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Entrepreneurial, Innovative and Sustainable Ecosystems

Best Practices and Implications for Quality of Life

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Preface

The concept of entrepreneurial ecosystems has been attracting considerable attention in the fields of entrepreneurship studies, economic geography and regional studies as well as in policy consulting, seeking to foster firm births as a driver of regional development (Alvedalen and Boschma 2017). However, until now, there has been a lack of knowledge in terms of the best practices and implications for quality of life associated with this type of complex development platform.

Despite its growing relevance for regional policy (Startup Genome 2017; Startup Commons 2017), the concept so far has been applied almost exclusively in (successful) cases, and empirical findings have not been used to advance the ecosystem concept theoretically. Not surprisingly, it has been criticized as being 'underdeveloped' (Stam and Spigel 2016) and 'undertheorized' (Spigel 2017).

The holistic construct of an (E)ntrepreneurial, (I)nnovative and (S)ustainable ecosystem refers to the collective and transversal nature of entrepreneurship, innovation and sustainability. New firms emerge and grow not only because there are entrepreneurs that created and developed them. New ventures emerge also because they are located in an ecosystem made up of private and public stakeholders, which nurture and sustain them, supporting the inventive and innovative action of entrepreneurs.

According to Isenberg (2010), an entrepreneurial ecosystem consists of elements that can be grouped into six domains: (1) a conducive culture (e.g. tolerance of risk and mistakes, positive social status of entrepreneur), (2) facilitating policies and leadership (e.g. regulatory framework incentives, existence of public research institutes), (3) availability of dedicated finance (e.g. business angels, venture capital, microloans, crowdfunding, crowdsourcing, equity funding), (4) relevant human capital (e.g. skilled and unskilled labour, serial entrepreneurs, entrepreneurship training, coaching and mentoring programmes), (5) venture-friendly markets for products (e.g. early adopters for prototypes, reference customers) and (6) a wide set of institutional and infrastructural supports (e.g. legal and accounting advisers, telecommunications and transportation infrastructure, entrepreneurship promoting associations).

Based on this definition, governments can evaluate whether they have an EIS ecosystem and what actions they should take, knowing that each EIS ecosystem is unique and all elements of the ecosystem are interdependent. Successful dynamics often result from the identification of both comparative and competitive advantages founded on natural resources or specific assets, which may be very limited.

Following the previous work by Leitão and Alves (2016), this edited volume aims, firstly, to present a multidimensional approach by providing the state of the art on EIS ecosystems, as well as structural and changing dynamics and their impact on citizens' quality of life. Secondly, it aims to present a set of international benchmarking case studies on good practices and initiatives oriented to the creation and development of EIS ecosystems. Thirdly, it aims to be positioned as a reference guide for scholars, policy makers and practitioners interested in entrepreneurship, public procurement, new public management, innovation and sustainability.

In terms of knowledge transfer, these international benchmarks of EIS ecosystems should be able to be replicated, to foster the creation of entrepreneurial and innovative units and promote sustainable practices, under an open innovation paradigm, which needs to congregate both public and private stakeholders, using co-creation, transparency and participatory practices.

This volume is particularly opportune in that it contributes to the scarce literature on the subject of ecosystems' complexity and their importance in determining the quality of life of different communities and organizations. Nevertheless, it is a first organized attempt which should be continued, as within the complexity characterizing the different phases of an ecosystem's life cycle, namely, creation, development, growth, maturity, decline and regeneration, in pioneering terms, only the entrepreneurial, innovative and sustainable dimensions of ecosystems are portrayed here.

Based on the set of pioneering contributions collected in this volume, an entrepreneurial, innovative and sustainable ecosystem corresponds to what is formed by a natural environment and the communities of entities that inhabit it, interacting with each other and with the environment itself and resulting in a relatively stable system. Consequently, an ecosystem covers the set of communities that form a natural system, including different actors, such as producers, consumers and decomposers, underlining the importance of entrepreneurship, innovation and sustainability as critical anchors of the stages of creation, development and growth of that ecosystem.

Regarding the communities of bodies forming an ecosystem, relations can be established with different characteristics, namely, (1) competitive relationships, which imply a limited resource is disputed by various bodies, and so only the most able survive; (2) predatory relationships, which assume that one body, i.e. a predator, feeds on another, the prey (this type of relationship also allows regulation of the number of species and survival of the fittest, forming a mechanism to self-regulate the ecosystem); (3) parasitical relationships, where one or more smaller bodies, parasites, feed on another larger one, the host, which they live next to; (4) mutual relationships, around which there is a relationship that benefits both associated species; and (5) commensal relationships, where there is a type of relationship where one species is benefited without any detriment to the other.

However, various open questions deserve additional research efforts and the drawing up of new public policies to contribute in the future to better understanding of the role of ecosystems in determining citizens' quality of life, in different spatial units of analysis (e.g. town, region, country or common economic area) and according to the different phases of the ecosystem's life cycle.

Conceiving, designing and analysing ecosystems, with a view to increasing citizens' quality of life, means deepening knowledge about social network analysis and promoting the eclectic intersection of various branches of knowledge, namely, economics, management, psychology, sociology, mathematics, engineering and information systems, history, anthropology, etc.

Also necessary are metrics associated with key performance indicators (KPIs), which can be used in technological prospection exercises, aiming to improve quality of life, setting out from the different dimensions of ecosystems, in continuous evolution and therefore requiring continuous monitoring and correction.

The volume is formed of two parts. Part I deals with ecosystems' entrepreneurial, innovative and sustainable dimensions (EISE), which served as a basis for the structure of this edited volume. Part II presents a selected set of benchmarking cases originating in India, Mexico, Brazil, Finland, Denmark, Portugal and Italy.

Highlighted in Part I is firstly the work done by Michael Fritsch and Sandra Kublina, who propose four types of regional growth regimes, taking as a reference the type of relationship between new firm creation and the level of economic development. The authors analyse the characteristics of those regimes, aiming to identify the reasons for obtaining different levels of performance regarding growth. They identify typical transitionary tendencies between regimes, clearly suggesting that entrepreneurship is a factor leading to economic development, figuring among the factors that produce long-term effects on economic well-being at the regional level, thereby promoting quality of life.

