm intern career opportunities, many different disciplines, and our headquarter status.” (Firm 4, Interviewee 8)*

Another vector of internal diversification is internal mobility within multinational firms: firms that have subsidiaries often transfer employees between locations, with employees from subsidiaries coming to work at the headquarter for some time (Glückler 2011). Hence, large and/or multinational firms are able to increase the diversity at their headquarters more easily.

*“I believe that our international orientation is very important. We have 26 locations in 15 different countries and we have an active exchange and people from other subsidiaries come to our headquarter.” (Firm 1, Interviewee 20)*

## Dimension 2: Interaction patterns among employees across formal boundaries

The second dimension of diversity involves interaction among employees within the firms. Employees at different hierarchical levels and in different departments interact quite intensely. Whilst this is of course related to firm culture, it is striking that this was observed in all firms that were interviewed. We therefore suggest that it may also reflect the social structures prevalent in small towns, which sociologists have observed as more multiplexed (i.e. people interact with each other in a wider variety of environments), and somewhat more prone to cut across social boundaries (Beggs, Haines, and Hurlbert 1996).

Being a large firm in a small town - i.e. in a town with few other major economic actors and with fewer possibilities for interaction – means that the firm’s identity and culture will tend to align with that of the town (and vice-versa). Thus, social patterns external to the firm spill over into the firm, and those within the firm extend to the wider community, similarly to what was described by Tönnies and Wirth over a century ago:

*“The firm belongs to our town and our town belongs to the firm, it is reciprocal.” (Firm 7, Interviewee 14)*

*“If someone comes to us – from Zurich or elsewhere – they are astonished that everyone says “Grüezi<sup>3</sup>”. There is a huge feeling of shared identity [within the firm].” (Firm 2, Interviewee 27)*

Such a firm culture, and the fact that there are limited possibilities to meet people outside the firm who are not connected to it, foster exchanges between employees that cut across formal boundaries, and leads to the development of dense networks among employees and other involved actors, such as government officials, - sometimes with the same, and sometimes with different, status:

*“Our CEO is like a colleague. He eats lunch at the same table we do. We wear a tie sometimes, sometimes not. Respect does not have anything to do with such things – we*

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<sup>3</sup>Swiss German greeting

*know how life works. It means listening to each other and taking each other seriously. That is a breeding ground for innovation.*“ (Firm 3, Interviewee 11)

*“Our canton is small; everyone knows everyone. The way we collaborate is based on the fact that we know each other. We call each other by the first name (...) it is very personal.”* (Firm 7, Interviewee 14)

In line with White and Guest (2003) and Wellmann and Wortley (1990) these quotes suggest that the presence of fewer people, and hence the difficulty of building groups of similar people, lead people who would otherwise not interact to adjust to each other, as these citations illustrate:

*“We know each other – this way, the communication way is different than when you have to follow the normal organization.”* (Firm 2, Interviewee 28)

*“No one drives a Mercedes S here, the highest of models is maybe a BMW X5 – that is also a really good car, but yes – we also do not have private helicopters – that is the secret of our success.”* (Firm 1, Interviewee 16)

This reveals a paradox: it suggests that by adhering to a certain degree of homogeneity (keeping social distinctions linked to car models, food and dress in check), greater diversity of interactions can be fostered across formal boundaries within the firm. Whilst this has been understood, and promoted somewhat self-consciously, in firms such as Facebook, Google and Yahoo, it seems to have occurred spontaneously in small towns in Switzerland. A key difference between these small-town firms and their better known counterparts is that, within the small town context, homogeneity extends beyond firm boundaries as interactions across departments and hierarchy spill over to interactions that occur in other social contexts (such as whilst shopping, picking kids up from school, etc...). Multiplex relationships emerge – meaning that employees or/and managers can entertain social relationships outside of the firm, notwithstanding their hierarchical relationship within it:

*“I think there are dense relationships because everyone knows everyone in the community. There are people that play soccer or something like that together.”* (Firm 6, Interviewee 26)

Firms benefit from these personal relationships since they reduce barriers between employees across formal within-firm boundaries. This type of diversity may, in turn, increase knowledge exchange within firms (Glückler 2011).

Employees in the firms that we studied were characterised as loyal by the interviewees. When a person decides to move to the region and work in one of these firms, they stay in the firm for a long time and are highly loyal:

*“People carefully think about coming to our town. That’s the reason, why the fluctuation is small. It is great if you find good people. Otherwise, it is not that great.”* (Firm 2, Interviewee 28)

At first sight this suggests less diversity, since the ‘churning’ of employees – associated with industrial districts, clusters and cities – has often been understood as a way of sharing know-how and of increasing interaction between people. The limited availability of equivalent jobs in the region contributes to this low fluctuation. However, although it seems like a disadvantage for diversity, this circumstance may be conducive to stable social relationships and to trust between employees, thereby further encouraging relationships that overcome status barriers.

Homophily might, therefore, be less common in a large firm within which people know each other well, trust each other, and entertain multiplexed social connections (McPherson, Smith-Lovin, and Cook 2001).

A final factor that we identified as contributing to interactions amongst different types of employee is geographical proximity between production and R&D departments. The co-location of production and R&D – which is observed in all of the interviewed firms, and which Clark (2013) has highlighted as advantageous for innovation - makes communication between employees of these different departments easier.

*“In my previous job I had to do design transfer between Switzerland and China. Everyone who has experienced that knows that having production and development at the same location is an absolute advantage. My developers can slide the prototypes on a small trolley to production, and we do not have a time difference nor different languages. We also do not have to spend days flying the newly developed prototypes around the world. It is an absolute advantage!” (Firm 4, Interviewee 7)*

Whilst such co-location *can* occur in cities, it is often more straightforward to arrange in smaller towns given real-estate values and site availability, and given the closer connection between city leaders and firm directors. Since these large firms are key to the small towns’ economic health, local planning and land-use policies take careful account of the firms’ needs in a way that administrations in larger cities are often unable to. The advantage that smaller jurisdictions have in adapting policy to the needs of local economic actors has been noted by Polèse and Shearmur (2002) in their study of regional development in Canada: this does not (necessarily) reflect corruption or underhand tactics, but rather the better understanding by decision makers of the particularities of their local economy, and the possibility of directly engaging with both citizens and firm directors when decisions are made.

### Dimension 3: External knowledge sources

Our analysis confirms, in keeping with studies cited above, that firms in small towns draw upon non-local knowledge sources, thereby overcoming possible deficiencies in local knowledge sources. It should be noted that firms in clusters and cities also draw upon non-local sources (Bathelt, Malmberg, and Maskell 2004) – so the relevance of this finding is that location in a small town does not appear to inhibit this in any particular way.

We identify three main external knowledge sources: clients; universities and research institutions; and fairs and conferences. Interviewees are aware of the importance of external knowledge and actively engage in its acquisition:

*“From the beginning, we could not rely on local or regional markets or partners – we always had to go beyond local borders.” (Firm 3, Interviewee 11)*

Networks involving non-local partners, subsidiaries and willingness to travel are key to acquiring this non-local knowledge, lending confirmation to work such as Torre’s (2008) and Bathelt’s (2011) on travel and temporary co-location. Whilst it has been shown that in-house capabilities play a major role in how firms absorb external knowledge (for example Grillitsch and Nilsson 2015), this is beyond the scope of our study.

Most of the firms we interviewed established a worldwide presence in order to be physically close to clients:

*“If you want to work on a global basis, with Ericsson, Nokia, and Siemens for example, then you have to follow them. If they go to the east, to Poland or China, then we have to be there as well. You have to have their mentality, you have to be close to them and do something locally.” (Firm 3, Interviewee 19)*

One interviewee said that direct dialogue between the firm and its clients is more effective than contact established through distributors:

*“It is important that we do not rely solely on distributors but also invest in subsidiaries. They are essential for the success of the firm, especially in weak times. If we are in trouble the distributors drop us and look where they can earn money to survive. It is different if you have your own people around the world.” (Firm 1, Interviewee 20)*

*“If you have your own locations the dialogue and the access from here to there and vice-versa is better as if you only work with distributors.” (Firm 1, Interviewee 21)*

Because R&D departments remain next to headquarters, tools for knowledge and information transfer have been developed, allowing subsidiaries to communicate effectively with headquarters. For example, video or audio conferences are regularly used to communicate with subsidiaries and clients. Nevertheless, communication with clients – asking the right questions, understanding answers correctly, transmitting information correctly to headquarters - is not an easy task and is being continuously improved.

*“We discovered that we either do not ask the right questions, don’t listen right, or do not understand or transmit the information right so that it does not work many times(...). Many clients also do not have a concrete idea what they want.” (Firm 3, Interviewee 18)*

Hence, employees working at headquarters sometimes travel to clients across the world to gain a broader picture of the situation.

*“From time to time we do visits. Colleagues from the product management or development go to the clients or our local people go for a visit and we support them with a video or phone-conference.” (Firm 3, Interviewee 18)*

Contact with universities is established principally by searching for research groups in Europe, sometimes globally. Hence, for the interviewed firms, geographic proximity to the university or research institute is not important – these are strategic partners and it is their specific expertise rather than the convenience of location that is paramount (Shearmur and Doloreux 2015). If the firm and university decide to cooperate, they meet periodically in face-to-face meetings or via video or audio conferences. Cognitive proximity is therefore essential (Capello 2017; Fitjar and Rodríguez-Pose 2011). The firms interviewed confirm that temporary visits are sufficient for the cooperation. Either the firms’ innovation managers or the university employees travel for meetings.

Most of the time going to fairs, workshops or conferences involves travel for managers and employees. However, because of the firms’ strong reputations (they are all leaders in their field) and thanks to good transport connections to core cities such as Zurich or Munich, distant travel is not always necessary: firms can hold workshops or conferences at their headquarters, bringing people to the small towns:

*“People also like to come to us. We have a nice laboratory and nice venues for meetings. We have committee meetings that are normally in Bern or Zurich. They like to come to us from time to time.” (Firm 7, Interviewee 4)*

This raises an important point: as Shearmur (2012) emphasises, innovation in outlying regions rests not so much on local dynamics as on ease of access to metropolitan areas and to the connections they provide to the world beyond. Whilst ‘ease of access’ will be defined differently by different firms, reliability, predictability, and reasonable cost of travel are essential. Basic physical infrastructure – good roads, reliable airports, good internet access, efficient trains – is often neglected when factors of innovation are considered, but emerge as critical for the firms that we interviewed.

