Entrepreneurship and Regional Growth: Exploration into the Determinants of the Employment Effects of New Business Formation

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German Summary

Das Interesse von Forschern, Politikern, aber auch der Öffentlichkeit an Entrepreneurship, definiert als unternehmerische Gründungsaktivitäten, hat in den letzen drei Jahrzehnten deutlich zugenommen. Heute gelten Gründungsaktivitäten als wesentlicher Motor für Innovation und damit ökonomisches Wachstum (Acs et al., 2009; Audretsch and Keilbach, 2004a–c; Wennekers, 2006; OECD, 1998, 2004a, b; European Commission, 2003). Aus diesem Grund gewinnt die Förderung unternehmerischer Aktivitäten als Mittel zur Generierung von Beschäftigung und Wachstum zunehmend an Bedeutung (Audretsch et al., 2006; Lundström and Stevenson, 2005). Obgleich in den letzten Jahren bedeutende Fortschritte im Verständnis des Zusammenhangs zwischen Gründungen und Beschäftigungswachstum gemacht wurden, existieren weiterhin eine Reihe von offenen Forschungsfragen. Die vorliegende Promotion hat das Ziel mit Hilfe von empirischen Untersuchungen und theoretischen Überlegungen weiterführende Erkenntnisse zur Bedeutung und Wirkung von Gründungsaktivitäten auf regionales Wachstum herauszuarbeiten. Im Mittelpunkt der Arbeit steht zum einen die Analyse des Einflusses regionaler Bedingungen auf die Beschäftigungswirkung von Gründungen. Zum anderen wird die Wirkung verschiedener Arten von Gründungsaktivitäten, insbesondere der von qualitativ hochwertigen bzw. innovativen Gründungen, auf die regionale Beschäftigungsentwicklung untersucht.

Kapitel 1 stellt einführend verschiedene Auffassungen über die Definition, Arten und Funktionen von Entrepreneurship dar, welche in der Literatur diskutiert werden. Im Zentrum steht dabei die Relevanz unternehmerischer Gründungsaktivitäten für ökonomisches Wachstum sowie die besondere regionale Dimension dieses Zusammenhanges.

Das zweite Kapitel befasst sich mit dem Einfluss regionaler Charakteristika auf die Beschäftigungseffekte von Gründungen. Empirische Studien belegen, dass nicht alle Regionen in gleichen Umfang von Gründungen profitieren, sondern dass deren Beschäftigungswirkung stark zwischen Regionen variiert (u.a. Fritsch und Mueller, 2004, 2008; Mueller et al., 2008; van Stel und Suddle, 2008). Dies deutet darauf hin, dass räumliche Gegebenheiten hier eine wichtige Rolle spielen. Bisherige wissenschaftliche Erklärungsversuche beschränken sich auf regionale Unterschiede im Agglomerationsgrad und Produktivitätsniveau, d.h. hochverdichtete und hochproduktive Regionen profitieren mit Blick auf die Arbeitsplatzentwicklung am stärksten von Gründungsaktivitäten (Fritsch und Mueller, 2004, 2008; van Stel und Suddle, 2008; Fritsch und Noseleit, 2009a). Weiterhin analysieren existierende Studien lediglich den direkten Effekt von regionalen Charakteristika auf die Beschäftigungsentwicklung. Im Gegensatz dazu werden in Kapitel 2 zum einen weitere mögliche Determinanten der Beschäftigungswirkung von Gründungen ermittelt. Dabei wird zum anderen nicht nur deren direkter Beitrag zur Arbeitsplatzentwicklung analysiert, sondern – und viel bedeutender – deren moderierende Wirkung auf den Zusammenhang zwischen Gründungen und Beschäftigungsentwicklung untersucht. Im Ergebnis zeigt sich, dass der Agglomerationsgrad, gemessen durch die Bevölkerungsdichte, den größten Einfluss auf den Beschäftigungsbeitrag von Gründungen hat. Weiterhin üben die Qualifikation des regionalen Arbeitskräftepotentials, definiert als Beschäftigungsanteil von Facharbeitern, sowie das Ausmaß von Innovationsaktivitäten, gemessen als Anteil von FuE-Beschäftigten, eine positive moderierende Wirkung auf den Arbeitsplatzbeitrag von Gründungen aus. Demgegenüber hat ein hoher Anteil von Kurzzeit-Arbeitslosen sowie von kleinen und mittelständischen Unternehmen in einer Region einen negativen Einfluss auf die Beschäftigungswirkung neuer

Unternehmen. Obwohl in empirischen Untersuchungen grundsätzlich ein positiver Effekt von Gründungen auf das (regionale) Beschäftigungsniveau festgestellt werden kann (Fritsch, 2008 für einen Überblick über die Literatur), gibt es erste Hinweise, dass Gründungen unter bestimmten Umständen auch negative Arbeitsplatzeffekte entfalten können (u.a. Mueller et al., 2008; Bosma et al., 2010, van Stel and Suddle, 2008). Kapitel 2 ergänzt diese Literatur, indem es einen abnehmenden marginalen Beschäftigungsbeitrag von Gründungen identifiziert, welcher sogar negativ werden kann für besonders hohe regionale Gründungsaktivitäten.

Anknüpfend an die Ergebnisse aus dem vorherigen Kapitel wird in Kapitel 3 ein theoretisches Model zur Erklärung des abnehmenden marginalen Effekts von Gründungen entwickelt, da die in der Literatur vorhandenen Konzepte keine ausreichende Begründung für dieses Ergebnis liefern können. Das Modell basiert auf der Annahme, dass wesentliche Unterschiede in der Qualität einzelner Gründungen und damit in ihren ökonomischen Wirkungen existieren. Die Qualität kann sich dabei auf verschiedene Merkmale des oder der Gründer(s) und des Unternehmens beziehen, wie etwa die unternehmerische Qualifikation des oder der Gründer(s), die Sorgfalt der Gründungsplanung, die Wissensbasis und die Ressourcenstärke der Newcomer sowie ihre Innovativität. Darüber hinaus werden Kosten für die von Unternehmemsgründungen verursachte ‚kreativen Zerstörung' angenommen. Diese entstehen durch die Gründung neuer Unternehmen, dem Ausscheiden neuer und/ oder etablierter Firmen sowie der dadurch verursachten Turbulenz. Das Hauptargument des Modells ist, dass der marginale Effekt von Gründungen mit zunehmender Anzahl neuer Unternehmen sinkt, da die Kosten der ‚kreativen Zerstörung' stärker ansteigen als der dadurch verursachte Nutzen. Daraus folgt, dass eine höhere Anzahl von Gründungen nicht

notwendigerweise einen positiven Effekt auf das regionale Wachstum hat, sondern dass die Qualität neuer Unternehmen entscheidend ist für deren ökonomischen Effekt. Basierend auf diesem Modell werden schließlich verschiedene Gründe für regionale Unterschiede in den Beschäftigungswirkungen von Gründungen diskutiert.

Basierend auf dem Ergebnis aus Kapitel 1 sowie weiteren Studien (u.a., Fritsch und Mueller, 2004, 2008; van Stel und Suddle, 2008), welche zeigen, dass die Beschäftigungswirkung neuer Unternehmen stark vom Agglomerationsgrad abhängt und damit hochverdichtete Räume mehr von Gründungen profitieren als andere Regionen, versucht Kapitel 4 eine Erklärung für dieses Phänomen zu geben. Unter Rückgriff auf die Literatur zu Agglomerationsvorteilen und Wachstum in Städten (urban growth bzw. urban economics) wird argumentiert, dass die besonders ausgeprägten Beschäftigungseffekte von Gründungen in hochverdichteten Räumen auf deren spezielle Charakteristika, d.h. eine breite Wissens- und Ressourcenbasis, eine hohe Diversität von Akteuren und ökonomischen Aktivitäten, eine starke und vielfältige Nachfrage sowie ein hohes Maß an Spillovern, zurückzuführen sind. Diese tragen zu einem stärken Beschäftigungseffekt von neuen Unternehmen bei, indem sie die Entstehung von qualitativ hochwertigen bzw. innovativen Gründungen befördern, welche stärke Wachstumseffekte induzieren als andere, qualitativ weniger hochwertige bzw. nicht-innovative neue Unternehmen. Weiterhin führt der höhere Anteil qualitativ hochwertigen bzw. innovativen Gründungen sowie die höhere Unternehmensdichte in verdichteten Räumen zu relativ intensiveren Wettbewerbsprozessen und damit einer stärkeren Marktselektion von neuen und/oder etablierten Unternehmen, welche vergleichsweise höhere Angebotseffekten von Gründungen erwarten lassen. Diese Angebotseffekte, welche die Sicherung der Effizienz bzw. Stimulierung von Produktivitätssteigerungen, die Beschleunigung des

Strukturwandels, die Durchsetzung von Innovationen sowie die Erzeugung größerer Vielfalt an Produkten und Lösungsansätzen beinhalten, spielen eine wesentliche Rolle für die regionale Wettbewerbsfähigkeit. Das relativ höhere Beschäftigungswachstum in verdichteten Räumen kann daher als Folge einer stärker verbesserten Wettbewerbsfähigkeit infolge von Angebotseffekten von Gründungen interpretiert werden. Der Beitrag dieses Kapitels besteht somit zum einen in der Erklärung des höheren Arbeitsplatzeffektes von Gründungen in Agglomerationen; zum anderen erweitert es die vorhandene Literatur über Agglomerationsvorteile um einen weiteren positiven Aspekt hochverdichteter Räume.