Secondly, Jamile Rodrigues takes a pioneering look at the subject of local government committed to quality of life in the context of sustainable cities. The emphasis is on the need to create an urban ecosystem that is modelled and modified by people on a daily basis, despite non-sustainable methods being used. Adopting a descriptive and qualitative approach, the author analyses the contribution made by introducing sustainable practices in the city context, concluding that this option promotes not only sustainable local development but also quality of life.

Thirdly, José Luis Vázquez, Ana Lanero, Pablo Gutiérrez and César Sahelices present an innovative view of the contribution of *smart cities* to quality of life, according to citizens' perception. This study analyses the perceptions of a sample of 272 university students in Spain, regarding the local authority's present and ideal level of involvement in six dimensions defining a smart city (smart economy, smart people, smart governance, smart mobility, smart environment and smart living). The results reveal an important gap between real experience in the city and the perceived potential of the dimensions to improve quality of life in the future. The main gaps were detected in the dimensions of smart economy and smart governance.

Fourth, Romano Audhoe, Neil Thompson and Karen Verduijn propose expanding the approach of reference followed in this volume, i.e. integration of the entre-

preneurial, innovative and sustainable dimensions, coupling a so far unexplored theoretical perspective of historical-cultural activity. The authors underline the growing importance attributed to entrepreneurial, innovative and sustainable ecosystems, by both political decision-makers and the research community. Connecting to the theoretical approach of new public management, it is recommended that political decision-makers using this type of approach should be more enabled to better understand the links between the stakeholders of EIS ecosystems, which have a determinant role in stimulating the sources leading to local transformation, i.e. entrepreneurship and innovation, towards improving citizens' well-being (i.e. happiness, trust, safety and satisfaction). In this connection, the authors propose and explain a novel framework for analysing and assessing EIS ecosystems, i.e. activity system analysis (ASA), which is a methodological framework, rooted in cultural-historical activity theory (CHAT), assisting researchers by guiding analyses towards specific tensions and contradictions between stakeholders that prevent EIS ecosystems from developing. Additionally, it allows researchers to gain insights into the developmental trajectory of EISE and to understand the learning actions that transform them.

Fifth, Teresa Paiva, Luísa Cagica Carvalho, Cristina Soutinho and Sérgio Leal position product innovation as a mechanism with high value added to promote a region's sustainability, supporting their arguments through exploration of the case study on Douro Skincare. In the context of implementing so-called regional strategies of intelligent specialization (RIS3), the authors present the case of Douro Skincare, a company created by entrepreneurial women and operating in the field of selective biological cosmetics, through the creation, development and production of cosmetic products that use emblematic raw material from the Douro region, one of the oldest wine-producing regions in Europe.

Sixth, Fernando Herrera, Maribel Guerrero and David Urbano describe the determinant role of higher education institutions, as drivers of entrepreneurial and innovative ecosystems. From an evolutionary perspective, the authors position higher education institutions as drivers of entrepreneurial and innovative ecosystems in Mexico. They underline, on one hand, the importance of incentives for the configuration of the triple mission of this type of higher education institution and, on the other, the limited participation and weak involvement of this type of institution in entrepreneurial and innovative activities in the Mexican context.

Seventh, in the business ecosystem context, Zhaojing Huang, Clare Farruk and Yongjiang Shi approach the challenging work of commercialization, which covers the different mechanisms for transferring knowledge and technology, from academia to the market. In an innovative way, the authors approach the subject of commercialization, from the perspectives of scientists whose aim is to develop new products from high-quality research, which can be transferred and valorised. The authors present a theoretical approach, from a business ecosystem perspective, based on a literature review. That theoretical approach is contrasted through the development of a longitudinal case study about the development of a fibre optic sensor analyser with application in the construction industry. As the main results, the authors emphasize, firstly, the need for relationships with partners and other sup-

porting organizations to be established at an earlier stage than is suggested in the literature. Secondly, they highlight the need for scientists to develop a precise understanding of the business ecosystem, to which technology is adjusted, serving as support for the application of instruments of technological and innovative surveillance. Consequently, the anticipated focus on communication and partnerships is pointed out as a critical success factor in commercializing technology.

Part II presents a selected number of benchmarking cases originating in Italy, Mexico, Brazil, Finland, Denmark, Portugal and Italy. In the first case, Ranjini Swamy and Arbind Singh present an interesting support system for the entrepreneurial ecosystem of street sellers, developed by the National Association of Street Vendors of India (NASVI). After the liberalization movement, this system allowed the creation of an entrepreneurial ecosystem based on regulatory procedures defending the interests of street sellers, thereby contributing to improving the quality of life and sustainability of this type of subsistence entrepreneur.

In the second case, Mario Vázquez-Maguirre presents an example of a sustainable ecosystem applied to the situation in Southern Mexico, where the founding element is the community of indigenous social enterprises. The empirical evidence points to this type of company having developed new mechanisms based on their culture and cosmovision, which ultimately generate an ecosystem promoting the community's well-being. Highlighted among the mechanisms are accountability and transparency, legitimacy, equality policies, a participatory organizational structure, social innovation and entrepreneurial orientation. This case also demonstrates unequivocally how an entity's community perspective contributes to improving its employees' and their families' quality of life, making the local economy more dynamic and consolidating an ecosystem that promotes the host community's development. From a public policy perspective, the case also suggests actions that can promote the emergence of new business models to favour the integration of vulnerable communities in the global economy, following an approach of sustainability and collaboration.

In the third case, Ainomaija Haarla, Henri Hakala and Greg O'Shea present an exemplary case of the creation of the *Finnish cellulose entrepreneurial ecosystem*, illustrating the different phases of creating the ecosystem from a community-led initiative which involved three different stages, (1) community of dreams, (2) community of commerce and (3) creation of the ecosystem, which are described in detail in the case, serving as benchmarks for the actors involved. Concerning the main implications, the case reveals unequivocally that entrepreneurial ecosystems can be created and developed following a bottom-up approach, counting with community participation and being led by different types of public funding, as opposed to the more usual top-down approach, representing a better understanding of the associated roles and micro-processes which contributes to better grounding, creation, organization and coordination of the ecosystem's development.