Finally, collaborations with consultancies and specialised firms were mentioned a couple of times as sources of knowledge. However, these sources are not seen as main sources of external knowledge: in particular, collaboration with firms within the same industry is presented as difficult, since the interviewed firms are afraid to lose their competitive advantage by sharing valuable information and know-how (Dahlander and Gann 2010). Working with firms that serve a different geographical market seems more likely to happen, as this citation shows:

*“We want to protect ourselves. But there are committees where we have exchanges [with firms in the same industry], for example, the Iron Link Network. We meet at symposiums or places like that (...) However, exchanges with firms from the same niche are easier if they serve different geographical markets. The Japanese market is, for example, difficult to access, and the Japanese would rather buy products from Japanese firms than from European ones (...) hence, it is easier to collaborate with these firms than with European firms with which we would also have to compete for clients.” (Firm 6, Interviewee 26)*

This result seems to support the finding of Grillitsch and Nilsson (2017) that knowledge-intensive firms might suffer from negative knowledge spillovers likely to happen in urbanized regions.

## Conclusion

This paper questions one of the dominant ideas in the economic geography and innovation literature: that cities and dense regions are key loci for innovation because they alone foster the diversity that is required to generate new ideas and innovations. It is argued that the co-location and density of diverse people, firms and institutions make spontaneous knowledge exchange possible and contribute to the economic success of cities (Jacobs 1969; Florida, Adler, and Mellander 2017). It is also argued that the co-location of related industries can lead to collaborations and to the development of new ideas drawing on knowledge and know-how that is partly shared (Asheim, Boschma, and Cooke 2011; Frenken, van Oort, and Verburg 2007). Whilst sociologists have shown that diversity is multidimensional (and not always higher in urban areas), and whilst research from management has begun to question whether more diversity always leads to more innovation, economic geographers have by and large not questioned the fact that diversity is associated with urban areas and density. Rather, the minority of economic geographers who have seriously examined innovation outside of cities and clusters have focused more on how firms can overcome lack of local diversity.

In this paper, following the sociology literature, we have chosen to view diversity as a multi-dimensional phenomenon. This choice has allowed us to look for different dimensions of diversity, and to consider forms of diversity that may be more prevalent in small-town contexts. The observations of rural sociologists regarding the greater heterogeneity (along certain dimensions) of social networks in rural regions inspired idea of diverse diversities. Hence, this paper puts forward a more differentiated view of diversity and illustrates how small towns can be diverse – although in dimensions that probably differ from those that characterize urban areas.

From our qualitative interviews, three dimensions of diversity are identified in small towns and seem to be associated with innovation:

- **Diverse employees:** The thinness of the regional labor market and the need for many well-educated, highly specialized employees, forces firms to look for people nationally and internationally. Thus, firms build up diversity internally.
- **Interaction patterns among employees across formal boundaries:** Dense social structures and a strong firm identity, as well as the co-location of production and development, fosters exchange between firm members and across specialisation and hierarchies.
- **External knowledge sources:** Firms access non-local knowledge from different sources.

Only the second dimension is, arguably, specific to small towns. The two other dimensions, whilst not specific to small towns, reveal that small-town locations do not impede access to these types of diversity.

Indeed, our analysis shows that firms are able to foster diversity and that the paucity of actors in small towns can in fact lead to types of diversity (cross-hierarchical and multiplexed) which are more difficult to foster in urban areas or in regions where workers rarely cross paths outside of the workplace. The strength as well as the heterogeneity of social networks in small towns, as already emphasized by Tönnies (1881), Beggs, Haines, and Hurlbert (1996), and Wellmann and Wortley (1990), combined with the fact that the (large and successful) firms interviewed can attract diverse people and knowledge to small towns, create a different atmosphere for the generation of new ideas. Our observations contribute to understanding why Grillitsch and Nilsson (2017) find no evidence that knowledge-intensive firms grow faster in knowledge-rich regions, and shed light on the question of how firms in small towns are able to maintain high levels of knowledge. Diversity is diverse, and once this is acknowledged then it is possible to explore the variety of ways and of dimensions along which firms seek and find it.

In the cases we have studied, diversity in small towns is generated by the firms themselves: it is not ‘in the air’. The firms that we studied are large and successful; they require diverse employees and have sufficient reputation to attract employees nationally and internationally. Furthermore, access to non-local knowledge sources is expensive, so firm size and higher financial strength also play a role. However, there is no reason to believe that interaction among employees will differ between small and large firms, since this rests more squarely on the small-town dynamics. Thus, whilst our results illustrate that large successful firms can emerge and operate outside of cities, and also shows that certain types of diversity are available to these firms, they remain exploratory. Our principal contribution is to introduce the idea that diversity – when considered as a geographic attribute conducive to innovation – should not be thought of as one-dimensional: there are diverse diversities, some of which we illustrate in this study.

This study is qualitative and exploratory and has, therefore, limitations. First, our study focuses solely on knowledge-intensive firms that were able to develop successfully in small towns in a specific region. To widen the scope of our observations, research is necessary that includes less knowledge-intensive, smaller and younger firms, and other geographical settings. Second, whilst we illustrate that three dimensions of diversity are present in small towns, we do not know which of the identified dimensions contribute most to knowledge generation and processing. The importance of each of these dimensions might vary for different steps in the innovation process. Furthermore, these three dimensions are not necessarily exhaustive: they are merely those that emerge from our observations. Finally, case-study work, whilst important for understanding and exploring concepts, cannot lead to generalisation: once a clearer idea emerges of the relevant dimensions of diversity, indicators should be devised that replace one-dimensional diversity indices in statistical approaches to understanding the geography of innovation.

This exploratory study is an invitation for economic geographers to think in a differentiated way about diversity, and to recognize that its equation with cities and with regions that have a certain density of economic actors – whilst it appears to be commonsensical, and is supported by statistical indices and the literature – may require reappraisal in light of work from sociology, recent work on the geography of innovation, and our own arguments and observations presented above.

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## Appendix

*Table A1 Details of interviews*

<b>Interviewee Nr.</b>	<b>Firm Nr.</b>	<b>Function</b>	<b>Date</b>	<b>Duration</b>
1	7	Executive Manager	15.02.2017	57min 21sec
2	7	Senior Manager R&D	16.02.2017	25min 20sec
3	7	Quality Manager	17.02.2017	14min 14sec
4	7	Analytical Development Manager	18.02.2017	29min 13 sec
5	7	Deputy Head of Production	19.02.2017	25min
6	4	Head of Production	17.03.2017	22min 13sec
7	4	Head of Development	17.03.2017	19min 41sec
8	4	Head of Human Resources	17.03.2017	22min 41 sec
9	2	Director of the cantonal chamber of commerce and industry	22.03.2017	40min 05sec
10	1	Chairman of the town's trade association	24.03.2017	36min
11	3	Head Global Training	24.03.2017	66min 05sec
12	5	Head of Operations	24.03.2017	31min30sec
13	5	Head of Human Resources	24.03.2017	14min 43sec
14	5	Director of town's economic and local promotion department	27.03.2017	38min 45sec
15	6	Director of the cantonal chamber of commerce and industry	28.03.2017	48min 27sec
16	1	Chairman of the town's industry association	29.03.2017	67min 43sec
17	2	Regional location adviser	19.04.2017	84min 15sec
18	3	Head Product Management & Development RF	19.04.2017	35min 29sec
19	3	Head Mechanics / Tool Shop	19.04.2017	47min
20	1	Head of Innovations	03.05.2017	21min
21	1	Head of Business Development	03.05.2017	19min 54sec
22	1	CEO & Head of Production	03.05.2017	15min 33sec
23	1	Head of Human Resources	03.05.2017	16min 09sec
24	6	CEO	11.05.2017	33min 23sec
25	6	Plant Manager/Managing Director	11.05.2017	20min 46sec
26	6	Head of Development	30.05.2017	21min 15sec
27	2	Head of Human Resources	14.06.2017	73min 32sec
28	2	Former CEO, Share holder	19.06.2017	15min 22sec

# Article 4

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## **Leaves in the wind? Local policies of small and medium-sized towns in metropolitan regions**

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**Abstract:** Small and medium-sized towns (SMSTs) contribute to the economic performance of whole metropolitan regions. However, the variety of factors that influence the economic development of SMSTs is understudied and the impact and relevance of their local policies is especially unclear. This article studies the economic specialization of SMSTs within the metropolitan region of Zurich (Switzerland). Switzerland serves as an interesting context in which to study SMSTs, particularly those in metropolitan regions, due to their constant growth and the high local autonomy enjoyed by their local governments. Using a multiple case study design that relies on a pair-wise comparison, we examine the local policies SMSTs formulate, and we study the impact of local policies on the economic specialization of these towns. We find that economic specialization of SMSTs can mainly be explained by factors that are largely exogenous to local policy-making such as the town's location and its connectivity. Land-use strategies are the only local policies that can influence the economic specialization of SMSTs. Therefore, SMSTs are well advised to invest in professionalized land-use departments and to coordinate their land-use strategies with neighbouring jurisdictions.

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## Introduction

Small and medium-sized towns (SMSTs) located in metropolitan regions contribute to the economic performance and success of whole metropolitan regions (Giffinger & Suitner, 2015; Riguelle, Thomas, & Verhetsel, 2007; Roca, Marmolejo, & Moix, 2009). Although the metropolitan centre, i.e. the dominant city within a metropolitan region, carries most functions and economic activities, metropolitan regions compete in globalized competition as networks of several cities and towns. It is the concentration of metropolitan functions, such as financial and business services, creative industries and global transportation links, as well as the high density of highly educated workers, that make metropolitan regions powerful players in globalized interurban competition (Hall & Pain, 2006). Thus, the prevailing research concentration on large cities and centres of metropolitan regions does not consider the diverse realities of economic growth because cities and towns within metropolitan regions interact. Furthermore, the economic performance of European cities is not correlated with city size (Parkinson, Meegan, & Karecha, 2015). For example, since the turn of the millennium, SMSTs in Europe have performed better than large cities with regard to economic and population growth (Dijkstra, Garcilazo, & McCann, 2013). Therefore, to better understand the development of metropolitan regions, we should also study the drivers of economic development in the SMSTs within metropolitan regions.

Studies have shown that the economic specialization of SMSTs depend on their relative distance to the metropolitan centre (Hamdouch, Demaziere, & Banovac, 2017; Polèse & Shearmur, 2006). Towns that are close to the metropolitan centre and towns that are better functionally integrated may be better able to ‘borrow’ economic specialization and performance from the metropolitan centre (Meijers & Burger, 2015). However, this theory neglects the role of local policies. It is unclear how SMSTs strategically leverage their positions inside metropolitan regions and how they seek to deliberately influence their economic development through local policies. As a consequence, SMSTs’ ability to steer their economic development should be analysed in detail and not taken for granted. Savitch & Kantor (2002) raise the question whether cities are more than just leaves in the wind of economic globalization. This article down-scales this question to SMSTs as the unit of analysis. We want to find out whether SMSTs located inside metropolitan regions can influence their economic development via local policies, and thus, whether SMSTs can be more than just leaves in the wind.