Obwohl Unterschiede in den Beschäftigungswirkungen verschiedener Typen von Gründungen in der Literatur bereits diskutiert wurden, existieren nur wenige diesbezügliche empirische Untersuchungen (Metzger und Engel, 2006; Metzger und Rammer, 2009; Baptista und Preto, 2010, Fritsch und Noseleit, 2009b). Generell erscheint es plausibel anzunehmen, dass qualitativ hochwertige bzw. innovative Gründungen relativ größere Beschäftigungsimpulse generieren, da sie eine stärkere Herausforderung für etablierte Unternehmen darstellen als andere, nicht innovative neue Unternehmen. Kapitel 5 untersucht die Arbeitsplatzwirkungen verschiedener Arten von Gründungen in westdeutschen Regionen im Zeitraum zwischen 1988 und 2002. Die Qualität neuer Unternehmen ist definiert durch deren Zugehörigkeit zu Wirtschaftssektoren sowie zu Wirtschaftszeigen des verarbeitenden Gewerbes und des Dienstleistungssektors. Dabei wird zum einen angenommen, dass Gründungen im verarbeitenden Gewerbe qualitativ hochwertiger sind als im Dienstleistungsbereich; zum anderen, dass neue Unternehmen in innovativen Wirtschaftszweigen des verarbeitenden Gewerbes sowie in wissensintensiven Bereichen des Dienstleistungssektors eine höhere

Qualität aufweisen als in nicht-innovativen und nicht-wissensintensiven Bereichen beider Sektoren. Weiterhin wird zwischen den direkten Beschäftigungsbeitrag von Unternehmensgründungen, d.h. der Arbeitsplatzentwicklung innerhalb der neuen Unternehmen, und deren Gesamtbeschäftigungswirkung, welche zusätzlich die von Gründungen induzierten (negativen) Verdrängungseffekte sowie die (positiven) Angebotseffekte beinhaltet, unterschieden. Die Grundhypothesen lauten, dass (a) qualitativ hochwertige Gründungen einen stärkeren direkten Arbeitsplatzeffekt aufweisen als andere neue Unternehmen, d.h. es werden relativ mehr Jobs innerhalb dieser Firmen geschaffen und dass (b) Gründungen mit einer höheren Qualität einen größeren Gesamtbeschäftigungseffekt generieren als andere, da sie eine größere Herausforderung für etablierte Unternehmen darstellen. Die Ergebnisse der empirischen Untersuchungen bestätigen deutlich die erste Hypothese: Gründungen im verarbeitenden Gewerbe leisten einen höheren direkten Beschäftigungsbeitrag als neue Unternehmen im Dienstleistungsbereich und es werden mehr Arbeitsplätze in Gründungen in den innovativen Wirtschaftszweigen des verarbeitenden Gewerbes und in den wissensintensiven Wirtschaftszweigen des Dienstleistungssektors geschaffen als in neuen Unternehmen in nicht-innovativen und nicht-wissensintensiven Bereichen beider Sektoren. Hypothese (b) hingegen kann nur für Gründungen im verarbeitenden Gewerbe und in wissensintensiven Dienstleistungen, nicht aber für neue Unternehmen in innovativen Wirtschaftzweigen des verarbeitenden Gewerbes bestätigt werden. Letzteres kann möglicherweise auf den geringen Anteil innovativer Gründungen des verarbeitenden Gewerbes an allen neuen Unternehmen zurückgeführt werden. Desweiteren können Probleme in der empirischen Erfassung der Effekte dieser Unternehmen für dieses Resultat verantwortlich sein. Denn innovative Unternehmen agieren deutlich mehr auf interregionalen und internationalen Märkten als andere Gründungen,

sodass ihre Angebotseffekte wahrscheinlich hauptsächlich außerhalb der Region entstehen und somit nicht durch einen empirischen Ansatz erfasst werden können, welcher auf die Erfassung des Beschäftigungsbeitrags innerhalb der Region abzielt. Nichtsdestoweniger zeigen die Ergebnisse im Kapitel 5, dass nicht alle Gründungen gleichermaßen zu regionalem Beschäftigungswachstum beitragen. Vielmehr wird es ganz erheblich von der Qualität der neuen Unternehmen bestimmt.

Das Schlusskapitel fasst zunächst die Ergebnisse der einzelnen Kapitel zusammen und leitet daraus zentrale Politikimplikationen ab. Anschließend werden verschiedene Marktversagenstatbestände diskutiert, welche eine spezielle Rechtfertigung für die staatliche Förderung qualitativ hochwertiger bzw. innovativer Gründungen bilden können. Im Folgenden werden verschiedene Maßnahmen zur Unterstützung dieses Typs neuer Unternehmen sowie Voraussetzungen für die erfolgreiche Implementation einer solchen Strategie diskutiert. Ein Ausblick auf weitere offene Forschungsfragen in den im Rahmen dieser Promotion diskutierten Feldern schließt die Arbeit ab.

1 Introduction

Economic growth is a key issue in economic research and a primary concern in economic policy making. After World War II, Western economies experienced historically high rates of economic growth. However, following the first oil crisis in 1973, a period of stagflation set in and in the 1980s, stagflation and high unemployment rates required new solutions for stimulating economic growth. The search for these led to a renewed interest in supply-side economics and its underlying factors. Around the same time – the early 1980s – interest in new business formation received a huge boost, in large part due to research conducted by one individual – David Birch. His claim that it is not large corporations, but young and small firms that are the main sources of new jobs (Birch, 1981) generated a fervent debate as well as a surge of scientific research, which led to a reevaluation of the role of small firms and, especially, of entrepreneurship for economic development. Today, it is widely acknowledged that entrepreneurship is a key element of economic dynamism and, as such, lies at the root of economic prosperity (Acs et al., 2009; Audretsch and Keilbach, 2004a–c; Wennekers, 2006; see also OECD, 1998, 2004a, b; European Commission, 2003). Therefore, promoting entrepreneurial activity has become a central aspect of economic growth policy in many countries (Audretsch et al., 2006; Lundström and Stevenson, 2005).

The body of knowledge regarding the entrepreneurial process has expanded rapidly during the last two decades, but there are still gaps in the research that need to be filled to ensure a understanding of the relationship between entrepreneurship and (regional) economic development. This thesis contributes to the literature on the role entrepreneurial activity plays in regional growth by investigating the causal mechanism between new business formation and regional employment growth. The thesis is organized as follows. The next

section elaborates on the definition of entrepreneurship and different measurement methods. The role entrepreneurial activity plays in regional growth is discussed in section 1.2. An overview of the main contributions as well as an outline of the thesis' individual chapters (section 1.3) complete this introductory section.

1.1 Defining Entrepreneurship

> "*The entrepreneur is at the same time one of the most intriguing and one of the most elusive characters in the cast that constitutes the subject of economic analysis.*"
> (Baumol, 1968, p. 64)

Entrepreneurship is a fundamental, multi-dimensional, and sometimes fuzzy concept since it links several academic disciplines—notably economics, psychology, and sociology (Casson, 2010; Shane, 2003). There are at least three approaches to understanding entrepreneurship: (a) the economic approach, which examines the functions of entrepreneurs within the economy; (b) the psychological trait approach, which studies personal characteristics specific to entrepreneurs; and (c) the social-behavioral approach, which stresses the influence of the social environment as well as personal attributes (Deakins and Freel, 2009). In short, there is no generally agreement on definition of entrepreneurship. Even within the field of economics, there is no consensus on its key attributes (Parker, 2003). For example, entrepreneurship may indicate an economic function that, among other things, has to do with handling uncertainty, allocating resources, or innovating. It could also, however, refer to a particular behavior, intrinsic characteristics, the creation of new organizations, or the ownership-management of a company. To further complicate things, Baumol (1990) and, later, Dejardin (2000) point out that entrepreneurial activity

is not necessarily productive to society, but also encompasses unproductive activities, such as rent seeking, as well as destructive acts, such as crime and war, all depending on the incentive structures determined by the prevailing institutions in a society.

Early attempts to define the role of entrepreneurs within the economy were made by Cantillon and Say. Cantillon (1755) was the first to attach economic meaning to the concept of entrepreneur. He identified three classes of agents in society: entrepreneurs, landowners (capitalists), and hirelings (wage workers). Unlike the last two groups, entrepreneurs earn an uncertain profit from the difference between a known buying price and an uncertain selling price. Hence, Cantillon's entrepreneur is an arbitrageur who equilibrates supply and demand in the economy and bears the risk of doing so. According to Jean-Baptiste Say (1803/1971), the entrepreneur has a central coordinating function in production and distribution. Moreover, he is the coordinator, modern leader, and manager within the firm. Say is the first economist to stress the managerial function of the entrepreneur.

Many contributions to the concept of entrepreneurship followed in literature, each elaborating on different entrepreneurial functions within the economy.[1] Hebert and Link (1989) identify three intellectual traditions in the history of economic thought on entrepreneurship, each tracing its origin to Cantillon: the Chicago tradition, mainly represented by Marshall (1890/1930), Knight (1921/ 1971), and Schultz (1975); the German tradition based on von Thünen (1826/1960) and Schumpeter (1911/1934); and the Austrian tradition rooted in von Mises (1949) and Kirzner (1973, 1982, 1985).