In the fourth case, Simone Sehnem and Hilka Machado analyse the sustainable and social environmental practices of a sample of 50 Brazilian companies located in Santa Catarina. The main results reveal that the majority of environmental practices adopted by the firms studied include the monitoring of risks and opportunities for

organizations' activities, due to climatic change. Therefore, the majority separate waste and provide training in health and safety at work. However, they do not incinerate waste, do not use recyclable water and do not take on workers belonging to tribal Indian communities.

In the fifth case, Hugo Pinto and Carla Nogueira develop a pioneering application consisting of mapping an entrepreneurial, innovative and sustainable ecosystem in the Algarve region of Portugal, by resorting to an analysis of social networks focused on innovative projects receiving public funding. Starting from the Algarve case study, the authors use methods of social network structural analysis to map actors and centralities regarding cooperation and innovation in regional development. The mapping of the innovation network in the Algarve is compared to theoretical models of resilient networks with the statistical indicators of hierarchy and homophily. The empirical evidence facilitates the identification of gatekeepers, clusters of activities and constraints and potentialities for enhancement of the regional EIS ecosystem.

In the sixth case, Luís Mendes and Dalila Dias revisit the role of stakeholders in the value creation process, focusing on the sustainable dimension of ecosystems and exploring the relationship between practices of corporate social responsibility (CSR) and total quality management (TQM). Through a literature review, the authors systematize knowledge of how strategies based on CSR and TQM principles may create stakeholders' value and generate sustainable competitive advantages while improving the quality of life. The findings highlight that when thought proactively and strategically, sustainability-based approaches combining CSR and TQM are potential sources for obtaining sustainable competitive advantages and for improving the quality of life of the workforce and citizens in local communities in particular and even of society in general.

In the seventh case, Paula Ungureanu and Diego Maria Macri illustrate how hybrid partnerships help to set up, implement and then innovate business models. The authors exemplify the design of a hybrid partnership for open innovation where six public and private organizations came together with the intention to set up and implement joint innovation projects with a large-scale impact at the regional level. Two business models of hybrid partnerships are discussed in this chapter, the brokering model and the platform model, as well as the mechanisms of transition from the former to the latter. The findings suggest that while the platform model seems more appropriate for complex projects in which a wide number of heterogeneous interests coexist, both models present advantages and disadvantages.

In the eighth case, Alexander Kerl characterizes the development of an innovative ecosystem in an accelerated economic environment, using as the case of reference the Vodafone Open Innovation Program. The author formulates a research question based on an issue frequently faced by multinational companies with an innovative profile, i.e. by what kind of organizational framework are initiatives for multi-cross industry innovation supported, and how can companies utilize this approach to generate new innovation ecosystems? To answer the question, the author describes the organizational model of the Vodafone Open Innovation Program, identifying the structured nature of the programme and the so-called

staged intellectual property rights mechanism, as key characteristics potentiating new innovation ecosystems.

Finally, this volume is a step forward in the incomplete and demanding task of building a theoretical body on ecosystems, which requires the future coupling of new dimensions and perspectives of the (formal and informal) structuring and evolution of ecosystems but also the use of qualitative and quantitative methods to measure their evolutionary stage and performance, with a strong motivation to use network approaches in order to improve citizens' and consequently nations' quality of life.

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Contents

Part I
Ecosystems' Entrepreneurial, Innovative and Sustainable Dimensions (EISE)

Chapter 1
Entrepreneurship, Growth, and Regional Growth Regimes

Michael Fritsch and Sandra Kublina

Abstract We distinguish four types of regional growth regimes based on the relationship between new business formation and economic development. The distinguishing characteristics of these regime types are analyzed in order to identify the reasons for different growth performance. Although growth regimes are highly persistent over time, typical transition patterns between regime types can be identified. We explain these patterns and draw conclusions for policy. The evidence clearly suggests that entrepreneurship is a key driver of economic development and one that has long-run effects on regional economic well-being.

1.1 Different Patterns of Entrepreneurship, Growth, and Economic Well-Being

The notion of regional growth regimes[1] is based on the idea that the drivers of economic development and well-being may vary considerably across regions. We speak of "growth regimes" in recognition that such differences in economic development may result from a complex interplay of a variety of factors. In investigating the role entrepreneurship plays in growth, we apply a typology based on the of relationship between new business formation and economic development, which was introduced by Audretsch and Fritsch (2002) and further analyzed by Fritsch and Mueller (2006). A particular advantage of our study, compared to previous analyses, is that we have a more comprehensive dataset that covers a considerably longer period of time. We investigate the distinguishing characteristics of the four kinds of growth

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[1] Audretsch and Fritsch (2002), Fritsch (2004), and Fritsch and Mueller (2006).

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regime and analyze transitions between these regimes over time. The results help better understand the forces behind different regional growth trajectories and clearly show that the effects of new business formation on regional development can be very long lasting.

The remainder of the paper is organized as follows. First, we introduce the general concept of regional growth regimes and make a distinction between four types of them that is based on the effect of new business formation on regional growth (Sect. 1.2). Section 1.3 elaborates on these four regime types and develops hypotheses about their characteristics. Section 1.4 describes the database and shows the distribution of growth regime types across time and space. We then analyze regime characteristics (Sect. 1.5) and transition patterns between regime types over time (Sect. 1.6). In Sect. 1.7, we provide an interpretation of the development patterns of growth regime types and discuss critical points in the development of the growth regime life cycle. The final section (Sect. 1.8) concludes.

1.2 Regional Growth Regimes

1.2.1 What Is a Regional Growth Regime?

We define a regional growth regime as a set of economic and institutional conditions that influence the level of regional entrepreneurship and growth. Focusing on the effect of new business formation on growth, our typology of regional growth regimes is based on two assumptions for which there is compelling empirical evidence. The first assumption is that the regional context has a significant effect on the level and type of new business formation (for an overview, see Sternberg 2011). The second assumption is that the regional context plays a significant role in the effects that new businesses have on the process of regional development (see Fritsch 2013). Given the role of the economic and institutional context for entrepreneurship, it can be regarded as a "systemic" phenomenon; indeed, one could even speak of a "regional system of entrepreneurship" (Qian et al. 2013) that also constitutes an important part of the regional innovation system (Cooke 2004). The relevant institutional context comprises the formal "rules of the game" (North 1994), such as tax laws and labor legislation, as well as the informal institutions of norms, values, and codes of conduct (Baumol 1990; North 1994), both types of institutes together constituting the regional entrepreneurship "culture."[2] A positive culture of entrepreneurship is marked by a high level of social acceptance and approval of self-employment (Kibler et al. 2014) that result in high levels of new business formation. Recent research indicates that such a culture is also conducive to a positive effect of new

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[2] An entrepreneurial culture is typically defined as a "positive collective programming of the mind" (Beugelsdijk 2007, 190) or an "aggregate psychological trait" (Freytag and Thurik 2007, 123) of the population oriented toward entrepreneurial values such as individualism, independence, and achievement (e.g., McClelland 1961; Hofstede and McCrae 2004).

business formation on economic development (Glaeser et al. 2015; Fritsch and Wyrwich 2017).