Against this backdrop, this article studies four SMSTs<sup>1</sup> inside the metropolitan region<sup>2</sup> of Zurich (Switzerland). We focus on SMSTs in Switzerland because Swiss SMSTs located within metropolitan regions are embedded in a growth context, their economic specializations vary and there is little research that studies the impact of their policies on economic specialization (Mayer & Meili, 2017). Furthermore, Swiss local governments enjoy comparatively very high autonomy because they have authority over many policy fields, such as economic development

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<sup>1</sup> To be defined as a town in Switzerland, a settlement must have a density of inhabitants, jobs or equivalent for overnight stays, which sum is higher than 500 per km<sup>2</sup> in a grid cell with an edge length of 300 meters (see Goebel and Kohler 2014 for more information about the definition).

<sup>2</sup> The Federal Statistical Office of Switzerland defines metropolitan regions by their commuting statistics. If agglomerations reach the threshold of a minimum of 8.3 % of out-commuters to a core metropolitan region, then the agglomeration is assigned to that metropolitan region (Schuler, Dessementet, Joye, & Perlik, 2005).

and spatial planning, and they enjoy high tax autonomy (Sellers & Lidström, 2007). Accordingly, we expect that Swiss SMSTs are most-likely cases (George & Bennett, 2005), meaning that there is a higher likelihood of finding local policies that influence economic specialization in Swiss SMSTs than in SMSTs in other Western European countries.

We apply a multiple case study design and a pairwise comparison. We select two pairs of SMSTs that have a high variance in their economic specializations and that are located in the same region within the metropolitan region of Zurich, i.e. in Zurich South and Zurich North. More specifically, we compare towns that have a dominant knowledge-intensive business or financial service sector (KIBS/KIFS) with towns that have a residential economy sector. Through this structured comparison, we can control for regional context while maximizing differences in economic specialization.

The remainder of the article is structured as follows: In the first section, we present the literature on economic development trends and local policies in SMSTs. We derive three categories of local policies pursued by SMSTs and formulate a proposition for each category. This is followed by an outline of the multiple case study design that adopts a pairwise comparison. We then compare two SMSTs in Zurich North and two SMSTs in Zurich South. Afterwards, we analyse the findings of the comparison between these two pairs, discuss the validity of the propositions and relate the findings to the literature. Finally, we sum up the findings and formulate practical recommendations for SMSTs.

## SMSTs inside metropolitan regions

SMSTs that are located inside metropolitan regions are attractive locations for firms and living spaces for people that work in the core city of a metropolitan region. In north-western European countries, high real estate prices and salaries have mostly displaced manufacturing industries out of metropolitan regions. As a result, towns inside metropolitan regions have begun to specialize in either knowledge-intensive businesses and financial services (KIBS/KIFS), or in the residential economy (Hall & Pain, 2006; Meili & Mayer, 2017; Serrano & Hamdouch, 2017). Sub-centres close to metropolitan centres are able to attract KIBS/KIFS firms, such as law firms or consultancies, due to their availability of affordable land, proximity to the metropolitan centre and favourable transport connections (Glanzmann, Gabi, Kruse, Thierstein, & Grillon, 2006). What is more, smaller urban places within metropolitan regions can combine the advantages of a city and those of a village and are therefore attractive places to live and to buy everyday supplies (Fertner, Groth, Herslund, & Carstensen, 2015; Schneidewind et al., 2006). Attracting inhabitants – especially those with high incomes – increases the chance of successful urban development and economic wellbeing (Davezies, 2008). Hence, the residential economy sector – which refers to economic activities that serve local needs, such as food stores, hairdressers or schools – is another way for SMSTs to specialize and gain importance inside metropolitan regions (Segesseman & Crevoisier, 2016).

The economic specialization of SMSTs inside metropolitan regions may depend on how integrated they are in the metropolitan region and their distance to the core city. The closer a town is to the core city of a metropolitan region, the more specialized it is (Polèse & Shearmur, 2006). Towns that are close to a bigger city may be better able to ‘borrow’ economic specialization from the core city. However, the opposite can also happen and towns must cope with an ‘agglomeration shadow’, meaning that their proximity to the core city results in its

having less functions than a town would normally have (Alonso, 1973; Meijers & Burger, 2015). Metropolitan integration and co-operation are considered to be essential factors that allow SMSTs to benefit from the advantages that arise from the metropolitan region's scale and hence for the performance of the whole region (Cardoso & Meijers, 2017; Meijers, Hoogerbrugge, & Cardoso, 2017). Some barriers make metropolitan integration more difficult. A highly dominant core city and large differences in the socio-economic performance of SMSTs might lead to asymmetric power relations that hinders the willingness of SMSTs to collaborate (Rayle & Zegras, 2013; Cardoso, 2016). According to Cardoso (2016, p. 2213) a 'leading but not dominant core city acting as a symbol of territorial identity beyond its boundaries' as well as functional interdependence and weak hierarchies between SMSTs are necessary for a successful metropolitan integration. From an institutional perspective, metropolitan integration is fostered in cases of low institutional fragmentation, low local autonomy and when metropolitan governance structures are present (Kaufmann and Sager, 2018; Savitch & Vogel, 2009).

Swiss metropolitan regions are characterized by high institutional fragmentation, high local autonomy and the absence of metropolitan governments<sup>3</sup>, which are, for example, existent in France or the United Kingdom. However, the high functional interdependences, the weak hierarchies between and the strong consolidating role of Swiss cantons may foster metropolitan integration. As a result, for economic development to be successful, Swiss SMSTs try to balance autonomous policy initiatives as well as the coordination of policy agendas with other jurisdictions within a metropolitan region.

## Local policies of SMSTs in metropolitan regions

Most studies focusing on policies in SMSTs trace the prevalent policy agendas in these towns, but they do not discuss the impact of these policies on local economic development (Kaufmann & Arnold, 2017; Lorentzen, 2012). Moreover, it is often the case that SMSTs located in rural areas are studied and treated as regional towns or as economically unimportant (Bell & Jayne, 2009).

Generally, evaluations of whether or not local policy initiatives could influence local economic development have been ambiguous. One problem is that the relationship between policies, institutions, governance and economic development is multi-faceted and hard to trace (Malecki, 2007; Rodríguez-Pose, 2013). Erickcek and McKinney (2006, p. 239) mention that 'several previous studies suggest that public policy actions on the state and local levels may have limited results, whereas others conclude that such actions do have positive benefits.' Geographical setting, institutional framework, history and culture influence the outcome of local policy initiatives (Shearmur & Coffey, 2002). Settlements with small governments may not have the necessary expertise to shape effective local policy initiatives. External agents and experts, however, may not have sufficient local knowledge to design tailor-made strategies (Rodríguez-Pose, 2013).

By mainly relying on the edited volume, *Creative Approaches to planning and local development – Insights from Small and Medium-sized Towns in Europe* (Hamdouch et al., 2017), we propose three categories of local policies that SMSTs may apply to influence their economic specialization. We derive one proposition for each of these categories, which we then

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<sup>3</sup> The exception is the metropolitan region of Bern. The canton of Bern enacted the establishment of a metropolitan governance institution called regional conference (*Regionalkonferenz*).



test in our case studies with the help of qualitative data. To be sure, such local economic development policies cannot always be assigned unambiguously to one policy category. Local policies are formulated in packages, do not operate in isolation from each other and are often mutually dependent (Uyarra, 2010).

The first category focuses on creativity (Nyseth et al., 2017). Creativity is related to different strategies in KIBS/KIFS towns compared to towns that have a residential economy (Aarsaether et al., 2017). One strategy links the KIBS/KIFS sector to innovation through approaches that enhance knowledge interactions between economic actors inside and outside of the town. Innovation policies may aim to build a cluster of firms that invest in similar research and development (R&D) activities, or they aim to promote start-ups through incubators, or they support entrepreneurship through accelerators (Kaufmann & Arnold, 2017). Innovation policies may also include business and innovation parks that could help cluster similar firms and hence enhance knowledge transfer. Another strategy that may be applied by residential economy SMSTs focuses on the importance of culture, creative capacity and amenities in a town (for example, music concerts, architecture, design, etc.). Cultural and creative activities help to create an environment that is attractive for inhabitants. Such strategies can shape people's sense of belonging and local experience (Førde & Kramvig, 2017; Lorentzen, 2012). These two strategies emphasizing innovation and culture in the creativity category lead us to develop the following proposition:

**Proposition 1:** *Local innovation policies have contributed to a KIBS/KIFS economic specialization in SMSTs, whereas local cultural policies have contributed to a residential economic specialization in SMSTs.*

The second category, which Nyseth & Tønnesen (2017) term entrepreneurialism, aims to create closer links between public and private sectors, and has to do with tax-oriented policies and to policies that seek to promote and brand a location. Entrepreneurialism transforms the traditional role of the government from a service deliverer to a risk-taking and promotion-oriented actor (Nyseth & Tønnesen, 2017). Low corporate tax rates attract KIBS/KIFS firms, whereas low personal income tax rates attract residents (Segessemann & Crevoisier, 2016). Local governments in Switzerland enjoy high tax autonomy. They are allowed to levy personal income tax, corporate income tax and property tax, among others. This may lead to a tax competition for attracting residents and firms (Devecchi, 2016; Kaufmann & Arnold, 2018). Place branding is another way to promote SMSTs, and it refers to the creation of a place identity that relates to local people, businesses, facilities and landscapes. Labels, such as 'Slow city' or 'Green city', illustrate examples of this strategy and values the social, environmental, economic or heritage-related amenities of towns (Knox & Mayer, 2013). In sum, tax strategies and place branding appear to be versatile strategies that can be tailored to multiple target groups. We thus develop the second proposition as follows:

**Proposition 2:** *Low corporate tax rates and business-oriented place branding have contributed to KIBS/KIFS economic specialization in SMSTs, whereas low personal tax rates and resident-oriented place branding have contributed to residential economic specialization in SMSTs.*

The third category of local policies focuses on land-use planning. SMSTs can steer the development of housing and industry or trade zones, as well as the management of land reserves, via land use planning (Berli, 2018; Devecchi, 2016). To do so, SMSTs may apply, as Serrano & Hamdouch (2017) call it, the market of territories approach, meaning that SMSTs offer land to private actors as quickly as possible so that they build profitable business buildings

or apartment blocks. Since SMSTs in metropolitan regions have, to a certain extent, the same location advantages, such as quick transportation connections and proximity to the city centre, SMSTs seek to give themselves a competitive edge by providing land before neighbouring SMSTs do (Serrano & Hamdouch, 2017). A contrasting strategy in the land-use planning category is the archipelago approach, as it is called by Dormois (2007). This strategy emphasizes the crucial role of public authorities in land-use planning and spatial development (Serrano & Hamdouch, 2017). Instead of selling land to the highest bidder, local authorities plan a multifunctional space that may include farmland, natural land and economic and residential areas. This approach seeks to avoid urban sprawl because it concentrates growth in certain designated areas. According to this theoretical background on land-use strategies, we develop the following proposition:

**Proposition 3:** *Land-use planning for business buildings has contributed to KIBS/KIFS economic specialization in SMSTs, whereas land-use planning for apartment buildings and single-family homes has contributed to a residential economic specialization in SMSTs.*

## Research design

We empirically test these theory-driven propositions through a case study design that compares four SMSTs that are located within the metropolitan region of Zurich. Our research design builds on two distinctive research heuristics that are often deployed individually in the study of European SMSTs but seldom in conjunction with each other. These heuristics are ‘regional determinism’ and ‘territorial autonomy’ (Servillo, Atkinson, & Hamdouch, 2017). In concrete terms, this means that we control for regional context, which is important for contextual variables, but we argue that SMSTs inside a metropolitan region can actively influence their economic specialization via local policy initiatives.