[1] For an overview see Hebert and Link (1989), van Praag (1996) and Bögenhold (2004)

The Chicago tradition, representing the (neo-)classical school of thought, focuses on the equilibrating function of entrepreneurs in the economy. Marshall describes the entrepreneur as a superintendent who – in addition to his or her risk-bearing and management functions as put forward by Cantillon and Say – also fulfills an innovating function that is rooted in the superintendent's constant search for cost minimization. In this way, entrepreneurs are also pioneers and instigators of progress (Marshall, 1890/ 1930).[2] According to Knight (1921/ 1971), the main entrepreneurial function is to bear uncertainty in society. In contrast to risk, uncertainty is uninsurable since it relates to unique events. Knight argues that entrepreneurs bear uncertainty in order to make a profit. Thus, entrepreneurs actively protect others who are reluctant to take the same gamble for uncertain rewards.[3]

In the German tradition, economists characterize the entrepreneur as the creator of instability and a force of creative destruction. Its most

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[2] Although early neoclassical economists such as Alfred Marshall (1842–1924), Francis Y. Edgeworth (1845–1926), and A. C. Pigou (1877–1959) attached great importance to entrepreneurship, the concept was largely ignored in mainstream economics of the twentieth century (Baumol, 1968, 1993). The entrepreneur receded and virtually disappeared from the microeconomics textbooks as neoclassical economics became more formalized (van Praag, 1996; Barreto, 1989). The traditional neoclassical model with its assumptions about production function, perfect information, and rational choice leaves no room for an active entrepreneur. Instead, the entrepreneur is viewed as similar if not exactly the same as the capitalist employer, the owner-manager, who owns the resources that enable production to take place, but has no further attributes. Therefore, Baumol (1968, p. 67, see also 1993, p. 13) critically states:

"Obviously, the entrepreneur has been read out of the model. There is no room for enterprise or initiative. The management group becomes a passive calculator … One hears of no … brilliant innovations, of no charisma or any of the other stuff of which entrepreneurship is made; one does not hear of them because there is no way they can fit into the model. … The model is essentially an instrument of optimality analysis of well-defined problems which need no entrepreneur for their solution."

[3] Accordingly, Knight's concept can be regarded as a generalization of Cantillon's theory. The latter stresses the strong link between entrepreneurship and risk/uncertainty, but does not distinguish between them. In addition, the function of the Knightian entrepreneur goes beyond only arbitrage.

prominent representative, Schumpeter (1911/1934), made significant contributions to the theory of entrepreneurship. He argued against the prevailing view of the entrepreneur as simply a firm manager, risk-bearer, and capitalist; instead defining an entrepreneur as a leader, an innovator, and an engine of economic growth. The Schumpeterian entrepreneur causes waves of creative destruction by introducing 'new combinations', which make current technologies and products obsolete.[4] In this way, the existing economic equilibrium is destroyed and – if the innovation is reproduced via imitation – recreated. The ongoing innovative activity and innovation competition are largely responsible for technological progress and long-run economic growth.[5] As the main characteristics of entrepreneurship are innovation and leadership, Schumpeter's entrepreneur does not necessarily either start[6] or manage[7] an own business.

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[4] These 'new combinations' include: (1) the creation of a new good or a new quality; (2) the creation of a new method of production; (3) the opening of a new market; (4) the capture of a new source of supply; and (5) the creation of a new organization or industry (Schumpeter, 1934).

[5] Thus Schumpeter states: "the function of entrepreneurs is to reform or revolutionize the pattern of production …. To undertake such new things is difficult and constitutes a distinct economic function, first, because they lie outside of the routine tasks which everybody understands and, secondly, because the environment resists in many ways …. To act with confidence beyond the range of familiar beacons and to overcome that resistance requires aptitudes that are present in only a small fraction of the population and that define the entrepreneurial type as well as the entrepreneurial function. This function does not essentially consist in either inventing anything or otherwise creating the conditions which the enterprise exploits. It consists in getting things done" (Schumpeter, 1942, p. 132).

[6] In *Theory of Economic Development* (1911/1934), Schumpeter argues that new firms are the most prominent case of new combinations (so-called Schumpeter Mark regime). In *Capitalism, Socialism and Democracy* (1942), however, he states that large corporations outperform small and new firms in the innovation process (so-called Schumpeter Mark II regime).

[7] Hence, the Schumpeterian concept of entrepreneurship is broader than earlier concepts. Entrepreneurs are not necessarily owners and leaders of their own firm; instead, any person in any position can be an entrepreneur if he or she introduces an innovation. The Schumpeterian notion thus includes innovative managers or employees within a firm, what is currently referred to as 'intrapreneurship'. However,

Finally, the Australian tradition of entrepreneurship focuses on profit opportunities and the importance of competition. The key concept in Kirzner's notion of entrepreneurship is alertness to profit opportunities, i.e., the discovery of knowledge previously unknown (Kirzner, 1973). They emerge due to ex-post errors in evaluations and expectations of other market participants. In contrast to the Schumpeterian entrepreneur, Kirzner's entrepreneur is more of an 'exploiter' who – in doing so – drives the economy towards equilibrium than a 'destroyer'. Concerning the role of entrepreneurs in economic development, Kirzner states:

> *"In economic development, too, the entrepreneur is to be seen as responding to opportunities rather than creating them; as capturing profit opportunities rather than generating them … Without entrepreneurship, without alertness to the new possibility, the long-term benefits may remain untapped."* (1973, p. 74)

More generally Kirzner argued that entrepreneurs are behind the competitive behavior that drives the market process (Kirzner, 1973).

Contemporary definitions of entrepreneurship build on the concepts described above. Following the Kirznerian view, Shane and Venkataraman (2000, p. 218) state that entrepreneurship is the process by which ''opportunities to create future goods and services are discovered, evaluated, and exploited.'' Casson (1982) perceives the entrepreneur as someone with particular skills that enable him or her to specialize in taking difficult judgmental decisions about the coordination

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Schumpeter's concept is also narrower in the sense that business owners are only entrepreneurs if they are also innovators, i.e., not every business owner can be considered to be an entrepreneur.

of scarce resources under uncertainty. In line with Kirzner (1973) these authors argue that their definitions do not require viewing entrepreneurs as the founders of new organizations.

However, the Schumpeterian concept of entrepreneurship, particularly in how it relates entrepreneurship and economic growth, dominates the literature on economic growth. For example, Baumol (1993) identifies two major functions of the entrepreneur. The entrepreneur is:

> *"…someone who creates and then, perhaps, organizes and operates a new business firm, whether or not there is anything innovative in those acts. … the innovator—… the one who transforms inventions and ideas into economically viable entities, whether or not, in the course of doing so they create or operate a firm."* (Baumol, 1993, p. 198)

Integrating both views, Kirchhoff develops a narrow definition and characterizes entrepreneurship as "… *innovation by newly formed independent firms*" (Kirchhoff, 1994, p. 37).

Given the different perspectives on entrepreneurship, its operationalization is rather difficult, and has resulted in various indicators. According to the OECD (1998), there are three ways how entrepreneurship can be measured, each method having both particular advantages and shortcomings. First, entrepreneurship involves a dynamic process in which new firms are starting up, existing firms are growing, and unsuccessful ones are restructuring or closing down. This corresponds to the notion of creative destruction put forward by Schumpeter (1911/1934). Empirically, this dynamic feature of entrepreneurship can be operationalized by start-up rates as well as by survival and hazard rates. However, these measures do not reflect the innovative element of entrepreneurship as they encompass all types of

business activity. Second, entrepreneurship – to the extent that it implies control of the process by the entrepreneur-owner – tends to be identified with small businesses where the owner(s) and manager(s) are the same person. This is mostly measured by the self-employment or business ownership rate (Verheul et al., 2002). However, these indicators neither distinguish between innovative and non-innovative activities, nor do they account for the dynamic element of entrepreneurship as they measure only the stock of existing businesses. Finally, entrepreneurship entails innovation, which is mostly captured by indicators of R&D activity. Unfortunately, R&D-related measures have some serious limitations. Input-oriented measures suffer from the problem that not all innovations can be attributed to or require R&D effort and not all R&D effort yields an innovation. Similarly, output-oriented measures, such as patent-related indicators, do indeed document the success of R&D in terms of new knowledge, but not its commercialization. Moreover, not all new knowledge is patentable and patenting is a crucial protection mechanism only in a small number of industries (for a detailed discussion, see Fischer al., 2006; Cohen, 2005; Arora et al., 2008). Eventually, although innovative activity is an important element of entrepreneurship, focusing on this element ignores the dynamic aspect of entrepreneurship in terms of market entry and exit, which is a central element in the process of creative destruction.

This overview of economic thought on entrepreneurship shows that the entrepreneurial phenomenon can be viewed from different angles. According to Audretsch (2003a), the absence of a generally accepted definition of entrepreneurship reflects the multidimensionality of the concept, which involves uncertainty-bearing, innovation, opportunity-seeking, management, and enterprising individuals. In its contribution to the understanding of the role entrepreneurship plays for economic growth, the present thesis focuses on analyzing the impact of

start-ups and, particularly, innovative new businesses on regional employment. It therefore concentrates on the link between the entrepreneurial aspects of venture creation and innovation and regional economic growth.