Being part of the regional innovation system, growth regimes are characterized by a certain knowledge stock. Although new firms may generate important knowledge about the (non)viability of business concepts, the focus of growth regimes is on knowledge exploitation via start-ups. Hence, the notion of regional growth regimes applies the "knowledge spillover theory of entrepreneurship" in a regional context (Acs et al. 2013) but also includes those new businesses that are not knowledge-intensive. To the degree new business formation is determined by the regional knowledge stock, the extent and nature of this knowledge, and, particularly, the ability of regional actors to absorb external knowledge and produce new knowledge should determine the number and characteristics of start-ups. There is some overlap between the idea of regional growth regimes and the common concept of technological regimes, which emphasizes the role of certain characteristics of a knowledge base for new business formation (Winter 1984; Audretsch 1995, 47–55; Marsili 2002).

The concept of regional growth regimes suggests that the sources and mechanisms of growth may vary considerably across regions, meaning that regions can be regarded as having different production functions. Accordingly, factors such as new firm formation, large firm presence, innovation, qualification, labor mobility, and the like may not play the same role in all regions. The existence of different growth regimes means that different theories may be required to explain their development and also has important implications for policy aimed at stimulating growth. If the way economic growth occurs differs between regions, then distinct policy strategies may be not only appropriate but necessary for spurring regional development.

1.2.2 Entrepreneurship and Development: Four Types of Regional Growth Regimes

Audretsch and Fritsch (2002) suggest a distinction between four types of regional growth regimes that should account for differences with regard to the role that new firms and entrepreneurship play in development. Analogous to a technological regime, a region's growth regime is called *entrepreneurial* if relatively high growth corresponds with a high level of new firm start-ups and a turbulent enterprise structure. It is assumed that in these regions, growth results from new business formation. In contrast, above-average growth in regions with low start-up rates is probably due to relatively stable, large incumbent enterprises. Audretsch and Fritsch (2002) characterize this combination of new business formation and growth as a *routinized* growth regime (Fig. 1.1). In the routinized regime, new businesses do not play an important role, and their chances for survival and growth are probably much lower than in an entrepreneurial regime.
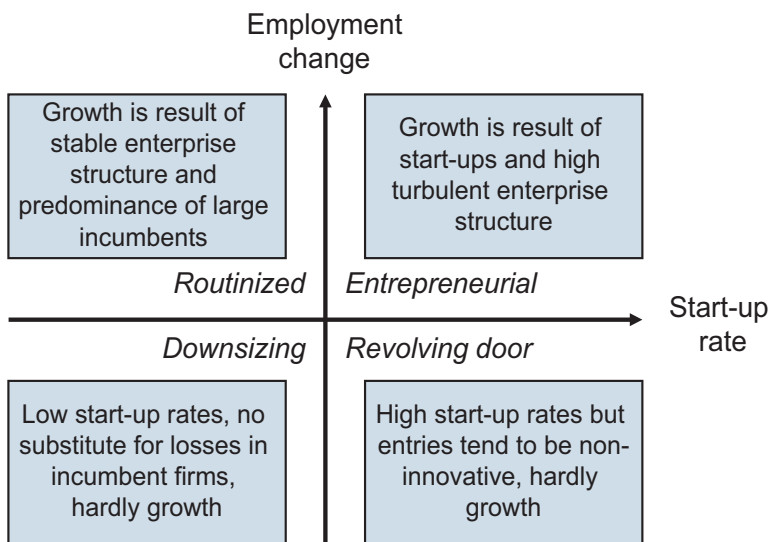
Employment
change

Growth is result of stable enterprise structure and predominance of large incumbents	Growth is result of start-ups and high turbulent enterprise structure

Routinized │ *Entrepreneurial*   Start-up
                                                                              rate
Downsizing │ *Revolving door*

Low start-up rates, no substitute for losses in incumbent firms, hardly growth	High start-up rates but entries tend to be non-innovative, hardly growth

Fig. 1.1 Regional growth regime types and their characteristics (Source: own presentation)

Audretsch and Fritsch (2002) characterize regions with relatively low growth rates but above-average start-up rates as *revolving-door* growth regimes. They conjecture that in such a regime, entries will tend to be non-innovative, supplying basically the same products and using nearly the same technology as the incumbent firms. Finally, relatively low-growth regions characterized by a below-average level of start-up activity are classified as *downsizing* growth regimes. In such regions, the number and quality of start-ups are insufficient to provide enough new jobs or income to compensate for the losses in incumbent firms.[3]

Fritsch and Mueller (2006) analyze transitions between these types of growth regimes and identify patterns that suggest a type of "life cycle" for regional development. These transition patterns are analyzed in detail in Sect. 1.6.

1.3 Characteristics of the Four Growth Regime Types: Hypotheses

There are a number of reasons for expecting that the four growth regimes described above will have distinct characteristics. This section deals with three broad categories of such reasons: the regional knowledge base and the quality of start-ups (Sect.

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[3] Audretsch et al. (2012) in an analysis of the relationship between regional conditions and the propensity to start a business use the term "entrepreneurial regime" to characterize regions where the members of the labor force have a relatively high propensity for starting an own business. Regions with lower propensities to start a business are characterized as having a "routinized regime."

1.3.1), the regional industry structure (Sect. 1.3.2), and a region's general entrepreneurial environment (Sect. 1.3.3). We derive hypotheses about each category's relationship with regional development. Section 1.3.4 then summarizes.