We adopt a case study design that compares two pairs of SMSTs. Based on a most similar systems design logic (Przeworski & Teune, 1970), we select pairs of SMSTs that vary in their economic specializations but that are similar to each other in regard to their contextual variables. Therefore, we select two pairs of SMSTs that are located in the same region within the metropolitan region of Zurich, i.e. in Zurich South and Zurich North. To take advantage of this pairwise comparison, we first conduct a within-pair comparison before attempting to generalize the findings in a between-pairs comparison. Investigating two similar pairs of SMSTs allows us to eliminate rival findings and allows these findings to achieve a higher level of generalizability (Blatter & Haverland, 2014).

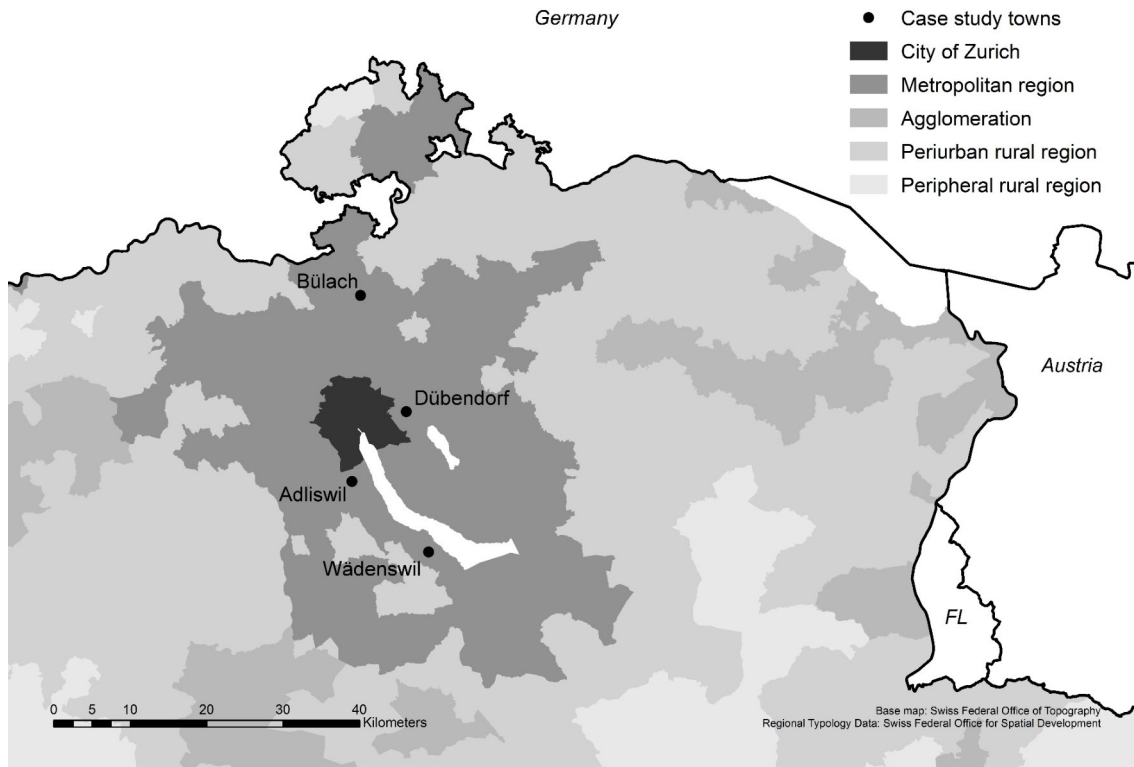
The y-centred and data-driven case selection is informed by Meili & Mayer’s (2017) cluster analysis of the economic profiles of 152 SMSTs in Switzerland. This cluster analysis groups these 152 SMSTs into seven types: prospering residential economy towns, residential economy towns, knowledge-intensive towns, business hub towns, high tech towns, low tech towns and alpine tourism towns. Most towns located in Swiss metropolitan regions belong to the knowledge-intensive town type, the business hub town type (which also has a large share of employment in the knowledge-intensive business service sector) and the residential economy type. However, the geographical pattern shows that knowledge-intensive towns and business hub towns are located near major cities, in the case of this study, in the city of Zurich, whereas residential economy towns are located further away from the city centre of Zurich (Meili & Mayer, 2017). For our case studies, we chose two towns that serve as locations of KIBS/KIFS

firms (one from the knowledge-intensive town type and one from the business hub town type) and two towns that serve the local population. By considering the importance of the distance between the towns and the city centre of Zurich, we seek to examine how the interplay between the distance to the city centre and local policies influences the economic specialization of SMSTs.

The KIBS/KIFS towns are represented by Dübendorf (Zurich North) and Adliswil (Zurich South). As Table 1 shows, Dübendorf and Adliswil are among the SMSTs with the highest share of employment in the KIBS sector in the metropolitan region of Zurich, as well as in Switzerland as a whole (BFS, 2013). Both towns are at a similar distance to the city centre of Zurich by train and by car. For the two residential towns, we chose Bülach (Zurich North) and Wädenswil (Zurich South). Both towns are part of the ranking of SMSTs with the highest share of employment (SOE) in the residential economy inside the metropolitan region of Zurich. Bülach and Wädenswil have nearly the same SOE in the residential economy and are at a similar distance from the city centre of Zurich. Bülach and Dübendorf are located in the north of Zurich around the Zurich Airport (the largest international airport in Switzerland). Adliswil and Wädenswil are located in the south of Zurich, in the so-called Zimmerberg region (see Figure 1).

Table 1: Key figures of the four cases

	Pair Zurich North			Pair Zurich South	
	Dübendorf	Bülach		Adliswil	Wädenswil
Number of inhabitants (2016)	27,689	19,611		11,900	21,797
<i>Economic specialization</i>					
SMST Type (Meili & Mayer, 2017)	Business hub town	Residential economy town		Knowledge-intensive town	Residential economy town
Share of employment in the KIBS/KIFS sector (BFS, 2013)	33%	7.30%		52%	8%
Rank CH <sup>1</sup>	4	131		1	123
Rank Metro ZH <sup>2</sup>	3	43		1	40
Residential economy (BFS, 2013)	53%	69%		40%	68%
Rank CH <sup>1</sup>	118	22		148	28
Rank Metro ZH <sup>2</sup>	35	5		45	6
<i>Explanatory factor distance</i>					
Time to the city centre of Zurich (main station)					
- with motorized private transport (Google maps, (9.1.2018))	15 min for 10.4km	21 min for 21.4km		14 min for 8.9km	26 min for 25.4km
- by the fastest train (SBB, 9.2.2018)	10 min	17 min		15min	17 min
<sup>1</sup> out of 152 SMSTs in Switzerland					
<sup>2</sup> out of 45 SMSTs inside the metropolitan region of Zurich					



*Figure 4 Map of the Metropolitan Region of Zurich (own illustration)*

The case analysis relies on semi-structured, in-depth, elite interviews. We conducted 25 interviews (five to seven interviews per town) with relevant local politicians, local public servants, representatives from local interest groups and firms and experts (see Table A1). These interview partners were carefully selected to ensure sufficient variety within the cases, while ensuring consistency between them. The interview questions covered the general development of each town, the goals of the town's general development, the goals of the town's economic development, specific local policies and their impacts on the town's economic specialization, the impact of regional and cantonal policies on the town's economic specialization and the influence of regional dynamics on the town's economic specialization. The interviews were conducted by both authors between June and October 2017. We took extensive notes during the interviews and, after the interviews, we immediately wrote interview protocols. In a next step, we scanned the interview protocols for causal explanations for the economic specialization of the towns and we assign these explanations to the three local policy categories as well as to alternative policy categories and explanations, which we did not include in our local policy categories. Besides the interviews, we reviewed statistical data, reports, press articles and other secondary literature to triangulate the interviews (reactive data) with these types of non-reactive data. This data triangulation is expected to enhance the reliability of the inferences.

## Case studies

We present the pair-wise comparison by first testing the propositions in the two cases related to Zurich North and then in the two cases related to Zurich South. After that, we discuss the

between-pairs comparison in order to assess the possible generalizability of the findings generated by the within-pair comparisons.

### Within-pair comparison of Zurich North: Bülach and Dübendorf

The land-use policy proposition is supported in both cases. We find creativity and entrepreneurialism policies in Dübendorf, mainly in accordance with our propositions. However, these policies have only been implemented recently, so they cannot have (yet) contributed to Dübendorf's KIBS/KIFS economy.

While Dübendorf developed from a farmer town into a knowledge-intensive town in the last 200 years, Bülach developed from a farmer town into an industrial town, and it is now a residential town. Dübendorf's conversion into a knowledge-based economy was crucially affected by the establishment of the Swiss Federal Laboratories for Material Science and Technology (EMPA) in 1950 and the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) in 1970. Both research institutes are affiliated with the Swiss Federal Institute of Technology in Zurich (ETH Zurich). Bülach was once an industrial town and its development into a residential town began in the 1980s when the majority of firms moved their production facilities abroad where production was cheaper (Interviewee 21). By mid-2000s, most industrial firms in Bülach had sold their unused land to developers, who transformed industrial brownfields into residential quarters.