1.2 Entrepreneurship and Regional Economic Growth

"… the engine of growth is entrepreneurship."
(Holcombe 1998, p. 60)

Today, entrepreneurship is widely acknowledged to be a main driver of economic growth. However, ever since the beginning of the twentieth century, large corporations have been seen as the sole and most powerful engine of economic and technological development. The exploitation of economies of scale and scope were considered to be the driving force of economic development (Teece, 1993; Chandler, 1990), land lead to an increasing market concentration across key industries in Western economies. The post-war era was characterized by relatively well-defined technological trajectories, stable demand, and seemingly clear advantages of diversification. According to Audretsch and Thurik (2001), stability, continuity, and homogeneity were the cornerstones of this period, which they refer to as the managed economy. The importance of entrepreneurship and small businesses steadily declined in Northern Europe and the United States. Small firms were perceived as inefficient and rarely involved in innovative activity. Between the mid-1970s and the early 1990s, though, a structural shift from large companies toward smaller and entrepreneurial firms occurred in Western economies (see, e.g., Acs, 1996, 1999; Acs and Audretsch, 2001; Audretsch and Thurik, 2001; Carree et al., 2002; Thurik, 1996; Verheul et al., 2002). This so-called entrepreneurial economy is marked by a decentralized industry structure with knowledge and flexibility as

key factors of production. Globalization and the revolution in information and communication technologies (ICT) drastically reduced the costs of transferring capital and information to low-cost countries, thus shifting the comparative advantage of high-wage countries from the traditional hard location factors to innovative, knowledge-based activity (Audretsch and Thurik, 2001). Moreover, technology shifts, particularly in the field of ICT, moved the competitive advantage away from large-scale organizations to smaller and more flexible economic units, which directly favored entrepreneurship and small businesses (Nooteboom, 1999, 2000).[8]

The importance of entrepreneurship and innovative, knowledge-based activities for competitiveness and growth in Western countries has amplified the relevance of the regional level for economic activity and analysis. In contrast to predictions regarding the 'death of distance' and the emergence of a 'flat world', issued by *The Economist* (1995) and Friedman (2005), it now appears that "the competitive advantage is created and sustained through a highly localized process" (Porter, 1990, p. 19).

The regional dimension of entrepreneurship is reflected by persistent differences in the level and type of new businesses across regions (Fritsch and Mueller, 2007; Sternberg, 2009; Audretsch et al., 2006; Bade and Nerlinger, 2000). On the one hand, this can be attributed to differences in regional resource endowments that influence new business formation, i.e., the pool of business opportunities and the quantity and quality of resources available to exploit these opportunities (Shane, 1996; Acs and Armington, 2004). In particular efforts to

[8] Various aspects and explanations of this shift are discussed in, e.g., Acs (1996), Audretsch (2009), Acs et al. (1999), Carlsson (1992), Eliasson (1994), Glancey and McQuaid (2000), and Piore and Sable (1984).

generate new knowledge, which is a major source of entrepreneurial opportunities, are very unevenly distributed in space (e.g., Malecki, 1979; Audretsch and Feldmann, 1996; Fritsch and Slavtchev, 2005). Since it is best transferred via face-to-face interactions and through frequent and repeated contact, accessing this knowledge requires spatial proximity.[9] As consequence, entrepreneurial opportunities are systematically higher in contexts rich in knowledge and the location decisions of new firms are found to be dependent on geographical proximity to relevant knowledge sources (Audretsch et al., 2004; Audretsch and Lehman, 2005). The 'incubator hypothesis' argues that urban areas offer favorable conditions for entrepreneurship due to the availability of rich and diversified labor markets, suppliers, and business support services, strong local demand, and, especially, knowledge spillovers (Hoover and Vernon, 1959; Leone and Struyk, 1976; Fagg, 1980).

The regional component of entrepreneurship is, on the other hand, also related to varying 'entrepreneurial cultures'. Regions with strong entrepreneurial traditions are breeding grounds for entrepreneurship primarily due to role models, which provide information about and skills for starting a venture (so-called demonstration effects) and positively shape values and attitudes toward entrepreneurship (Wagner and Sternberg, 2004; Parker 2004; Mueller, 2006b; LaFuente et al., 2007). Hence, entrepreneurship seems to be self-reinforcing by creating its

[9] While information has a singular meaning and interpretation and can be easily codified, transmitted, received, and stored, knowledge is vague and difficult to codify. New knowledge especially is often tacit, complex, or 'sticky', i.e., highly contextual and thus best transferred via face-to-face interaction and through frequent and repeated contact, which requires spatial proximity (von Hippel, 1994). Therefore, the costs of transmitting tacit knowledge rise with distance (Audretsch, 1998; Krugman, 1998). The spatial dimension of knowledge transfer has been investigated in empirical studies, many of which find strong evidence that knowledge spillovers are locally/spatially bound (e.g., Jaffe et al., 1993; Anselin et al., 1997, 2000; Audretsch and Feldman, 1996; Glaeser et al., 1992; Henderson et al., 1995).

own culture (Minniti, 2005), leading to persistent differences in new business formation across regions.

Finally, entrepreneurship can be considered a regional event since individuals tend to start firms in places they are familiar with, e.g., places where they have worked, studied, or lived for a long time (Michelacci and Silva, 2007; Schmude, 2002). The obvious reason for this phenomenon seems to be that it is easier to discover and take advantage of business opportunities in a well-known environment, where family, friends, and acquaintances can be consulted and an existing (local) network can be used to seek partners, employees, suppliers, customers, advisors, and investors (Zander, 2004; Michelacci and Silva, 2007). Not only do such social networks reduce search costs, they also have the advantage of signaling credibility and building on trust developed over time in past relationships.

For all these reasons, considering the regional level seems to be reasonable and essential for understanding the entrepreneurial process and its impact on economic development and growth.

Theoretically, entrepreneurship contributes to economic growth in at least four ways. First and as already described by Schumpeter (1911/1934), new firms are more prone to introduce radical innovations than incumbents and, indeed, most of the pathbreaking innovations of the past two centuries have been established by new and small firms (Baumol, 2004; Geroski, 1995; Acs and Audretsch, 1990; Audretsch, 1995; Klepper, 2009). This seems to be quite surprising because, theoretically, established firms are in a better position to commercialize opportunities as they have established organization structures, customer and supplier relations as well as more resources than new firms. However, existing companies often focus on the exploitation of existing technologies and product programs and do not pursue new

profit opportunities, in particular if they contest their established ones (Hill and Rothaermel, 2003; Audretsch, 1995; Geroski, 1995, Klepper and Sleeper, 2005). Additionally, in contrast to new firms, incumbents have established structures of organization and production, given resources as well as standard routines of information perception, learning and problem solving, which make them less flexible and may impede the recognition of business opportunities and the implementation of radically new products and processes (Hill and Rothaermel, 2003). Therefore, starting a new firm is frequently the only way of inventors to commercialize their ideas (Audretsch, 1995).[10] Hence, new ventures seem to be better at transforming new knowledge into innovations with high economic impact. This implies a crucial function of entrepreneurship for technological development and economic growth (Audretsch, 1995; Acs et al., 2009; Audretsch et al., 2006; Mueller, 2006; Braunerhjelm et al., 2010).

Second, new entrants can contribute to structural change simply if the industry affiliation of new firms differs from those of the incumbent firms. If new business formation leads to an increased variety of the industry structure, this might prevent 'lock-in' situations in the long-run (David, 1994, 2007; Fagerberg, 2003). Third, innovations introduced by newcomers result in a larger variety of goods and services, which makes it more likely for customers to find a supply that meets their preferences. In addition, such an increased variety of supply may foster

[10] The Knowledge Spillover Theory of Entrepreneurship argues that start-ups often commercialize new knowledge that was generated but left unexploited by incumbents (e.g., Audretsch, 1995; Acs et al., 2004; Audretsch et al., 2006). Frequently, former employees of incumbent firms commercialize new knowledge by starting a new firm since it is the most promising or only way to exploit and appropriate its value (Audretsch, 1995). Studies on spin-offs find that former employees exploit the knowledge generated in the incumbent firm by launching their own venture if they are frustrated by their employer's rejection of their innovative ideas or if they expect larger financial awards from exploiting the new knowledge on their own (Garvin, 1983; Klepper and Sleeper, 2005).

the division of labor as well as follow-up innovations and can, thus, stimulate economic growth. Finally, entrepreneurship may contribute to economic growth in a more indirect manner that relates to competition effects. New firms may contest established market positions and force incumbents to act more efficiently, which, eventually, leads to a productivity increase in the economy. Thereby not only entry, but also the mere threat of market access forces incumbents to perform more efficiently (Baumol et al., 1988).[11]

The notion that entrepreneurship may constitute an important driver of regional economic growth is supported by a growing body of empirical evidence indicating a positive relationship between different measures of entrepreneurship and various indicators of economic development.[12] However, early studies linking new firm formation to regional growth show confounding results. While some research suggests a positive growth impact (Reynolds, 1994, 1999; Acs and Armington, 2002 for the United States; Ashcroft and Love, 1996 for the United Kingdom; Brixy, 1999 for East Germany; Braunerhjelm and Borgman, 2004 for Sweden; Callejon and Segarra, 1999 for Spain), others detect small or insignificant effects (Audretsch and Fritsch, 1996; Fritsch, 1996, 1997; EIM, 1994).[13] Audretsch and Fritsch (2002) explain these diverging results by identifying positive long-term supply-side effects of new firm formation which were not, or only partly, captured by earlier studies. In accordance with this, other empirical research for the United States and various European countries detects a strongly

[11] See also Fritsch, 2008 for an overview on the different effects that new business formation exerts on economic development.

[12] For an extensive review of the empirical literature on the economic effects of entrepreneurship considering various indicators of both entrepreneurship and its economic impact, see van Praag and Versloot (2007).

[13] Furthermore, Fölster (2000) shows that increased self-employment shares have had a positive impact on regional employment rates in Sweden.

positive relationship between new business formation and regional employment growth, which is long term in nature, taking place over a period of up to ten years.[14] In addition, some studies include start-up rates in a Cobb-Douglas production function, assuming that entrepreneurship is an additional production factor. These studies also report a positive impact of new businesses formation on regional economic development in terms of the level and growth of GDP and labor productivity (Audretsch et al., 2006; Mueller, 2006a, 2007).