1.3.1 The Regional Knowledge Base and the Quality of Start-Up

Regional knowledge bases are diverse, comprised, to various degrees, of public and private research and development (R&D), the presence and the activity of higher education institutions, and the qualification of the regional workforce. According to the knowledge spillover theory of entrepreneurship (Acs et al. 2013), the size and quality of the regional knowledge base can have a positive effect on the number of start-ups, particularly on the emergence of those start-ups that exert significant competitive pressure on incumbent firms. Such challenging start-ups can be expected to contribute more to regional growth (Fritsch 2013) than purely imitative new businesses that are never more than marginal, undersized, poor-performance enterprises (also called "Muppets") (Nightingale and Coad 2014). A positive effect of the regional knowledge base, however, is in no way limited to new businesses but can also be a main source of success for incumbent firms. We thus expect to find a larger knowledge base in regions with above-average growth, that is, in those regions classified as being host to either an entrepreneurial or routinized regime as compared to regions with a revolving-door or a downsizing regime.

Although both entrepreneurial and routinized regions may have relatively large knowledge bases, the character of this knowledge can vary according to the technological regime present in them (Winter 1984; Audretsch 1995; Marsili 2002). Hence, in regions with an entrepreneurial growth regime, a high share of the relevant knowledge is expected to be related to an early stage of a product life cycle, whereas in a routinized growth regime, activity and knowledge related to a later stage of the life cycle are expected to prevail. We also expect a high share of knowledge in the later stage of the product life cycle in a downsizing regime. We do not have a clear expectation in this regard for regions with a revolving-door regime. If anything, we may presume that a considerable part of knowledge in these regions is in the entrepreneurial phase of the product life cycle because this would correspond to empirical analyses that show relatively low survival rates of start-ups entering the market at such an early stage (Audretsch 1995).

Using market survival as an indicator for the quality of a start-up, Fritsch and Noseleit (2013a) and Brixy (2014) show that new businesses that manage to survive for a certain period of time have a positive effect on regional development, whereas the effect of start-ups that exit soon after entry is insignificant. We thus expect higher survival rates for newly founded businesses in regions with an entrepreneurial growth regime compared to regions with a revolving-door regime. To the extent that new businesses contribute to employment growth in a routinized regime, we expect higher survival rates in regions with a routinized regime compared to regions with a downsizing regime.

1.3.2   Regional Industry Structure

The industry structure of incumbent firms in a region may be important for a number of reasons. First, it represents a large part of the regional knowledge base that may be exploited by start-ups. Since founders have a strong tendency to set up their venture in an industry in which they have previously worked and have experience with (Fritsch and Falck 2007), the characteristics of the incumbents' knowledge base and the type of technological regime in which these operate will shape the industry structure of future start-ups. Another aspect of the regional industry structure that should have an effect on knowledge exploitation by start-ups is the minimum efficient size of regional industries. Accordingly, regions that have high shares of industries with low minimum efficient size should also experience relatively high levels of new business formation in these industries. Hence, it is expected that these regions will have a high employment share in smaller businesses that act as "seedbeds" for new business formation in the future.[4]

Fritsch and Noseleit (2013b) find that the effect of new business formation on growth is more pronounced in regions with a high share of small business employment. They suspect that this result is due to the fact that young businesses start small and are more likely to compete with other small businesses than with large firms and that this more intense competition between new businesses and incumbents leads to a relatively strong effect on regional growth. We therefore suspect that there will be a higher share of small firm employment in regions with an entrepreneurial regime compared to regions with a revolving-door regime.

Another factor that may have an effect on regional performance is the concentration or variety of the industry structure, although empirical support for this idea is ambiguous (for an overview see Content and Frenken 2016). Frenken et al. (2007) and Boschma and Frenken (2011) argue that it is not industry variety per se, but the related variety of similar or complementary industries, that has positive effects. And, indeed, there is evidence that new business formation can make an important contribution to the emergence of such related variety (Neffke et al. 2011). Noseleit (2013) compares the industry structure of entries with the industry structure of incumbents, as well as with the industry structure of those firms that exit. He finds that dissimilarity of these structures has a pronounced positive effect on regional development in West German regions. Based on these results, we expect that dissimilarity of industry structure between start-ups and exits will be particularly high in regions with an entrepreneurial growth regime and relatively low in regions that are characterized by a revolving-door regime.

The share of regional employees in knowledge-intensive business services (KIBS) may indicate at least two things. First, it can demonstrate a well-developed and relatively rich knowledge base in a region, particularly a high level of labor

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[4]The relatively high propensity of small-firm employees to start an own firm is well documented by empirical research (Parker 2009; Elfenbein et al. 2010). Another reason small average firm size in a region may lead to a high number of start-ups is that it implies a high density of entrepreneurs who act as role models for potential founders (see Bosma et al. 2012).

division in knowledge-intensive activity. Second, it is an indicator for the availability of knowledge that may be conducive to the competitiveness and development of the local economy. Since local availability of knowledge inputs can be particularly important for the success of start-ups suffering from unbalanced skill sets (Helsley and Strange 2011), we expect a positive relationship between the employment share in KIBS and the success of start-ups. Hence, high shares of KIBS employment should be found particularly in regions with an entrepreneurial growth regime. High shares of KIBS employment may also be found in routinized regimes where large firms have a long-established division of labor with local service suppliers. Specifically, we expect a higher share of KIBS employment in regions with a routinized regime compared with regions characterized by a downsizing regime.[5]

1.3.3 General Regional Entrepreneurial Environment

It is not farfetched to expect that regions with relatively high start-up rates might have favorable conditions for entrepreneurship. These can include easy accessibility of inputs such as labor and finance, as well as a generally held positive attitude toward self-employment (Kibler et al. 2014; Westlund et al. 2014) and a large number of entrepreneurial role models (Bosma et al. 2012). Thus we expect especially high shares of self-employed persons in regions with an entrepreneurial regime and a revolving-door regime as compared to the two other regime types.

Since several empirical studies show that high levels of entrepreneurship tend to be persistent over time (Andersson and Koster 2011; Fotopoulos 2014; Fritsch and Wyrwich 2014), it is expected that most of the transitions between types of growth regime will be between those with a relatively high start-up rate (entrepreneurial, revolving door) and those with a relatively low start-up rate (routinized, downsizing). We thus expect relatively high levels of transition, especially between revolving-door and entrepreneurial regimes as well as between routinized and downsizing regimes.