Over the last decades, neither Bülach nor Dübendorf have felt the need to formulate economic development strategies on their own. Local officials from both towns explain:

We do not have to formulate economic development policies. The region, and especially Dübendorf, is very attractive. Firms settle in Dübendorf anyway. We have to be conscious of managing growth and not also fueling it (Interviewee 9).

All we have done is visit the most important employers once a year, and we have met with local business interest groups. Our economic development strategy was only to retain our existing firms (Interviewee 20).

Interview partners in both towns consider regional economic dynamics and market pressure to be more important than local policies. For example, economic globalization was mentioned several times by the interviewees as a reason for the decline of industrial production in Bülach. In another example, interview partners stressed that the development of Dübendorf must be understood within the context of the regional growth dynamics of the whole *Glatt* valley: Growing firms that were originally based in the city of Zurich expanded their office spaces and consolidated their dispersed locations in Dübendorf since it still had unused land (Interviewees 10, 11, 12). The connectivity ensured by both train and tram is considered to be of the greatest importance for the location attractiveness for firms and research institutions in Dübendorf and for residents in Bülach (Interviewees 9 and 20). Regional growth dynamics, the distance to the city of Zurich and the connectivity of the towns are explanatory factors that are largely exogenous to local administrations. Although neither town formulates a comprehensive local development strategy, they both still pursue individual strategies that aim to influence their economic specialization, as will be outlined in the following section.

## Creativity and entrepreneurialism

While Bülach has not formulated local policies based on the creativity or entrepreneurialism approach, Dübendorf connects the two approaches.<sup>4</sup> Dübendorf attempts to position itself as research town by supporting the development of an innovation park and by marketing the presence of the federal research institute. A consortium of national, cantonal and local politicians and ETH representatives was successful in establishing a Swiss Innovation Park, financially supported by the Swiss Federation, on the premises of a decommissioned military airport (Interviewee 8). The construction began in summer 2017. The innovation park is expected to serve as a collaborative platform between universities, research institutions and KIBS firms with the goal of fostering innovation and commercialization in life sciences, engineering and environment, and digital technologies. The presence of knowledge-intensive firms, research institutes and the innovation park is actively marketed given that it is a concrete goal of the 2014-2018 parliamentary legislative term (Interviewee 9). However, the marketing of Dübendorf as a city of research only began recently. Only once the federal research institutes were already in place did the local authorities realize the economic potential of their research organizations as part of today's knowledge economy.

## Land-use planning

Land-use policies are the only local policy instrument that interview partners from Bülach and Dübendorf consider to be effective instruments for influencing local economic specialization. Both towns had available land and both initially pursued a market of territories approach before turning to an archipelago approach.

Dübendorfs' development into a knowledge-intensive town began in 1950, when the EMPA settled in Dübendorf because the municipality owned land that it urgently wanted to sell. Local historians explain the market of territories approach that Dübendorf pursued at the time:

Dübendorf needed money and the municipality owned a spot of land. They sold the land to the bidder with the highest price. The federation was the only bidder. If someone else had paid more money per square meter, the EMPA would not be in Dübendorf today (Interviewee 12).

In Bülach, land reserves in the south of town were also sold to different developers without a coherent land-use plan (Interviewees 19 and 23).

Most developers built residential houses. South Bülach was sprawling so chaotically that the executive council adopted a planning moratorium to obtain a construction stop. The market just overran us (Interviewee 20).

Today, profound land-use regulations are employed in Dübendorf and Bülach. Cantonal authorities have designated parts of both towns as a so-called Cantonal Centre Area (*Kantonales Zentrumsgebiet*, CCA). The canton of Zurich seeks to concentrate the growth of the built environment in these areas in order to combat urban sprawl. This designation allows local authorities to adopt more profound building regulations regarding the percentage of residential and non-residential buildings that can be built and the quality and the density of the built environment in this area. Based on this opportunity for profound regulation, Dübendorf aims to

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<sup>4</sup> Both towns have outsourced part of their location promotion activities to regional economic promotion organizations: Bülach to the organization Location Zurich Lowlands (*Standort Zürcher Unterland*) and Dübendorf to the organization Airport Region Zurich.

create a mixed-use development of housing and business premises. Rather than actively attract firms via land-use planning, Dübendorf seeks to prevent unwanted firms and industries from settling in the local CCA (Interviewee 9). Bülach predominantly uses the CCA to plan for housing units, but it reserves ground floor premises for retail stores (Interviewees 19 and 20). Overall, it appears that Dübendorf's decision to focus on mixed-use development and Bülach's decision to focus on housing units can only be steered to a limited extent by local authorities. These decisions are mostly aligned to the demands of the market.

The CCA strategy is decisive for explaining growth in the *Glatt* valley. For example, a new tram line in the *Glatt* valley, which was financed by the canton and the federation due to the CCA status of multiple areas in the *Glatt* valley, cost around 1 billion Swiss Francs, but it has induced another 6 billion Swiss Francs in investments around the newly developed tram line (Interviewee 11). This tram line connects the patchwork of different growth archipelagos in Zurich North. The original impulse for the tram line was generated by informal meetings between four *Glatt* valley mayors, one of which was the mayor of Dübendorf, in the early 1990s (Nüssli & Schmid, 2016).

### Within-pair comparison of Zurich South: Adliswil and Wädenswil

No proposition can fully be supported in the two Zurich South cases. Adliswil has focused its land-use planning on businesses and housing, whereas Wädenswil has planned for business and research and education institutions, as well as housing. With regard to the two propositions on creativity and entrepreneurialism, we find that the residential economy town of Wädenswil is more active than Adliswil, the KIBS/KIFS town.

While both Adliswil and Wädenswil were industry towns in the 19th century, they followed different development paths during the 20th century. Adliswil's economy developed into a knowledge-intensive economy, hosting major insurance companies, whereas Wädenswil developed into a residential town with a focus on education and research. In the 1990s, Adliswil benefited from the lack of office space in the city of Zurich. Big firms, such as the re-insurance company Swiss Re, moved to Adliswil and established themselves on industrial brownfields (Interviewee 7). In Wädenswil, most of the industrial brownfields were transformed into housing due to high demand and the profitability of housing units (Interviewee 14). The origin of Wädenswil's education and research focus lies on the agricultural research and education centre that was founded in 1890 on land that was made available by the bailiwick (Interviewee 15). Today, Zurich University of Applied Sciences (*Zürcher Hochschule für Angewandte Wissenschaften*, ZHAW) has its department of Life Science and Facility Management in Wädenswil.

Although authorities in Wädenswil invest more in economic development policies when compared to their counterparts in Adliswil, the respective interview partners agree that the influence of local economic development policies is limited. Despite not having employed anyone who is solely responsible for economic development, a regional location promoter states that Wädenswil is one of the only towns in the region that has its own development strategy, which has a research and education focus (Interviewee 4). Wädenswil's further distance from Zurich is seen as a disadvantage when luring big national and international firms to the town (Interviewees 13 & 17). However, the distance to Zurich is not too far to attract out-commuters and education and research institutions. The economic specialization of Adliswil is the result of its proximity to the city of Zurich, the availability of land and the ease of connectivity to it.

Contrary to its economic specialization, its image as a residential town dominates local development discussions (Interviewee 1).

Adliswil has never formulated an economic development strategy. One Member of Parliament stated that it might be that Adliswil is currently too well off to be forced to think about economic development issues (Interviewee 5). Other than local land-use policies, the authorities of Adliswil consider themselves to be without the competence, time and monetary resources for comprehensive local development and location promotion issues (Interviewees 1 and 4). Additionally, authorities or politicians do not consider themselves to be in a position to significantly influence market dynamics or the relocation decisions of big national or international firms as, for example, the mayor of Adliswil explains:

As a small town you can do nothing. You can only make little changes – maybe improve schools and leisure activities (Interviewee 1).

### Creativity and entrepreneurialism

While Adliswil has not formulated local policies based on the creativity or entrepreneurialism approach, Wädenswil links the creativity approach to the entrepreneurialism approach by focusing on education and research.<sup>5</sup> Different strategies seek to position Wädenswil as an education and research centre (Interviewees 13 and 18). First, the town buys and renovates buildings for educational purposes and ensures reliable public transport to improve the infrastructure and accessibility of schools. Second, the town is a partner of a local business incubator called 'Grow'. Third, the local cluster organization, 'Foodplus', aims to develop cooperation between economic actors, schools and research institutions (Interviewee 17). These activities are accompanied by place branding instruments, such as the slogan 'Bildungs- und Forschungsstadt am Zürichsee' (Education and Research town at the lake of Zurich). This focus on education and research may have helped the town to be chosen as the new location for a cantonal secondary school (Interviewee 13).

Besides promoting Wädenswil as an education and research town, authorities have attracted new firms to Wädenswil by providing affordable land in a newly established business land-use zone close to the motorway at the edge of the town (Interviewee 13). Not only is expected that new industries will be attracted to Wädenswil because of this new zone, but also local businesses that do not have enough space will be encouraged to stay in Wädenswil. Some firms that had left Wädenswil, due to a shortage of land, have already returned to this new business zone, including a construction firm (Interviewee 16). However, due to its location at the edge of the town, the business zone is not expected to be attractive to service firms (Interviewee 13).

### Land-use planning

Local land-use policies are important in both towns and both towns currently employ an archipelago approach to local land-use planning. No area in Adliswil or Wädenswil is designated as a CCA. Adliswil's local land-use planning has supported the development of industrial brownfields into places that are suitable for service firms and residents. Given the presence of research and education institutions, Wädenswil seeks to attract businesses, research organizations and residents via land-use planning.

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<sup>5</sup> Both towns have outsourced parts of their location promotion to the regional economic promotion organization called Zurich Park Side.



Similar to Bülach and Dübendorf, Adliswil and Wädenswil had available land that was sold by private owners or the town to the highest bidder, according to the market of territories approach (Interviewee 7). Whereas residential houses and new buildings for education and research institutions were built in Wädenswil, office buildings for service firms and housing were built in Adliswil. However, the area close to where service companies have located has been the focus of general land-use planning since the early 2000s because it is close to the motorway and has good connections to the city of Zurich (Interviewee 3). The town of Adliswil has started to comprehensively plan the development of available land for housing and businesses and shifted from a market of territory approach to a more integrated archipelago approach to prevent unorganized urban sprawl. So far, an international school has settled there and residential buildings with around 461 apartments and a park have been constructed. Similarly, Wädenswil authorities highlight the fact that they can steer development via official zone planning. As one local official explains:

When developers want to have special permits, we can give those under certain conditions. This way, we can – to a certain extent - decide how much of the new buildings should be for housing or businesses (Interviewee 14).