Nevertheless, recent empirical findings suggest considerable between-region variation in the overall effect of new business formation on employment growth. Evidently, regional characteristics seem to shape the link between new firm formation and employment growth. The employment contribution of start-ups is found to be more pronounced and, particularly, more positive in agglomerated areas than in rural regions (Fritsch and Mueller, 2004, 2008; van Stel and Suddle, 2008). Moreover, Fritsch and Mueller (2008) report the employment impact of start-ups to be generally positive in high productivity regions, but negative in low productivity areas. Even negative employment effects of new business formation were found for Scotland, Wales, and regions of Great Britain with relatively low start-up rates (Mueller et al., 2008), as well as for the rural regions of the Netherlands (van Stel and Suddle, 2008). These results imply that the employment impact of new businesses is not necessarily positive and is influenced by certain regional features. Hence, there are not only differences in the level of new business formation across regions, but also in the way and extent

[14] Acs and Mueller, 2008; Andersson and Noseleit, 2010; Arauzo-Carod et al., 2008; Audretsch and Fritsch, 2002; Baptista et al., 2008; Baptista and Preto, 2010; Bosma et al., 2010; Carree and Thurik, 2008; Dejardin, 2010; Fritsch and Mueller, 2004, 2006, 2008; Koster, 2010; van Stel and Storey, 2004; Mueller et al., 2008; van Stel and Suddle, 2008.

regions are able to benefit from start-up activity. Regional conditions are not only rather significant, but seem to constitute different types of regional growth regimes that affect the employment impact of new firms. (Audretsch and Fritsch, 2002; Fritsch, 2004; Fritsch and Mueller, 2006). Obviously, the degree of agglomeration is one moderating factor in the relationship between start-ups and regional growth; however, population density is highly correlated with a number of regional conditions, such as availability of resources, quality of the workforce, regional knowledge spillovers, wage levels, etc., and is thus a catch-all indicator. The same holds for the regional productivity level. Therefore, it is still a largely open question which regional characteristics affect the scale of the employment effect of new ventures.

In addition, not all start-ups seem to be equally important for economic growth; different types of entrepreneurship impact the economy differently (Sternberg and Wennekers, 2005). Indeed, not all new firms are truly 'entrepreneurial' (Wennekers and Thurik, 1999) or 'productive' (Baumol, 1990) in a Schumpeterian sense. On the contrary, the vast majority of them are imitative, i.e., they walk well-trodden paths (Schumpeter, 1934; Schutjens and Wever, 2000). Although imitative entrepreneurs also exert an important function in knowledge diffusion, market expansion, and industry development, it is the Schumpeterian 'promotor of new combinations' who initiates innovation, technological progress, and economic growth (Carree and Thurik, 2003; Baumol 1990, 2004; Baumol et al. 2007; Audretsch, 2007; Schramm, 2006; Acs, 2008; Acs and Armington, 2006). Consistently, empirical results found that new businesses started due to lack of better employment options (necessity entrepreneurship) do not contribute to economic

development (Wong et al., 2005; van Stel et al., 2005).[15] In contrast, so-called high-quality business start-ups and opportunity entrepreneurship that are based on the recognition and exploitation of innovative business opportunities in a Schumpeterian sense are said to enhance knowledge spillovers and economic growth. The quality of start-ups might be indicated by various factors, such as the innovativeness of the supplied goods and services, the qualification of the entrepreneur, the amount and quality of mobilized resources, and the marketing strategy, as well as productivity.

Despite these insights into the outstanding effects of high-quality entrepreneurship, there are very few empirical studies investigating this issue. In a study based on GEM data, Wong et al. (2005) identify a positive impact of high growth potential total entrepreneurial activity (TEA) on GDP growth, but not on overall TEA, necessity TEA, or opportunity TEA.[16] In addition, high-quality entrepreneurship, indicated by innovativeness and time of survival, is found to exert a disproportionally large impact, compared to other types of entrepreneurial activity, on regional (Mueller, 2006a, 2007; Audretsch

[15] Van Stel et al. (2005) report that entrepreneurial activity by nascent entrepreneurs, i.e., people actively trying to start a venture, and owner/managers of young businesses that are less than 42 months old, exert a positive effect on economic growth in rich countries while negative effects were identified for poor nations. The authors argue that these results may be attributed to the fact that people in poorer countries are driven by poverty and lack of employment alternatives (necessity entrepreneurship), while in developed countries, it is opportunity and innovation that are the primary motivations for a starting business (opportunity entrepreneurship).

[16] Total entrepreneurial activity is the percentage of the adult population between 18–64 years old that is either actively involved in starting a new venture or is the owner/manger of a business that is less than 42 months old (Reynolds et al., 2005). A venture was classified as having a 'high growth potential' if it fulfilled the following criteria: (1) the venture plans to employ at least 20 employees in five years; (2) the venture indicates at least some market creation impact; (3) at least 15% of the customers of the venture normally live abroad; and (4) the technologies employed by the venture were not widely available a year ago (Wong et al., 2005).

and Keilbach, 2004a-c) and industry (Falck, 2007) performance based on productivity or GDP measures. However, in a study based on GEM data, Bosma (2010) identifies a positive impact of high-growth oriented, but not of innovative entrepreneurship on regional labor productivity. Concerning employment effects, the scarce empirical evidence strongly supports the notion that high-quality start-ups generate relatively more regional employment growth than other new ventures. In their study of Portugal, Baptista and Preto (2010) find the effect of knowledge-based firms on regional employment to be substantially larger for businesses in knowledge-based industries than for start-ups in other industries. Fritsch and Noseleit (2009b) define the quality of new firms by their time of survival in the market. Using data of West German regions, they detect a positive employment impact of new firms that survived for four years or longer, but a negative effect for start-ups that stayed in the market for less than four years. Although there is some preliminary evidence, the relationship between the quality of new businesses and its effect on regional employment is a largely unexplored field. Especially the definition and measurement of high-quality entrepreneurship seems to be a main bottleneck for empirical research.

The above review of the relationship between entrepreneurship and economic growth illustrates the crucial function of new business formation for regional (employment) growth. Although there have been major advances in understanding the link between entrepreneurship, economic development, and, in particular, employment growth during the last decades, there are still important questions that need to be answered. In particular, the role of regional conditions and new firms' quality requires further investigation. The contribution this thesis makes in answering these questions is discussed in the following section.

1.3 Structure and Main Contributions of the Thesis

This thesis' main objective is to investigate the relationship between entrepreneurship and regional employment growth. To this end, two main determinants of the magnitude of employments effects induced by new business formation are analyzed. First, the influence of regional characteristics on the employment contribution of start-ups is examined. This is complemented by, second, an investigation of the role new firms' quality play for the size of the employment contribution induced by new ventures.

There is empirical evidence that the growth impact of new business formation varies widely between regions. Some regions profit substantially from new venture creation; others experience only low or even negative employment effects (e.g., Fritsch and Mueller, 2004, 2008; Fritsch and Noseleit, 2009a; Mueller et al., 2008; Stel and Suddle, 2008). However, it remains unclear what causes this variation. Chapter 2 expands the literature by exploring the determinants causing regional differences in the employment contribution of start-ups. Previous research on the varying growth contribution of new business formation is limited to the degree of agglomeration and the productivity level (Fritsch and Mueller, 2004, 2008; Fritsch and Noseleit, 2009a; van Stel and Suddle, 2008). In contrast, this thesis considers other regional characteristics in order to explain regional differences in the employment effects of start-ups. Moreover, existing studies focus on the direct impact of several regional characteristics on regional employment change, but not on their moderating effect on the employment contribution of new ventures. This dissertation extends previous research by analyzing the moderating influence of regional attributes on the relationship between start-ups and employment growth, thus making it possible to distinguish between the direct effects of regional characteristics and the indirect growth impact that these determinants

may have through new business formation. The results clearly reveal population density to be the most important regional characteristic shaping the magnitude of the employment impact of start-ups. Other regional determinants exerting a positive moderating impact include the share of medium-skilled workers and the degree of innovation activity as measured by the proportion of R&D employees. In contrast, a large share of employment in small businesses as well as a high short-time unemployment rate have a negative influence on the employment contribution of start-ups.

Recent research finds a positive relationship between employment growth and new venture creation (for an overview, see Fritsch, 2008). However, there is also evidence of a negative effect of start-ups (e.g., Mueller et al., 2008, Bosma et al., 2010). Chapter 2 adds to the body of empirical evidence by identifying an inverse U-shaped relationship between the level of start-up activity and employment change. This result indicates a decreasing marginal employment effect of new firms that can even become negative for very high rates of new business formation.

Building directly on the empirical results of Chapter 2, Chapter 3 provides a theoretical explanation for the empirical findings of a decreasing and sometimes even negative marginal employment effect of new business formation. It is shown that extant theories cannot convincingly explain this result. In particular, the ‘market-overcrowding’ approach, which dominates the literature, is not appropriate in the case of innovative start-ups. Hence, a theoretical model is developed that is able to elucidate why the marginal employment effect decreases with a rising number of new businesses and how this effect may even become negative. The model is based on the assumption that start-ups may differ considerably with regard to their quality, which in turn critically determines the magnitude of their impact on economic growth.

Additionally, the costs of creative destruction are introduced, which are caused by the entry of new firms and the turbulence that ensues. Comparing the gross effect and costs of creative destruction, the basic argument of this model is that the marginal net effect of new business formation will decline with the number of start-ups because the costs of creative destruction increase more than the respective gross effect. In particular, the model implies that a higher number of start-ups is not necessarily better for regional growth; rather, it is the quality of the new businesses that is of crucial importance for their effect on economic development. Based on this model, possible reasons for interregional differences in the effect of new businesses formation on economic development are discussed.