1.3.4 Summarizing the Hypotheses

Table 1.1 provides a summary of the general characteristics we expect to find in the different types of growth regimes. In Table 1.2, we summarize our expectations regarding the regional characteristics of certain regime types. These expectations are reported in pairwise comparison in line with our empirical approach. With

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[5] Since KIBS tend to rely heavily on geographic proximity to customers, they tend to be located in larger cities, delivering their services across considerable spatial distance. Hence, the regional share of KIBS employment could be primarily determined by the regional level of urbanization, while their effect may not be limited to the region where they are located. In this case, the effect of the local share of KIBS employment on the success of new businesses in that particular region may be found to be not statistically significant (Keeble and Nachum 2002; Wood 2005).

Table 1.1 Summary of the general regional characteristics

Regional characteristic	Entrepreneurial regime	Revolving-door regime	Routinized regime	Downsizing regime
Regional knowledge base and quality of start-ups	High knowledge intensity and high level of innovation; high share of activity under the conditions of an entrepreneurial technological regime	Low knowledge intensity and low level of innovation; low quality and low survival rates of start-ups	High knowledge intensity and high level of innovative output; high share of activity under the conditions of a routinized technological regime	Low knowledge intensity and low level of innovative output; low survival rates of start-ups; high share of activity under the conditions of a routinized technological regime
Regional industry structure	High share of small firms; high variety of industry structure; high employment share in knowledge-intensive services; entries strongly induce variety of industry structure	Relatively high share of small firms; low level of structural change (industry structure of entries similar to structure of exits); low variety of industry structure	Low share of small firms; low variety of industry structure but high employment share in knowledge-intensive services	High share of large firms; low variety of industry structure; low level of structural change (industry structure of start-ups similar to industry structure of exits)
General regional entrepreneurial environment	Favorable conditions for entrepreneurship, such as high level of peer effects and easy access to supportive infrastructure and other important resources	Low level of supportive infrastructure, but high level of peer effects	Low level of both supportive infrastructure for start-ups and peer effects	Low level of both supportive infrastructure for start-ups and peer effects

regard to the effect of new business formation on regional growth, the most interesting comparisons are between the entrepreneurial and the revolving-door regime as well as between the routinized and the downsizing regime. These are the cases where a relatively high or low level of start-up activity leads to above- or below-average employment growth. Hence, these comparisons should reveal some of the reasons for the opposite development patterns. The most pronounced differences should be found between the two extreme cases with regard to new business formation and growth, i.e., the entrepreneurial regime and the downsizing regime. According to Table 1.2, a relatively small number of differences is to be expected between the revolving-door regime and the downsizing regime.

Table 1.2 Expected differences between growth regime types

Regional characteristics	Indicator	Entrepreneurial vs. revolving door	Entrepreneurial vs. routinized	Entrepreneurial vs. downsizing	Revolving door vs. routinized	Revolving door vs. downsizing	Routinized vs. downsizing
Regional knowledge base and quality of start-ups	Share of highly qualified workforce	+	≈	+	−	≈	+
	Share of private-sector R&D employment	+	≈	+	−	−	+
	Survival rates of new businesses	+	+	+	−	≈	+
Regional industry structure	Employment share of small businesses	+	+	+	+	+	≈
	Similarity of industry structure between entries and exits	−	−	−	≈	≈	≈
	Level of industry diversity	+	+	+	≈	≈	≈
	Share of KIBS employment	+	≈	+	−	≈	+
General entrepreneurial conditions	Self-employment rate	≈	+	+	+	+	≈

"+" denotes "higher" and "−" denotes "lower" values for the first indicated growth regime; "≈" means that we do not expect any significant differences between the two regime types

1.4 Data Issues

1.4.1 Data Sources and Classification into Regime Types

The spatial framework of our analysis is comprised of the 71 planning regions of West Germany,[6] which represent functionally integrated spatial units comparable to labor market areas in the United States. Our data on new business formation are obtained from the German Social Insurance Statistics. This dataset contains every establishment in Germany that employs at least one person obliged to make social insurance contributions (Spengler 2008). The start-up rate is the yearly number of new businesses in the private sector divided by the number of those employed in the private-sector labor force (in 1000s).[7] In contrast to previous studies (Audretsch and Fritsch 2002; Fritsch and Mueller 2006), we exploit a novel and more reliable method of identifying start-ups in the data that is based on workflow analyses (Hethey and Schmieder 2010). Another main advantage of our work over previous studies is our considerably longer time period of more than 30 years, from 1976 to 2011. Data on establishment size distribution, qualification of workforce, R&D employment, and sectoral structure are also obtained from the Social Insurance Statistics; other information is from the Statistical Offices and other sources. All industry-related measures account for changes in the industry classification over time (for details see Eberle et al. 2011).

Classification into the four types of growth regime is based on the average start-up rate for the first 2 years of the respective time period and the percentage of employment change for the whole period. Because the main part of the positive employment effects of new businesses occurs only in the longer run (Fritsch 2013), it is important to relate the indicators for entrepreneurship to growth performance over a sufficiently long period. Fritsch and Mueller (2004) find for West German regions that the strongest positive effect of new business formation on regional employment occurs about 7–8 years after the new entities are set up. To capture such long-term effects, we divide the period of analysis into four relatively long periods of 8 years each: 1976–1984, 1985–1993, 1994–2002, and 2003–2011. Figure 1.2 shows the distribution of regional growth regimes for the period 1994–2002 as an example.

The distinction into the four long-time periods is particularly used for descriptive purposes (see Sect. 1.4.2) and for the empirical analyses of the development of

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[6] We restrict our analysis to West Germany because many empirical studies indicate that the East German economy in the 1990s was a special case with very specific conditions that cannot be directly compared to those of West Germany (cf. Fritsch 2004). There are actually 74 West German planning regions. For administrative reasons, the cities of Hamburg and Bremen are defined as planning regions even though they are not functional economic units. To avoid distortions, we merged these cities with adjacent planning regions. Hamburg was merged with the region of Schleswig-Holstein South and Hamburg-Umland-South. Bremen was merged with Bremen-Umland. Thus, the number of regions in our sample is 71.