### Between-pairs comparison

The between-pairs comparison reveals that only the proposition about land-use planning can be partially supported. The propositions regarding creativity and entrepreneurialism are only supported in the case of Dübendorf, and they, therefore, have to be rejected. The pairwise comparison also demonstrates that the distance to the city of Zurich, as an exogenous explanatory factor, is relevant for explaining the development of economic specializations in Zurich North and in Zurich South. Table 2 summarizes the pairwise comparison. In this section, we discuss each proposition and potential exogenous factors.

Table 2: Case comparison

	Zurich North			Zurich South	
	Dübendorf	Bülach		Adliswil	Wädenswil
Economic specialization	Knowledge-intensive town	Residential economy town		Knowledge-intensive town	Residential economy town with a research and education focus
Propositions	1. Innovation policies 2. Low corporate tax rates and business-oriented place branding 3. Land-use planning for business	1. Cultural policies 2. Low personal tax rates and resident-oriented place branding 3. Land-use planning for residents		1. Innovation policies 2. Low corporate tax rates and business-oriented place branding 3. Land-use planning for business	1. Cultural policies 2. Low personal tax rates and resident-oriented place branding 3. Land-use planning for residents
Empirically observed local policies	1. <i>Creativity</i> ✓ 2. <i>Research-oriented place branding</i> (✓) 3. Availability of land and local land-use planning: ✓ - From market of territories to archipelago approach - <i>Business, research</i> and housing	1. - ✗ 2. - ✗ 3. Availability of land and local land-use planning: ✓ - From market of territories to archipelago approach - Housing		1. - ✗ 2. - ✗ 3. Availability of land and local land-use planning: (✓) - From market of territories to archipelago approach - Business and housing	1. <i>Creativity</i> ✗ 2. <i>Research and education-oriented place branding and industry zone</i> ✗ 3. Availability of land and local land-use planning: (✓) - From market of territories to archipelago approach - Housing, business and <i>research/education</i>
Empirically observed exogenous factors	Cantonal growth strategy Economic dynamism of the region <i>Short distance to the city of Zurich</i>	Cantonal growth strategy Economic dynamism of the region		<i>Short distance to the city of Zurich</i>	<i>Long distance to the city of Zurich</i>

Notes: Not-shared, and thus explanatory, factors are in italics. Thick marks indicate whether or not the proposition is supported. A ✓ means it is fully supported, (✓) means it is partially supported, and ✗ means it is not supported

Interview partners in Zurich North and Zurich South emphasize the importance of land-use planning to influence local economic development. Hence, the distinction between land-use planning and the entrepreneurialism or creativity categories is not as clear-cut as we proposed in our categorization of local policies. Both KIBS/KIFS towns (Adliswil and Dübendorf) plan mixed-use development (i.e. housing and business). The residential town of Bülach mainly plans for housing development, whereas the residential economy town of Wädenswil plans for housing, business (but not so much for knowledge-intensive firms) and research organizations. In general, these four SMSTs do not possess much property. Instead, they try to influence property development via land-use planning. We find that the archipelago approach to land-use planning is currently prevalent in all four SMSTs. This means that instead of just selling land to the highest bidder, authorities plan designated growth areas (Dormois, 2007; Serrano & Hamdouch, 2017). However, the economic specializations of the towns were largely determined by the market of territories approach during the 1980s and 1990s, when industrial brownfields, or other building land, were sold to the highest bidder. Back then, the distance to Zurich was the crucial factor for attracting investors. In both Zurich North and Zurich South, large service firms looking to consolidate or expand their office spaces sought available land in towns close to the city of Zurich, which were well connected by train and by car. The distance from both Wädenswil and Bülach to the city of Zurich appears to be too far to attract knowledge-intensive firms. However, these towns are attractive to residents. Thus, towns that are close to a bigger city may be able to 'borrow' economic specialization from their larger counterparts (Alonso, 1973; Meijers & Burger, 2015).

In sum, the between-pairs comparison shows that land-use policies are currently implemented in line with our propositions in Zurich North, but only partially in line with them in Zurich South. The impact of land-use policies seems limited given the prevalence of the market of territories approach that reigned during the time when economic specializations were emerging. Thus, proposition 3 can only partially be supported. Additionally, the distance to the city of Zurich emerged as an important exogenous explanatory factor in both pairs of SMSTs.

We only found traces of innovation policies (creativity) and research-oriented place branding (entrepreneurialism) in Dübendorf (KIBS/KIFS town) as well as in Wädenswil (residential economy town), meaning that propositions 1 and 2 must be rejected since these two towns have different economic characteristics. Regarding innovation policies, both Dübendorf and Wädenswil formulate cluster building strategies. Dübendorf is partner in an innovation park project that is expected to spatially concentrate knowledge interactions. Wädenswil seeks to generate the same effect by applying a cluster approach in the education and research fields, as well as in the food sector. Thus, contrary to proposition 1, it seems that innovation policies are implemented in towns that have a research focus and not generally in KIBS/KIFS towns. Place-branding, which belongs to the entrepreneurialism category, is completely outsourced to regional location promotion agencies in Adliswil and Bülach. These two towns settle for being branded as 'part of' Zurich (Zurich Park Side or Airport Region Zurich) given that Zurich has a high international visibility. Meanwhile, Dübendorf and Wädenswil pursue – additionally to their membership in the region location promotion agencies – their own place branding strategies as towns of research and, in the case of Wädenswil, of research and education. In the two towns with a residential economic specialization, Bülach and Wädenswil, we found no strategies that exploit social or environmental amenities to brand the locations as residential towns. Thus, contrary to proposition 2, it seems that research and education are especially suited to place branding in the today's knowledge-intensive economy. However, local authorities in both towns jumped on the bandwagon, i.e. they market local assets that are already available. Tax policies, which also belong to the entrepreneurialism category, have not been considered to be very important at the local level. Instead, they are used as an instrument of the canton of Zurich.

Overall, interviewees do not generally consider local policies to be very effective for impacting local economic development or the economic specialization of SMSTs. One reason for this is that local governments seem to lack the expertise and the resources to formulate effective local economic development policies. Additionally, the impact of local policies on larger market dynamics and regional growth dynamics is limited. In the context of the Swiss political system, important policy fields, such as large-scale land-use planning, transportation and taxation are mostly under the control of the canton. This demonstrates that the cantons are the most influential political entities in Swiss policy making (Sager, Ingold, & Balthasar, 2017). This dominance of the cantons in combination with high local autonomy and high institutional fragmentation has led to interlocking politics and a high degree of policy cooperation between all three governmental levels in Switzerland (Kübler 2007).

Through the association 'Metropolitan Region Zurich' cantons, cities as well as municipalities in the metropolitan region should be encouraged to cooperate and coordinate their policies. However, as the interviews show, many SMSTs do not feel addressed by discussions and policy initiatives in this association and they see the city of Zurich and the canton of Zurich as much more important in influencing economic development. However, SMSTs in Zurich North and South cooperated in certain policy fields, for example in transportation, to launch policy initiatives and to increase their political weight *vis-à-vis* the canton.

## Conclusion

This article studies the local policies that four SMSTs located inside the metropolitan region of Zurich formulate in order to influence their economic specializations and investigates the impact of these policies. We distinguish between three categories of local policies that SMSTs can apply, namely, creativity, entrepreneurialism and land-use planning. We formulate one proposition for each category, which we test in four cases. We compare two pairs of SMSTs in Zurich North and Zurich South. In both pairs, we select a town with a dominant KIBS/KIFS sector and a town that possesses a strong residential economy.

Our comparison reveals that the economic development and the economic specialization of SMSTs are largely exogenous to local policy-making. The location of the town together with its connectivity seem to explain whether a SMST develops into a KIBS/KIFS town or a residential town. If the distance to the city of Zurich becomes too large, a SMST loses its attractiveness for knowledge-intensive firms and develops into a residential town. Local policies are only found to have a limited impact on the local economic specialization of towns. SMSTs lack expertise and administrative professionalization and seem to be too small-scale to influence economic development. The only exception is in regard to local land-use planning. Over the last couple of years, all four SMSTs under scrutiny moved from a market of territories approach to an archipelago approach, which designates growth areas within the town. Land-use planning is also an instrument to enhance a town's attractiveness for economic activities and for specific firms. Hence, land-use planning strategies can incorporate attributes of entrepreneurialism or creativity strategies. However, such profound land-use strategies were only recently formulated, so we are unable to evaluate their long-term impact. In general, local land-use planning is only able to manage growth that is already occurring and is unable to proactively steer this development. Local policies are thus, at best, reactive but not proactive.

These findings may be generalized to other polycentric urban systems in Western Europe. Given that Swiss SMSTs are the most likely cases in which we would find an impact of local policies on the economic specialization of towns, our findings suggest that SMSTs in Western Europe are not in a position to actively steer their economic development. This generalization can be applied to similar

polycentric urban systems in the *Blue Banana* (also known as the Manchester–Milan Axis), such as England, The Netherlands, Belgium, Western and South Germany and Northern Italy (Brunet, 1989). However, these findings should be generalized with caution given the small size of our unit of analysis that makes local economies vulnerable to distortions caused by idiosyncratic events. In Dübendorf, for example, the EMPA's decision to move to Dübendorf was pure luck and was not initiated by local leaders. The presence of the EMPA was an important factor for the development of knowledge-intensive business activities in Dübendorf. In Wädenswil, the bailiwick donated land that then laid the foundation for the town's research and education focus. Thus, idiosyncratic events may constitute so-called critical junctures that can shape the economic specialization of towns through path-dependent feedback effects.

Our case studies and the interviews allow us to draw practical implications for decision-makers in SMSTs. Active land-use planning seems to be the key for managing a town during the turmoil of economic globalization. Active land-use planning depends on a professionalized administration. Thus, SMSTs are well advised to invest in professionalized land-use and town planning departments, which recognize the value of land-use planning for the economic development of a town. A professionalized land-use administration has leverage in negotiations with investors and developers because they can make use of the competition between them (Devecchi, 2016). Given the spatial characteristics of land-use planning, SMSTs may also want to coordinate their land-use policies with neighbouring jurisdictions. This would not only enhance the effectiveness of land-use policies, but it would also increase the political leverage of SMSTs in cantonal land-use decisions. The cantons are the relevant political entities for metropolitan land-use planning given the limited decision-making power of metropolitan governance institutions in Switzerland. SMSTs would presumably benefit from a strengthening of metropolitan institutions, but given this is unlikely, SMSTs should seek strategic alliances to coordinate their policies and strategies within the region. SMSTs that coordinate their land-use strategies can initiate new regional projects, as the example of the tramline in the *Glatt Valley* shows.