Chapter 4 investigates the role of density for the magnitude of the employment contribution of start-ups. Although empirical studies suggest that this effect is much larger in agglomerations than in moderately congested and rural regions, the underlying reasons for this result have not yet been discovered. Chapter 4 begins to fill this knowledge gap by linking the literature on the employment effects of start-ups to the insights from the urban economics and new economic geography literature. In particular, it is argued that the specific characteristics of urban areas, which have been extensively described in the literature on agglomerations economies, have a further – yet unexplored – effect on economic development. These characteristics enhance the employment contribution of new firms in two ways. First, they foster the emergence of high-quality start-ups, which are known to induce stronger employment effects than other types of new businesses. Second, the relatively larger share of high-quality new ventures as well as the higher business density in such regions intensifies competition, spurs the market selection and, therefore, causes a stronger employment impact of new businesses in

agglomerations. The contribution of this chapter is thus twofold: it adds to the explanation of regional differences in the effects of entry and it also contributes to the vast literature on agglomeration benefits by introducing and explaining a new aspect of agglomeration benefits.

Theoretical considerations as well as recent empirical evidence suggest that the size of the employment effect of new business formation is closely related to the quality of these ventures. In particular, high-quality entrepreneurship seems to create more job growth than other types of entrepreneurial activity (Engel and Metzger, 2006; Metzger und Rammer, 2009; Baptista und Preto, 2010, Fritsch und Noseleit, 2009b). Chapter 5 adds to the scarce empirical evidence on this relationship by investigating the impact of high- and low-quality start-ups on regional employment change in West Germany. The quality of start-ups is measured by their affiliation with broad economic sectors (manufacturing and services) as well as with industries. New firms in manufacturing and innovative industries, i.e. innovative manufacturing and knowledge-intensive service industries, are assumed to be of a higher quality than start-ups in services and non-innovative industries. The empirical results show that entry cohorts in manufacturing and innovative industries generate more jobs than new firms in services and non-innovative industries, i.e., they have a larger direct employment effect. In addition, new businesses in manufacturing and knowledge-intensive service industries induce a larger overall effect on regional employment than their lower-quality counterparts. However, no significant effect could be detected for start-ups in innovative manufacturing industries, which may be due to their relatively small number and estimation problems with regard to their displacement and supply-side effects. However, the results clearly suggest that not all start-ups are equally important for growth and that the quality of the new businesses plays an important role.

Chapter 6 contains a summary of the main findings of this thesis and draws some policy conclusions. This thesis closes with some policy guidelines for the design and implementation of an entrepreneurship policy that concentrates on the promotion of high-quality new businesses.

2 Why Does the Effect of New Business Formation Differ Across Regions?[17]

2.1 Introduction

Recent empirical research strongly indicates that the effect of new business formation on economic development is of a long–term nature.[18] It is found that start-up rates may have a statistically significant impact on growth for a period of up to ten years (for an overview, see Fritsch, 2008). Over this time span, the effect of start-ups on growth shows considerable variation that is in most cases (countries or regions) characterized by a wave-like pattern (see section 2-2 for details). This wave-like pattern reveals that new businesses have a positive impact on economic development in the first one or two years after formation, but that the effect then declines and, in many cases, becomes negative. In many regions, the effect turns positive again after about five years, and then becomes insignificant after about another five years. Previous analyses also find that the magnitude of the 'wave', as well as the total effect of new business formation on growth, is shaped to a considerable degree by regional conditions. Some regions are able to achieve substantial employment growth from new business formation; however, the effect can even be negative in other regions (Fritsch, 2008).

[17] This chapter is largely based on Fritsch and Schroeter (2010a): Why does the effect of new business formation differ across regions?

[18] Acs and Mueller, 2008; Andersson and Noseleit, 2010; Arauzo-Carod et al., 2008; Audretsch and Fritsch, 2002; Baptista et al., 2008; Baptista and Preto, 2010; Bosma et al., 2010; Carree and Thurik, 2008; Dejardin, 2010; Fritsch and Mueller, 2004, 2006, 2008; Koster, 2010; van Stel and Storey, 2004; Mueller et al., 2008; van Stel and Suddle, 2008).

In this chapter, we analyze differences in the total effect of new business formation on regional development in West Germany. Unlike other work on this subject (Fritsch and Mueller, 2004, 2008), we are not interested in the ten-year wave pattern as it occurs, but in the overall result after this process has ended. To what extent and why do the long-term effects of new business formation vary between regions? What characterizes those regions where new business formation leads to pronounced employment growth as compared to those regions where this effect is negligible if it even occurs at all? What is behind these interregional differences? To answer these questions, we employ a panel approach in which we relate regional start-up rates and other regional characteristics to regional employment change over 10-year periods. This analysis allows us to identify the main factors that shape interregional differences in the effects of new business formation on economic development. Previous analyses of regional differences only compare the effects in different types of regions, such as agglomerations and rural areas or regions with high and low levels of productivity; however, our approach allows us to simultaneously account for several factors that may shape these effects, e.g., population density *and* productivity.[19]

The following section provides an overview of recent empirical research on the regional employment effects of new businesses. We

[19] E.g., Fritsch and Mueller (2008) find that the effect of new business formation on regional employment is relatively large in agglomerations and in regions with high levels of labor productivity. Since, in West Germany most of the regions with high labor productivity are agglomerations and many of the low productivity regions are rural areas (Fritsch and Mueller, 2008, p. 22), a larger growth effect of new business formation in regions with high productivity levels could well be explained by their higher population density. In this paper (section 2-5), we, indeed, find that the regional productivity level does not contribute to explaining the effect of new business formation on regional development when population density is included in the analysis.

then derive hypotheses about the reasons for regional differences in section 2.3. Section 2.4 introduces the data and the empirical approach. The results of our empirical investigation are presented in section 2.5. Section 2.6 concludes.

2.2 The Effects of New Business Formation on Employment

New business formation can affect regional development in a variety of ways (for a detailed overview, see Fritsch, 2008). The evolution of the newcomers, e.g. measured by the number of their employees or by their market share (the *direct effect* of new businesses on employment change) is only a part of the contribution new businesses make to economic development. Due to competition and market selection, only a fraction of start-ups survive for any appreciable length of time (Boeri and Cramer, 1992; Fritsch and Weyh, 2006; Schindele and Weyh, 2010), and those that do may displace incumbents. Given that market selection is a survival-of-the-fittest scenario, firms with relatively high productivity will remain in the market while those with low productivity either have to reduce their output or exit.[20] At a constant output level, this market selection process should lead to a decline in employment, instead of a gain, because the more productive survivors will need fewer resources (including labor) to produce a given amount of goods and services. Hence, although starting a new business means creating additional capacities that require personnel for their operation, the process of creative destruction initiated by the new entries does not

[20] Crowding-out effects may occur in the output market because the entrants gain market shares, as well as in the input market due to the new businesses' demand for resources, resulting in scarcity of inputs and increasing factor prices.

necessarily result in higher employment; indeed, it could just as likely lead to a decline in employment.

There are, however, several ways new business entry can stimulate improvements on the supply side of the regional economy that may, in turn, lead to improved competitiveness and higher employment levels. The main supply-side effects of entry include securing efficiency by contesting established market positions, acceleration of structural change, amplified innovation, and greater variety of products and problem solutions (for a more detailed exposition, see Fritsch, 2008). These *supply-side effects* are why one should expect positive employment effects from new business formation.[21] However, these positive effects will not manifest in the absence of a survival-of-the-fittest market environment. If this condition is not met and the actual market mechanism somehow forces the relatively efficient firms to exit and allows the inefficient firms to survive, economic competitiveness will wane.

Empirical analyses of the employment effect of new business formation show that the effect can be spread over a period of about a decade. Some studies find considerable between-region variation in the overall effect of new business formation on economic development. For example, Fritsch and Mueller (2004, 2008) and van Stel and Suddle (2008) show that the effects are more pronounced and, particularly, more positive in agglomerated areas than they are in rural regions.

[21] The emergence of the supply-side effects of new business formation does not necessarily require the newcomers to be successful and to be able to survive. As long as entry induces improvements on the side of the incumbents, it will generate positive supply-side effects even if most of the new businesses fail and have to exit the market just shortly after entry. Therefore, even the failed start-ups may also make a significant contribution to the improvement of competitiveness.

Fritsch and Mueller (2008) also find that the overall effects of start-ups on employment in high productivity regions are generally positive but that new business formation can have a negative effect in low productivity areas. This clearly suggests that in certain regions, new business formation may lead to a decrease, instead of an increase, in employment. Negative overall effects of new business formation on employment are also found by Mueller et al.(2008) for Scotland and Wales as well as for those regions of Great Britain that are characterized by a relatively low start-up rate. Van Stel and Suddle (2008) identify an overall negative impact of new business formation in the rural regions of The Netherlands. Acs and Mueller (2008) compare effects between Metropolitan Statistical Areas (MSAs) in the United States which have a relatively high share of rapidly growing companies ('gazelles') and the rest of the regions of their sample and find that the start-ups in the gazelle regions produce larger employment effects.

According to the above results, it is not at all obvious that new business formation will have a positive impact on regional economic development. Sometimes it does; sometimes it does not. That much, at least, is clear. What is not so clear is what causes this variation, which is our next avenue of exploration.

2.3 What Determines the Magnitude of the Regional Employment Effects?

The above theories and explanations as to how new business formation affects regional development give rise to the idea that a considerable part of any growth is due to the challenge the new businesses pose to incumbents. This challenge and incumbent firm reaction to it can be seen as one of the key determinants of the supply-side effects of new business formation. By extension, then, we may expect that the greater

this challenge is, the larger the overall effects initiated by the establishment of a start-up are. Hence, the extent to which the *quality of the new business* poses a challenge to incumbents should be an important factor. Quality can manifest in many dimensions, of course, including the innovativeness of goods and services, the efficiency of production, the entrepreneur's qualifications, the amount and quality of resources available to the venture, even the marketing strategy pursued. Hence, it does not take a very big leap of the imagination to think that a well-prepared innovative entry poses a much stronger challenge to incumbents and, therefore, has the potential to make a considerably larger impact on overall employment than a purely imitative start-up run by an unqualified person unable to acquire sufficient capital or appropriate personnel.