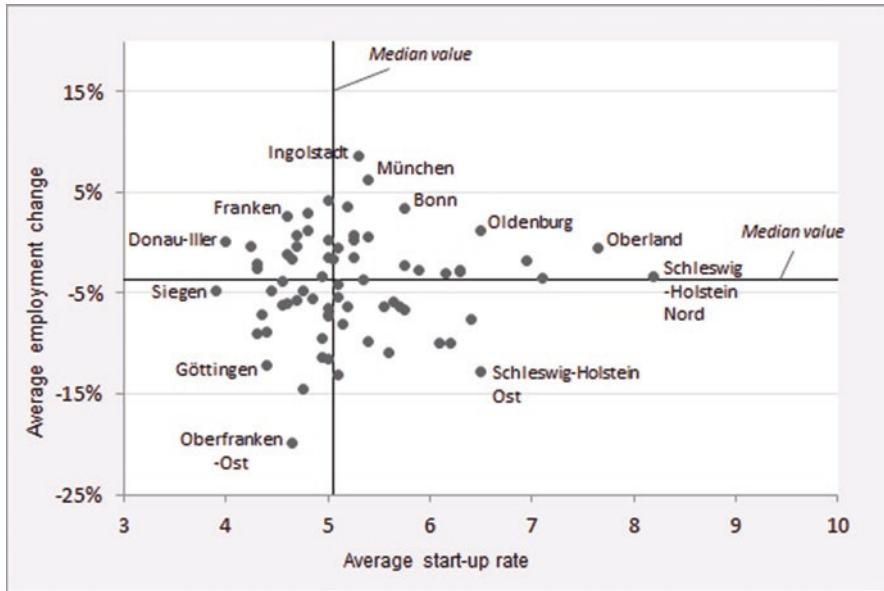[7] Start-ups in agriculture are not considered in the analysis.

Fig. 1.2 The relationship between new business formation and regional employment change in West German regions, 1994–2002 (Source: own presentation)

growth regime types over time (Sect. 1.6). For the empirical analysis of the distinctive characteristics of the different growth regime types in Sect. 1.5, we define seven partly overlapping time periods (1979–1987, 1983–1991, 1987–1995, 1991–1999, 1995–2003, 1999–2007, 2003–2011) in order to increase the available number of observations. Moreover, this classification does not include the years 1975–1978 for which information about some of the regional characteristics is missing.

1.4.2   The Spatial Distribution of Growth Regime Types

The geographical distribution of the four growth regime types in the two most recent time periods (Fig. 1.3) reveals two remarkable phenomena. First, we find no evidence of an erratic patchwork-like pattern of regional growth regimes, but there are pronounced neighborhood effects in the sense that adjacent regions are frequently assigned to the same type of growth regime. Obviously, the regional context that has an effect on the relationship between entrepreneurial activity and economic development often encompasses more than a single planning region. Second, there is a pronounced tendency of regions to be assigned to the same type of growth regime in subsequent time periods, indicating a certain degree of persistence. As expected, transitions between regime types are mostly between those with relatively high (entrepreneurial and revolving door) and relatively low start-up rates (downsizing
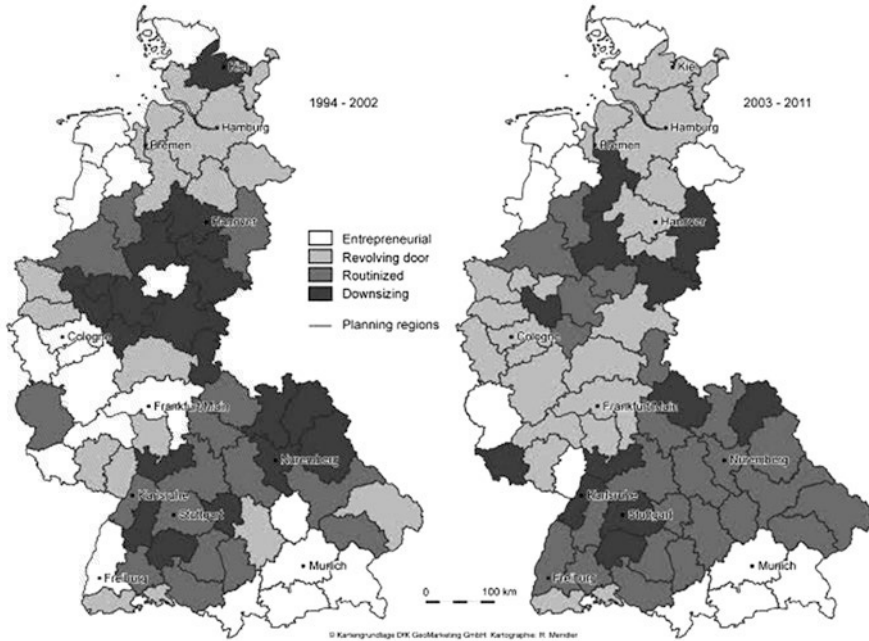
Fig. 1.3 Regional distribution of growth regime types over time (Source: Own presentation)

and routinized), indicating that the regional level of new business formation fluctuates less than regional employment growth.

An example of persistence of regional growth regime type is the southern part of Bavaria, particularly the Munich region and the regions south of it, which are in most or all observation periods classified as entrepreneurial. Also, a number of regions south of Hamburg and south of Frankfurt are always classified as entrepreneurial or revolving door. A downsizing or routinized regime is characteristic of the Ruhr area and of Stuttgart and surrounding regions.

1.5 Empirical Analysis of Regional Growth Regime Characteristics

1.5.1 Variables

Our dependent variable represents the growth regime type as described in Sect. 1.4.1. The following explanatory variables are included in the analysis (see also descriptive statistics in Tables 1.6, 1.7, 1.8, 1.9, 1.10, 1.11 and 1.12 in the Appendix).