SMSTs are certainly challenged by the economic dynamics of globalization and they only have few policy instruments at hand, but they are not bound to be leaves in the wind (Savitch and Kantor 2002), if they invest in a professionalized land-use planning that is coordinated among neighbours. Thus, SMSTs should strengthen their local autonomy by professionalizing their land-use planning, while simultaneously seeking strategic alliances to coordinate their land-use planning strategies within the region.

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## Appendix

Table A1: List of interview partners

Nr.	Municipality	Function	Date	Duration
1	Adliswil	Mayor	27.06.2017	60min
2	Adliswil	Chairman of the town's business association	30.06.2017	40min
3	Adliswil	Chairman of the town's historical society	11.09.2017	45min
4	Adliswil	Director of the region's economic and local promotion association	26.06.2017	90min
5	Adliswil	Parliamentarian	05.07.2017	60min
6	Adliswil	Head of Public Affairs of a big company located in town	05.10.2017	30min
7	Adliswil	Former real estate project manager of a big company located in town	01.11.2017	35min
8	Dübendorf	Mayor	22.09.2017	60min
9	Dübendorf	Head of town planning	21.07.2017	60min
10	Dübendorf	Chairman of the town's business association	27.09.2017	60min
11	Dübendorf	Director of the region's economic and local promotion association	08.08.2017	60min
12	Dübendorf	Local historians of the documentation centre	27.09.2017	75min
13	Wädenswil	Mayor	30.08.2017	45min
14	Wädenswil	Head of planning and construction	20.09.2017	35min
15	Wädenswil	Local historian	15.06.2017	60min
16	Wädenswil	Board member of the town's business association	12.09.2017	30min
17	Wädenswil	Deputy municipal secretary and person in charge of location promotion	06.10.2017	35min
18	Wädenswil	Director of the town's university of applied science	14.09.2017	30min
19	Bülach	Member of the municipal council	03.08.2017	45min
20	Bülach	Municipal secretary and head of economic and location promotion	08.08.2017	45min
21	Bülach	Chairman of the town's industry association	28.09.2017	40min
22	Bülach	Director of the region's economic and local promotion association	14.07.2017	75min
23	Bülach	Historians of the local historical museum	05.10.2017	90min
24	Expert	Director of the association Zurich Metropolitan Conference	15.06.2017	90min
25	Expert	Head of cantonal location promotion department	14.09.2017	60min

# Conclusion

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The charms of smallness. The title of this dissertation may evoke romantic feelings and imagery of idyllic and quiet towns surrounded by picturesque landscapes, perfect for a relaxing weekend or retirement. However, the central aim of this dissertation is not to cement this image but rather to present SMSTs as dynamic places that contribute to the economy of a country and to show that size alone does not determine economic success. To accomplish this aim, the dissertation identifies three theoretical blocks that help to explain economic success beyond the size paradigm: geographical proximity and connectivity to cities, innovation mechanisms beyond agglomeration advantages and local economic development policies and strategies. The four different articles that compose this dissertation focus on these theoretical blocks and attempt to extend the knowledge of how different factors contribute to the economic characteristics and innovation dynamics of SMSTs using qualitative and quantitative analysis. In the following, I outline the four articles' key results and demonstrate how they contribute to the aforementioned three theoretical blocks. Afterwards, I will present the policy implications, limitations and an outlook for future research.

## Summary of key results and theoretical contribution

**Theoretical block:** Geographical proximity and connectivity to cities

**Leading Question:** Is there a relationship between the socio-economic characteristics of SMSTs and their geographical links with their surrounding areas?

The concepts of borrowed size and network dynamics emphasise the importance of geographical proximity, as well as the interactions between places in order to gain economic and functional advantages (Camagni & Capello, 2015; Meijers & Burger, 2015). These concepts stem from the idea that smaller places closer to cities may perform better and have more functions than would normally be expected given their size. In the context of this dissertation, I empirically investigate how geographical proximity to cities and network activities influence SMST characteristics.

Articles 1 and 4 confirm that geographical proximity indeed influences SMSTs' economic characteristics. Both articles suggest that towns that are closer and that have faster connection to a city are more able to attract knowledge intensive firms than towns that are farther away. This result is also in line with previous studies that claim that towns closer to cities are more specialised (Hamdouch, Demaziere, & Banovac, 2017; Polèse & Shearmur, 2006). Using all Swiss SMSTs, Article 1 creates different socio-economic types with the help of a quantitative cluster analysis. This initial approach illustrates how SMSTs in Switzerland differ in their economic characteristics and socio-economic dynamics. It also demonstrates the geographical distribution of the different types of SMSTs. However, it is only possible to assume the role that proximity to a city plays. In order to obtain a more in-depth understanding of why the economic characteristics of SMSTs differ, Article 4 uses a qualitative case study approach (an explanatory method, which is thus suitable for the proposed research questions (Yin, 2009)) to examine cases with different economic characteristics inside the metropolitan region of Zurich. We selected the cases based on the typology built in Article 1. This qualitative analysis confirms the assumptions made in Article 1 regarding the role played by geographical proximity to a city.

Article 1 also shows that SMSTs only differ significantly in terms of their commuting and transportation linkages when the economy of SMSTs have completely different characteristics. To reach this conclusion, I rely on an analysis on variance that is suitable for analysing relationships between types of SMSTs and linkages to neighbouring centres. Only knowledge intensive towns show significantly different accessibility to the next centre when compared to residential towns, high-tech,

low-tech and alpine tourism towns. This result suggests that after a town exceeds a certain distance to the core city, it becomes more diverse and distance has less influence on its economic structure. However, I must note that residential towns and manufacturing dominated towns are also not that far away from cities. The fact that commuting and transportation linkages do not significantly differ between residential economy towns, industry dominated towns or the alpine tourism towns can be an outcome of the short distances in Switzerland and the well-developed transportation infrastructure. Hence, while Plane (2003) claims that places start to differ significantly after one hour's drive from a metropolitan region, this does not apply to Switzerland.

Whether SMSTs inside a metropolitan region are able to borrow size in terms of economic function depends not only on the proximity to the city but also on the availability of land and also on idiosyncratic events, as Article 4 shows. Beside land-use planning, SMSTs inside metropolitan regions can do little to influence whether they can benefit from the borrowed size effect. This result extends the literature on borrowed size (such as Alonso, 1973; Meijers & Burger, 2015) by showing the role of local development policies on borrowed size processes. Nevertheless, Article 4 also illustrates that cooperation between SMSTs inside metropolitan regions exist and have also lead to regional infrastructure projects. This result illustrates that metropolitan integration and the willingness to cooperate can indeed induce borrowed size effects that could eventually support the whole region. (Meijers, Hoogerbrugge, & Cardoso, 2017).

**Theoretical block:** Innovation mechanisms beyond agglomeration advantages

**Leading Question:** How can knowledge intensive firms be innovative in SMSTs despite the absence of a so-called 'local-buzz'?

As Article 2 and 3 and previous studies demonstrate (such as Fitjar & Rodríguez-Pose, 2011; Shearmur & Doloreux, 2016), high-tech firms in SMSTs are able to access knowledge and information from non-local sources. As the high-tech firms interviewed state, they do not see 'local buzz' in their home towns, however, they build their knowledge linkages strategically. Fitjar and Rodríguez-Pose (2017) corroborate this finding in their study in Norway. In addition, constant face-to-face contact does not seem to be necessary for successful innovation processes in the cases examined (McCann, 2007). Hence, Article 2 and 3 support Grillitsch and Nilsson's (2015) argument that collaborations compensate for the lack of local knowledge spillovers.

Qualitative case studies conducted in the eastern part of Switzerland, outside the metropolitan region of Zurich, support the results of both articles. I choose high-tech firms in SMSTs as the suitable unit of analysis for gathering information on innovation mechanisms because they require constant new knowledge to remain competitive and innovative. Moreover, the high salaries and other costs in Switzerland make it critical for high-tech firms to be, technically and qualitatively, the top players in their industry. A number of qualitative in-depth interviews in each case study firm allow me the opportunity to gain a profound insight into the firms' innovation mechanisms.

The results reveal that Capello's (2017) creative application pattern prevails in the SMSTs examined. Firms in SMSTs can be innovative because they hire employees who know where and how to look for non-local knowledge and integrate it into a firm's innovation process. So far, however, the literature does not discuss the constraints to or opportunities for building extra regional knowledge and information networks. This dissertation shows that small town characteristics can indeed be obstacles, for example, due to the missing urban amenities or longer time required to reach a city, but that they can also be opportunities for accessing non-local knowledge, for example, due to their natural amenities that attract certain kinds of employees. The results of Article 2 show that small town context

matters (positively and negatively) for accessing the knowledge of new employees, collaborating with universities and for attending workshops or conferences. Moreover, due to the missing ‘local buzz’, firms must be willing to let their employees travel, as Article 2 and 3 show (Torre, 2008). In sum, despite fast transportation connections to core centres, small town characteristics seem to affect firms’ open innovation processes. Also multinational companies with headquarters in small towns seem to be affected, because their most important innovation activities are located at company headquarters and not at globally distributed subsidiaries (Heidenreich et al., 2012). By shedding light on the local characteristics that influence a firm’s ability to develop networks, this dissertation contributes to the geographies of innovation literature, which has thus far overlooked specific location characteristics (Tödtling & Trippel, 2005). In doing so, this dissertation helps explain how SMSTs can host innovative firms. Moreover, the fact that small towns lay outside of highly urbanised areas but not in the absolute periphery highlights the importance of taking a more differentiated approach on innovation processes beyond metropolises.

Article 3 of this dissertation argues that firms in SMSTs not only rely on diversified non-local knowledge and information, but that they also draw on diversity in their hometown. Diverse knowledge and information can also be exchanged between different actors inside a small town. Based on the sociology literature (McPherson, Smith-Lovin, & Cook, 2001; Wellman & Wortley, 1990) Article 3 introduces a multi-dimensional view of diversity that the economic geography literature has not tackled thus far. Based on the interviews with people with different functions in high-tech firms, Richard Shearmur and I were able to identify three dimensions of diversity:

1. Diverse employees: The thinness of the regional labour market and the need for many well-educated, highly specialised employees, force firms to seek employees nationally and internationally. Thus, firms build up diversity internally.
2. Interaction patterns among employees across formal boundaries: Dense social structures and a strong firm identity, as well as the co-location of production and development, fosters exchange between firm members and across departments and hierarchies.
3. External knowledge sources: Firms access non-local knowledge from different sources.