The innovativeness of regional entries, which constitutes one important aspect of their quality as explained above, may critically depend on the characteristics of the regional environment, such as the *availability of important resources* (e.g., venture capital, supportive services, qualified labor), the *regional knowledge base* (innovation activity of regional firms, presence and quality of universities, and other public research institutes), and the *intensity of the regional knowledge spillovers*. As the incumbent firms in the respective region also benefit from these factors, their presence does not necessarily lead to higher survival chances of newcomers and higher direct employment effects. However, high-quality entry and a high-quality response from the incumbent should produce relatively pronounced supply-side improvements that result in correspondingly high employment growth.

A number of these possible determinants of high-quality start-ups should be more pronounced in agglomerations than in other regions, particularly remote rural areas. For example, agglomerations are often

characterized by a large supply of qualified labor and other inputs, they tend to have a rich knowledge base due to being home to universities and other kinds of research institutions, and the chance of knowledge spillovers is greater due to a higher number of innovative actors (for an overview, see Schroeter, 2009). Empirical research clearly supports these suppositions. For example, it has been found that the share of qualified labor, measured as employees with a university degree, is relatively high in agglomerations (Glaeser, 1999; Florida, 2005). Also, the number and the share of start-ups in knowledge-intensive and in high-tech industries tends to be relatively high in agglomerations (Audretsch et al., 2006, p. 87–90; Bade and Nerlinger, 2000; Schroeter, 2009). This larger share of high-quality entry should also contribute to a high intensity of competition and market selection in agglomerations, leading to relatively large employment effects of new business formation processes.

Another important feature of agglomerations is that their high density of economic activity results in a correspondingly high degree of competition, i.e. more firms demanding similar inputs or supplying goods and services on the same market. This high level of competition may facilitate the process of market selection and stimulate the performance of the surviving firms.[22] Hence, high density areas should be characterized by a relatively high level of competitiveness due to high entry rates and rigorous market selection.

Regions in which most of the incumbent businesses are characterized by a relatively high *productivity level* can be expected to

[22] This conjecture regarding the relatively high level of competition in agglomerations is supported by empirical analyses that find a higher level of start-ups (Brixy and Niese, 2006; Fritsch and Falck, 2007), but a lower probability of survival (Fritsch et al., 2006; Weyh, 2006), in these areas.

experience a less severe decline in employment due to the displacement effects of entry as compared to regions where a high share of the suppliers fall in the low productivity range. Moreover, incumbent firms operating close to the efficiency frontier may be better able to react to the need for improvements, thereby generating stronger supply-side effects if challenged by entries compared to the performance of low productivity suppliers (Aghion et al., 2009). It, thus, may be expected that the supply-side effects in high productivity regions will be more significant than they are in regions with a relatively low level of productivity.

Prosperous *economic conditions* in a region, as reflected by a strong rise in demand and a low unemployment rate, may be especially conducive to the survival of new businesses and to pronounced direct employment effects. However, a prosperous environment can also result in a scarcity of resources and high factor prices, which impede the development of start-ups.

A region with a high *share of small businesses* may imply a favorable environment for start-ups, particularly with regard to the availability of inputs, as compared to a region dominated by large firms that tend to pay higher wages and provide better career opportunities for their personnel (Brixy et al., 2007). However, the small firm sector may comprise a relatively high share of suppliers which are less competitive than larger firms so that supply-side effects in regions with high shares of small firm employment may be relatively small. Contestability of market position and survival probability may also be shaped by *the type of technological regime* that prevails in the industry and region (Audretsch, 1995, pp. 39–64; Winter, 1984). In an entrepreneurial regime where small firms play an important role in innovation processes, it should be easier for newcomers to mount a

serious challenge to incumbents than it would be in a routinized regime where large firms have the innovative advantage. Accordingly, new business formation can be expected to be an important determinant of growth in an entrepreneurial industry or region but to a much lesser degree in an industry or region that is routinized. Although the theory of technological regimes was originally developed for industries, it is also applicable to geographical units of observation (Audretsch and Fritsch, 2002; Fritsch and Mueller, 2006). Empirical research shows that an industry's mode of production in a particular location may be specific and distinct from the type of production found in other regions.[23] This implies that the technological regime of an industry is not necessarily invariant over space, but that there may be important differences that can lead to divergent regional performance.

The above discussion makes clear that the effects of new business formation will not be identical in all regions; indeed, considerable variation across space should be the norm. The employment effects of new business formation will probably be larger in high density regions that have a high level of productivity and a large share of high-quality entries, abundant resources, and a well-functioning innovation system. They will be much smaller or even negative in low productivity regions that have a high share of low-quality entries, a scarcity of relevant resources, and a routinized technological regime.

It would be unrealistic to expect the marginal effect of entry on regional growth to be of about the same magnitude at all levels of new

[23] Saxenian's (1994) study of the U.S. computer industry in both the Boston area and Silicon Valley provides an illustrative example of such different regional regimes in an industry.

business formation activity; rather, the marginal effect of additional start-ups should decrease. One cause for decreasing marginal effects of new business formation could be a declining average quality of start-ups that will occur if high-quality business ideas have a relatively high probability of being realized and if the potential number of high-quality start-ups in a region is limited. Another reason could be the increasing cost of creative destruction caused by the reallocation of resources initiated by newcomers.

2.4 Data and Empirical Approach

2.4.1 Data

Our analysis of the effect of new business formation on regional economic development over time is at the spatial level of planning regions (*Raumordnungsregionen*). Planning regions are comprised of at least one core city and the surrounding area. The advantage of planning regions, as compared to districts (*Kreise*), is that they can be regarded as functional units in the sense of traveling-to-work areas and that they account for economic interactions between districts. Planning regions are slightly larger than what is usually defined as a labor market area. A district, on the other hand, may be comprised of a single core city or a part of the surrounding suburban area (for the definition of planning regions and districts, see Federal Office for Building and Regional Planning 2003). We restrict the analysis to the planning regions of West Germany and exclude East Germany for two reasons. First, the time series of available data for East Germany is much shorter than for the Western part, beginning in the year 1993. Second, many analyses show that developments in East Germany in the 1990s were heavily shaped by its transition to a market economy and, therefore, it is

a rather special case that should be analyzed separately (e.g., Kronthaler, 2005). It was also necessary to exclude the Berlin region from our analysis due to changes in the definition of that region after the unification of Germany in 1990.[24] Moreover, start-ups and employment in agriculture and fishery, energy, mining, railways, and postal services are excluded because of the highly regulated market conditions in these industries.

The data used in this study stem from the Establishment History Panel which is based on official Employment Statistics and comprise information on all establishments that have at least one employee subject to obligatory social insurance (see Spengler, 2008, for a description). Start-ups in which the owner is the only actor are not included. In order to avoid distortions caused by new large subsidiary plants of incumbent firms, new establishments with more than 20 employees in the first year of their existence are not counted as start-ups.[25] Other data are taken from various publications of the German Federal Statistical Office.

New business formation activity is measured by the yearly start-up rates calculated according to the labor market approach; namely, the number of start-ups per period is divided by the number of persons in the regional workforce including unemployed persons (in thousands) at the beginning of the respective period. An important adjustment was made to control for the fact that not only does the composition of

[24] For historical reasons, the cities of Hamburg and Bremen are defined as planning regions even though they are not functional economic units. To avoid possible distortions, we merged these cities with adjacent planning regions (Hamburg with the region of Schleswig-Holstein South and Bremen with Bremen-Umland). Therefore, we have 71 regions in our sample.

[25] The share of new establishments in the data with more than 20 employees in the first year is rather small (about 2.5 percent).

industries vary considerably across regions, the relative importance of start-ups and incumbent enterprises also varies systematically across industries. For example, start-up rates are higher in the service sector than in manufacturing industries. This means that the relative importance of start-ups and incumbents in a region is confounded by the composition of industries in that region. This would result in overestimating the level of entrepreneurship in regions that are home to a large number of industries for which start-ups play an important role, and underestimating the role of new business formation in regions that are home to a high share of industries characterized by relatively low start-up rates. To correct for the confounding effect of the regional composition of industries on the number of start-ups, a shift-share procedure was employed to obtain a sector-adjusted measure of start-up activity (for details, see Audretsch and Fritsch, 2002, Appendix). This sector-adjusted number of start-ups is defined as the number of new businesses in a region that could be expected if the composition of industries were identical across all regions. Thus, the measure adjusts the raw data by imposing the same composition of industries upon each region. Our analysis shows that this procedure leads to somewhat clearer results and higher levels of determination than the estimates using the non-adjusted start-up rate. However, the basic relationships are left unchanged. Table A-1 in the Appendix A provides descriptive statistics for the variables used in the analysis.

According to our data, on average 107,356 new businesses were founded every year during the 1980–2002 period. The majority of the start-ups (76.5 percent) were in the service sector, whereas 20.9 percent and 2.6 percent occurred in manufacturing and other

industries,[26] respectively. Most new businesses were set up in agglomerations (57.6 percent); only 10.6 percent were located in rural regions. The start-up rate was calculated according to the 'labor market' approach as the number of new businesses per year divided by the number of employees and unemployed persons (per 1,000) at the beginning of the respective period.[27] There were about 8.74 new businesses per 1,000 employees in West Germany during the period of 1980 to 2002.