- To measure the *regional knowledge base* we employ two variables. First, the *qualification level of the workforce* is captured by the share of private-sector

employees with a tertiary degree in total private-sector employment. The second variable is the share of private-sector R&D as measured by the share of R&D employees in private-sector employment.[8]

- Our proxy for *start-up performance and quality of entrants* is captured by start-up survival rates, namely, the share of private-sector start-ups still in existence after 5 years compared to the total number of start-ups in the respective year of foundation.
- *Establishment size* is measured by the share of private-sector employment in establishments with less than 20 employees over total private-sector employment. To reduce the statistical relationship with the start-up indicator—the majority of new businesses start out very small—we exclude the employment in the start-ups that emerged in the respective year.
- We construct several variables to account for *regional industry structure and its development*. The first employs an entropy measure of regional industrial diversity according to Theil (1972) and as used by Fotopoulos (2014). The measure can be constructed in a way that the values vary between 0 and 1, with 0 indicating the presence of only one industry in the region and 1 representing a situation where all industries employ an equal number of employees. The variety measure is based on a distinction of 28 industries.
- We use a measure of the similarity between industry affiliation of start-ups and exits employed by Noseleit (2013). Since the number of employees in start-ups might not be an appropriate indicator of their economic significance, we relate the mere number of start-ups to the number of exits. The similarity measure is calculated as a correlation coefficient between the number of entries and the number of exits in 28 industries (two-digit level). This correlation coefficient can assume values from −1 to +1. A high level of correlation indicates a weak influence of entries on changes in the regional sectoral structure.
- The regional *supply of knowledge-intensive services* is measured by the share of employment in KIBS in total private-sector employment.
- As an indicator of the *general entrepreneurial conditions* in a region, we use the self-employment rate, which is calculated as the number of establishments in a region's nonagricultural private-sector industries divided by the regional workforce, thus reflecting the number of entrepreneurial role models in a region.
- In addition to our set of explanatory variables, we also employ a number of *control variables*. Population density is used as a catch-all variable for various regional characteristics (e.g., congestion issues, housing and land prices, infrastructure availability, etc.). To capture effects of different political conditions, we include dummies for the federal state to which a region belongs. Year dummies are included to control for time-specific effects.

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[8] Another important aspect of the regional knowledge base is the presence and size of higher education institutions such as universities. Unfortunately, detailed information on higher education institutions is not available for the full period of analysis.

Table 1.3 Characteristics of regimes: mean characteristics and t-test of equal means

Indicator	Full sample	Entrepreneurial	Revolving door	Routinized	Down-sizing
Share of highly qualified workforce	0.056	0.054	0.061***	0.053	0.053
Share of private-sector R&D employment	0.024	0.023*	0.026**	0.024	0.025
Survival rates of new businesses	0.573	0.578*	0.552**	0.589	0.571
Employment share of small businesses	0.294	0.323***	0.314***	0.279***	0.264***
Self-employment rate	0.096	0.104***	0.102***	0.093***	0.085***
Similarity of industry structure between entries and exits	0.967	0.964*	0.974***	0.963***	0.967
Level of industry diversity	0.852	0.853	0.844***	0.861***	0.848**
Share of KIBS employment	0.048	0.044	0.061***	0.048	0.039**
Population density (log)	5.405	5.253***	5.572***	5.201***	5.592***
Number of observations	497	108	131	137	121

Asterisks for each regime indicate that the mean of the particular regime is statistically different from the mean of all the rest of the sample, ***statistically significant at the 1% level; **statistically significant at the 5% level; *statistically significant at the 10% level

1.5.2 Characteristics of Regional Growth Regimes: T-tests of Equal Means

In the first step of the statistical analysis, we calculate the mean values for the regional characteristics in the different regime types over the complete observation period and conduct t-tests for significant differences between a particular growth regime type and the rest of the sample (Table 1.3). We find significant differences for all the variables considered.

The results show that regions with an entrepreneurial regime are characterized by a relatively high level of both self-employment and employment in small establishments. They have a relatively high level of industry diversity and relatively low similarity between the industry affiliation of entries and that of exits. Although the share of highly qualified workforce in regions with an entrepreneurial regime is somewhat below average, new businesses in these regions have higher than average survival rates.

Regions with a revolving-door regime have an above-average share of highly qualified workforce, but the survival rates of start-ups are relatively low. As in regions with an entrepreneurial regime, the share of employees in small establishments is relatively high in revolving-door regimes. Regions with a revolving-door regime exhibit the lowest level of industry diversity, while the similarity between the industry structure of exits and entries is the highest. Surprisingly,

regions with a revolving-door regime are characterized by a relatively high share of employment in KIBS.

The characteristics of regions with a routinized regime are rather similar to regions with a downsizing regime. Both types of regions have a below-average share of highly qualified workforce and below-average self-employment rates. The relatively small share of employment in small businesses indicates an on average large establishment size. In regions with a routinized regime type, the similarity between the industry structure of entries and that of exits is relatively low. Below-average similarity of industry structure between entries and exits indicates a relatively high level of structural change in regions with a routinized regime. In regions with a downsizing regime, this type of similarity is about average. Another difference between the two types of regions is that the share of KIBS employment is about average in regions with a routinized regime and significantly below average in regions with a downsizing regime. Furthermore, the population density of downsizing regions is above average, whereas it is below average for regions with a routinized regime. High population density is also a characteristic of regions with a revolving-door regime. In regions with an entrepreneurial regime, population density is significantly below average.

These differences of means tests provide a first impression of the characteristics of regions with different growth regime types, but the impression may be hazy and imprecise for at least two reasons. First, since we always compare the regions of a certain growth regime type with all remaining regions, the sample used for the comparison—all other regions—is not the same across regime types, which makes interpretation difficult. Second, since the variables are related to each other, multivariate analysis should be performed. We thus pairwise compare the characteristics of the different growth regime types by multivariate analyses (for t-tests for equal means of such a pairwise comparison, see Table 1.14 in the Appendix).

1.5.3 Multivariate Analyses of Regime-Type Characteristics

1.5.3.1 Methodology

To test the hypotheses developed in the Sect. 1.3, we use probit regression analysis to estimate the effect of the distinctive set of regional characteristics on the likelihood that the region will belong to the particular regional growth regime. Our dependent variable assumes the value 1 if a region belongs to certain type of growth regime and 0 otherwise. The base model is specified as follows:

$$P\left(Y_{it} = 1 | X_{it}\right) = \beta_0 + \beta_1 HC_{it} + \beta_2 SURV_{it} + \beta_3 RD_{it} + \beta_4 SMALLF_{it} + \beta_5 SIM_{it}$$
$$+ \beta_6 DIV_{it} + \beta_7 KIBS_{it} + \beta_n \chi_{it} + \varepsilon\varepsilon_{it.}$$

with Y_{it} as an indicator for the particular growth regime type of region i in time period t, HC_{it} as the share of employees with a tertiary degree, $SURV_{it}$ as the 5-year