The central contribution of this article is to show that diversity is not only an urban phenomenon (as suggested by many scholars, such as Florida (2002) or Jacobs (1969)). Instead, diversity can also exist in a presumably low-density context. Article 3 suggests that the second dimension of diversity is more prevalent in small-town contexts. The lower density of people in small towns compared to cities creates a greater heterogeneity (along certain dimensions) of social networks in rural regions. People in small towns are more likely to cross paths outside of the workplace, thus supporting interaction patterns among employees across formal boundaries. The other two dimensions of diversity may not be specific to small towns, however, they reveal that small-towns do not impede access to these types of diversity. The finding of Article 3 also suggest that firms generate dimensions 1 and 3 themselves and claims that firms outside core regions must be capable of doing so. Hence, not every firm that would survive in an urban context would also survive in a small towns context.

By shedding light on how specific non-urban location characteristics influence an open innovation process and by discussing different dimensions of diversity, this dissertation extends the geographies of innovation literature, which has not specifically mentioned these two aspects thus far.

**Theoretical block:** Economic development policies

**Leading Question:** How are SMSTs inside a metropolitan region able to influence their economic characteristics through economic development policies?

The central contribution to this theoretical block is the discussion on the role that local development policies play in SMSTs inside metropolitan regions and the highlighting of the strong autonomy of the local level. The existing literature usually considers metropolitan regions as a functional unity without distinguishing between the urban structures that compose metropolitan regions (for example Glanzmann, Gabi, Kruse, Thierstein, & Grillon, 2006). Without contradicting the fact that the regional context that embeds SMSTs plays an important role, the dissertation sheds light on the effects that local economic development policies may play. So far, no study examines this aspect. To highlight how local economic development policies and other possible factors influence a town's economic characteristics, David Kaufmann and I apply a case study design that compares four SMSTs located within the metropolitan region of Zurich. We adopt a case study design that compares two pairs of SMSTs based on a most similar systems design logic (Przeworski & Teune, 1970). We select pairs of SMSTs that vary in their economic specialisations but that are similar to each other in regard to their contextual variables. Investigating two similar pairs of SMSTs allows us to control for regional context, which is important for identifying contextual variables, eliminating rival findings and allowing these findings to achieve a higher level of generalisability.

Notwithstanding the strong local autonomy of Swiss SMSTs, the results from Article 4 show that the economic development and the economic specialisation of SMSTs are largely exogenous to local policy-making. As discussed in the first theoretical block, the location of the town, together with its connectivity, seem to explain the economic characteristics of SMSTs inside metropolitan regions. If the distance to the city of Zurich would become too large, a SMST would lose its attractiveness for knowledge-intensive firms and would develop into a residential town. Moreover, idiosyncratic events, through path-dependent feedback effects, also played a role in the economic development of the towns examined. SMSTs lack expertise and administrative professionalisation and seem to be too small-scale to influence economic development. Hence, SMSTs inside metropolitan regions are, to a certain extent, bound to be leaves in the wind of economic globalisation (Savitch & Kantor, 2002). The only instrument SMSTs have to influence their development to a certain extent and to mitigate their small size seems to be land-use planning. With the help of a professional land-use planning, which can be used to negotiate with investors and developers, SMSTs can enhance their attractiveness for economic activities and for specific firms (Devecchi, 2016).

Nevertheless, SMSTs inside metropolitan regions do apply local economic development strategies, although their effects are unclear. Two of the four SMSTs examined did attempt to find a niche inside its metropolitan context by branding themselves as research and education towns (Kelly, Ruther, Ehresman, & Nickerson, 2017; Lorentzen, 2009). However, these strategies are reactive and seek to enhance the existing economic structure. No strategies regarding heritage, traditions, liveability and sustainability could be found in the cases examined (Borén & Young, 2013; Lewis & Donald, 2010; Lysgård, 2016). SMSTs outside metropolitan regions may have more pressure to develop effective local economic development policies since they are less able to benefit from regional dynamics. Indeed, policies regarding creativity, place branding or attracting firms may have a greater impact outside metropolitan regions than inside them, and they may be better able mitigate the effects of the small size of SMSTs, as other studies suggest (such as Lorentzen & van Heur, 2012; Nyseth et al., 2017).

## Policy recommendations

This dissertation provides several recommendations for policymakers. First of all, policies that aim to foster the economic competitiveness of SMSTs should consider them as a category in themselves and not implement policies developed for cities or more remote and rural places. The mostly fast connections to cities, good infrastructure and central place functions make SMSTs a specific category in themselves, and they require adapted strategies to emphasise their advantages. In accordance with Tödtling and Trippel (2005), who argue for a differentiated regional innovation policy approach, local development policies in SMSTs should also be differentiated according to their existing constraints or opportunities. However, since SMSTs have different economic structures and form part of different regional contexts, a single strategy for fostering the development of SMSTs is not useful. Hence, based on the results of this dissertation, we recommend three fields for policy interventions that can be adapted to specific contexts:

**Collaboration:** As this dissertation demonstrates, SMSTs collaborate well with each other and have a common interest that they can present to higher political levels. Together they have more power to promote projects that are important to them. Land-use planning and place-branding projects that seek to make the whole region more attractive for firms and inhabitants may be more successful if SMSTs are actively involved. Moreover, as the results show, SMSTs close to cities do little to gain advantages from borrowed size processes. SMSTs could also try to increase their functions by actively collaborating with the core city or the cantonal administration in order to highlight their advantages as a place for certain activities, such as sport or cultural facilities, that could be placed in their town instead of in the city. By engaging in decision-making processes and regional or cantonal strategies, SMSTs may be better able to obtain certain functions and influence strategies according to their needs.

**Networks:** If SMSTs want to be part of national or global networks, they need actors that are able to develop such networks. Firms are one way to connect SMSTs to the global economy. In order to enable firms to take part in global or national innovation networks, it is necessary to provide necessary infrastructure, such as fast transportation connection to cities and airports and a high-quality living environment for employees from different parts of the country or even the world.

Other forms of networking can include taking part in specific culture or sustainability networks, for example the 'Slow City' (Knox & Mayer, 2013) movement. Branding towns with a specific characteristic and connecting them in a network with similar towns may help them to stand out and gain functions or characteristics that they would not have without these networks. The example of Wädenswil and Dübendorf, presented in Article 4, shows that a town's image as a research town may bring it more research institutions in the future. Such network activities can be carried out by the town's administration and/or the people involved in cultural or sustainability activities.

**Identity/Community:** Article 3 of this dissertation suggests that social networks foster exchange between people of different hierarchies and backgrounds. In order to have well-functioning social networks within a town, it is necessary for people to be willing to live, spend their free time and interact within it. Hence, ensuring a high quality of living and a strong town identity, which local sports and cultural clubs may help to facilitate, can help to build a community and foster exchange between different people. A strong sense of community not only benefits firms; it may also help the local administration to implement strategies that are supported by the majority of the inhabitants. Consequently, the local government should develop policies that help to build a liveable town by specifically ensuring effective land-use planning and the availability of schools, shopping facilities and leisure activities.

These three policy fields are not exhaustive. SMSTs may also consider how they can position themselves in the age of digitalisation. Workplace mobility and co-working spaces could be an opportunity, especially for SMSTs outside metropolitan regions looking to attract workers that work in the city but who are looking for workplace options elsewhere, be it for family or leisure reasons. These workers would bring money to the SMSTs and support the residential economy.

In the case of Switzerland, the recommended policies aim to enhance the competitiveness of places and could (depending on the project) be supported by different federal policies, such as the *New Regional Policy* or the *Agglomeration Policies*. The focus on regional centres in the *New Regional Policy* is already a first step in recognising the importance of SMSTs in the national context and considering them as a category in themselves.

## Limitations and future research

This dissertation has some limitations that need to be addressed in order to arrange the results in an appropriate framework. From a theoretical perspective, size and distance to the next city is relative to a national urban system. What may qualify as a big city in the Swiss context, may still be small in the European context; and what might be a city that is far away from the next city might be close in different national contexts. Hence, the results of this dissertation can – keeping in mind different political systems and relative distance between cities and towns – only be generalised to similar European urban systems. Futures studies could more deeply analyse the question of the relation between the size of towns and national urban systems (such as Frick & Rodriguez-Pose, 2018 started to do). From the methodological perspective, each approach has its own limitations. The cluster analysis applied in Article 1 depends, to a reasonable extent, on the variables used. Slightly different variables that explain the economic characteristics of towns, may have led to other SMST typologies. Notwithstanding, we assure the reliability of the typology by describing the characteristics of the different groups and by using data that are also used in other studies that characterise places. In future studies, it would be highly interesting to use dynamic data in order to understand how the different types of SMSTs have developed over the last centuries. The case studies employed in Articles 2-4 provide in-depth insights into firms' innovation processes. However, these findings should be generalised to other cases with caution given the small size of our unit of analysis, which makes local economies and firms vulnerable to distortions caused by idiosyncratic events and the specific local context of the cases. Moreover, the case studies in Articles 2 and 3 draw solely on successful and exporting high-tech firms. Given that the high-tech industry is one of the most important industries in Switzerland, it is probable that it is also especially able to access and generate knowledge. Firms that operate outside the export-oriented high-tech sectors may face other constraints to their innovation processes inside SMSTs. Nevertheless, the clear description of the research setting and the discussion of the study conducted within the literature should help recognise the value of the results. It would be interesting to conduct additional studies on firms in less export-oriented industries in order to investigate if and how the small town context affects them differently.

This dissertation also raises further interesting questions. First, more factors that show how SMSTs exist next to each other should be found in order to demonstrate why different economic types exist in the same regional context. Evolutionary processes may also play a role, as can vulnerability to exogenous shocks, such as a currency crisis. Future research should put more emphasis on the interplay between exogenous and endogenous factors that explain the economic development of SMSTs and the long-term effects of economic development policies. Concepts from the resilience literature may provide interesting new perspectives into this field of studies. Second, the geographies of innovation literature may want to focus more on the question of whether or not firms fail to access



certain external knowledge sources at all due to their local circumstances. Also, the urban-rural dichotomy should be abandoned in the innovation literature so as to discuss the influence of specific location characteristics on the innovation process more deeply. Certainly, in some research contexts (such quantitative studies with large datasets), a simplified dichotomous understanding of the core-periphery may be more practical. However, in order to better understand the fine nuance between places, a stronger differentiation between more central and more peripheral places is necessary. Article 3 introduces a multi-dimensional view on diversity. Hence, with this article, we hope to stimulate studies that consider diversity and creativity without an urban bias. Moreover, the different dimensions we introduce are not exhaustive and quantitative analysis may support our claims.

Finally, this dissertation only focuses on three theoretical blocks that explain economic success beyond the size paradigm. However, other concepts may also contribute to that debate. For example, in this dissertation I do not discuss entrepreneurship and firm creation dynamics in the context of SMSTs. Also, research on these two fields may help to further explain how economic success and innovation can occur despite a small location size.

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