2.4.2 Empirical Approach

To identify and to analyze regional differences in the employment effects of new business formation, we employ a robust fixed effects estimator. Our indicator of regional development is the *average employment change* (percentage) over a two-year period. A two-year average is used in order to avoid disturbances caused by short-term fluctuations. The regional differences of the effects of start-up activity on employment change are estimated by the regression:

$$\begin{aligned}&\text{Average employment change}_{r,t\ \text{to}\ t+2} = a + b_1 \cdot \text{average start-up rate}_{r,\ t\text{-}1\text{to}\ t\text{-}10}\\&+ b_2 \cdot \text{average start-up rate}^2_{r,t\text{-}1\text{to}\ t\text{-}10} + b_3 \cdot \text{variable I}_{r,t\text{-}1} + b_4 \cdot \text{variable I}_{r,t\text{-}1} \cdot\\&\text{average start-up rate}_{r,\ t\text{-}1\text{to}\ t\text{-}10} + b_5 \cdot \text{variable II}_{r,\ t\text{-}1} + b_6 \cdot \text{variable II}_{r,t\text{-}1} \cdot\\&\text{average start-up rate}_{r,\ t\text{-}1\text{to}\ t\text{-}10} + \text{industry shares}_{r,\ t\text{-}1} + \text{time dummies} + u_{r,\ t}\end{aligned}$$

[26] The 'other industries' comprise agriculture, forestry, and fishery (SIC codes 01–09); energy and water supply (SIC code 49); mining (SIC codes 19-14); and construction (SIC codes 15–17).

[27] This kind of start-up rate is based on the notion that each member of the workforce as well as every unemployed person can choose between working in someone else's business or starting his or her own firm. As start-ups are usually located close to the founder's residence (Mueller and Morgan, 1962; Stam, 2007), size of the regional workforce including unemployed persons is an appropriate measure of the number of potential entrepreneurs. According to the labor market approach, the entry rate may be interpreted as the propensity of a member of the regional workforce to start one's business.

where *r* indicates the regions and *t* time. The *average start-up rate* is calculated as mean over a period of 10 years from *t-1* to *t-10*. A period of 10 years is used in order to account for the relevant long-term effects that have been found in recent analyses (Fritsch, 2008). We also include the squared value of the start-up rate to account for a nonlinear relationship with employment change. If the marginal effect of new business formation on regional employment is declining with the number of start-ups, the coefficient for the average start-up rate should be positive, whereas the coefficient for its squared value should be negative. Several further variables that may determine regional growth and that could also be responsible for differences in the employment effects of start-ups such as population density, the qualification of the workforce, labor productivity, and the regional level of innovation activity (see section 2.4.3) are included, as are the interactions of these variables with the start-up rate. All independent variables are lagged by one year.

The estimated coefficients of the start-up rates and of the potential growth determinants indicate their direct influence on employment change. The coefficients of the interaction terms can be regarded as a measure of the impact that the respective variable has on the employment effect of the new businesses. This makes it possible to distinguish between the direct effects of several regional characteristics and the impact that these potential determinants of regional growth may have through new business formation activity. As an example, note that in our data employment in agglomerations grew less than in the other types of regions during the period under inspection. Therefore, the coefficient for population density should be negative. However, a number of studies on the employment effects of new businesses find that the employment gain due to start-ups is higher in agglomerations than in other areas (section 2.3). This effect is measured by the

interaction of the start-up rate with population density. If new businesses in agglomerations do, indeed, have a larger positive impact on regional employment, the coefficient for this interaction variable should be positive (see Brambor et al., 2006).

In order to account for the influence of industry structure on employment growth (Glaeser et al., 1992; Peneder, 2002; Combes, 2000), we also included the employment shares of 27 out of 28 aggregated private industries into our model. Year dummies control for special influences of certain years as well as for time trends. Since local employment growth may also be driven by the geographic proximity to other markets, we included a Harris-type potential function, which is a distance-weighted sum of total employment in all other regions (Redding and Sturm, 2008; Südekum, 2008) that shall also control for spatial autocorrelation.

Models with interaction terms should always also include the respective variables in their non-interacted form. The regression coefficients for the non-interacted variables can, however, not be interpreted directly. The reason is that these coefficients do not represent the unconditional or average effect of the respective variable but the result of a one-unit change in the independent variable on the dependent variable *if* the value of the conditioning variable (in our case the variables indicating the potential determinants of growth) assumes a zero-value. However, if the conditioning variable does not have the value of zero, the coefficients need to be calculated for the relevant values (Brambor et al., 2006). For our model with the start-up rate and a further variable, the marginal effect of new business formation on employment change is:

$$\frac{\text{Average employment change}_{r,\ \text{to } t+2}}{\text{average start} - \text{up rate}_{r,\ t\text{-}1 \text{ to } t\text{-}10}} = b_1 + 2 \cdot b_2 \cdot \text{average start} - \text{up rate}_{r,\ t\text{-}1 \text{ to } t\text{-}10} + b_4 \cdot \text{variable I}_{r,\ t\text{-}1}$$

For continuous variables, marginal effects are difficult to discern in table format; figures are much better suited for illustrating the marginal effect of the independent variable across a substantively meaningful range of values.

2.4.3 Further Determinants of Regional Growth and Employment Effects of New Businesses

We tested the following variables; any or all of which may be responsible for regional growth and the effect new business formation has on employment change (cf. Table 2-1).

Population density indicates the advantages as well as the disadvantages of being located in an agglomeration. Among the chief advantages (agglomeration economies) are the availability of large, differentiated labor markets and specialized services, proximity to research institutions, a large demand, and a high level of regional knowledge spillovers (see Duranton and Puga, 2004 for an overview on agglomeration economies). The main disadvantages of agglomerations (agglomeration diseconomies) include the higher cost of resources such as labor and floor space, more intense local competition, and a variety of congestion-related problems (Glaeser, 1998). There is a considerable degree of correlation between population density and a number of other regional characteristics, such as qualification of the workforce, regional income level, and labor productivity. Population density can, therefore, be viewed as a sort of ‘catch all’-variable for local conditions. However, recent empirical studies suggest a negative

employment development trend in German agglomerations (Kowalewski and Niebuhr, 2008). Hence, we expect a negative growth impact of density. Opposed to that, Fritsch and Mueller (2004, 2008) as well as van Stel and Suddle (2008) found much more pronounced employment effects of start-ups in agglomerations than in moderately congested or rural regions. We, therefore, assume a positive effect of density on the employment effects of new business formation. Since the *qualification of the workforce* is one of the basic determinants of economic growth (Lucas, 1988), we suggest that the regional share of high and medium skilled workers has a positive influence on employment growth.[28] Concerning the employment effects of start-ups, the qualification level of the regional workforce may also be relevant in several aspects. First, assuming that new businesses are set up by members of the regional workforce,[29] the share of highly qualified workforce may imply a large share of high-quality start-ups, which in turn exert strong pressure on incumbents. Second, workforce quality can be seen as a measure of the availability of certain qualifications in a region that may be important to the success of new businesses. Third, regional workforce qualifications can be a reflection of the human capital employed in incumbent firms and provide a clue as to how these firms will react to the challenge of a new entrant, thus influencing, albeit indirectly, the effects of new business formation. We, thus, expect a positive relationship between this variable and the employment effects

[28] A positive growth effect of human capital has been confirmed in several studies, particularly for the US, showing a robust positive correlation between the initial employment share of college educated workforce and subsequent total employment growth in MSAs. See Glaeser et al. (1995), Simon and Nardinelli (2002) as well as Shapiro (2006) for the US and Südekum (2008) for Germany.

[29] Empirical analyses (Mueller and Morgan, 1962; Cooper and Dunckelberg, 1987; Stam 2007; Michelacci and Silva, 2007) provide clear evidence that the majority of new businesses are set up near to the founder's residence.

of new businesses. We test two measures of regional workforce qualification: the share of employees with a tertiary degree and the share of employees with a medium level of qualification (skilled labor).[30]

The *regional share of R&D employees provides* an indicator of the regional efforts in knowledge creation and exploitation, which are the main drivers of technological change and, hence, regional economic growth (Romer, 1986, 1990). Therefore, we expect regions with higher shares of R&D employees to grow faster than other regions. Moreover, the regional endowment with R&D employees might have an impact on the employment effects of start-ups in two ways. First, since new knowledge that is created but left unexploited by established firms and organizations is a major source of innovative entrepreneurial opportunities (Audretsch, 1995; Acs and Plummer, 2005; Audretsch et al., 2006), high R&D intensity in a region may lead to a respective large share of high-quality or innovative entrepreneurship. As the innovativeness of new businesses reflects the challenge they impose on incumbents to implement improvements in order to stay competitive, high-quality start-ups are likely to induce larger employment effects, particularly larger supply-side effects, than other new ventures (Baptista et al., 2008; Baptista and Preto, 2010; van Stel and Suddle, 2008; Falck, 2007; Fritsch and Noseleit, 2009b; Engel and Metzger, 2006). Second, a high share of R&D employment may also indicate a high ability of the incumbents to react to the challenges of start-ups in innovative ways resulting in relatively pronounced improvements on the supply-side of the regional economy.

[30] Included in the medium qualification level are all employees who have vocational training or a high school diploma but no university degree.

The *regional unemployment rate* serves as an indicator of the region's general economic conditions and is obviously negatively related to employment growth. In addition, it can influence the propensity to start a new business as well as its effects. First, a high share of unemployed persons may indicate low levels of local demand and unfavorable conditions for those start-ups that produce mainly for the local market. Second, high unemployment may stimulate new business formation by unemployed persons. Third, high unemployment implies readily available and relatively cheap labor. As these three possible effects of unemployment on start-ups work in different directions, it is unclear a priori what the net-effect will be. We distinguish between short-term (up to one year) and long-term (more than one year) unemployment, expecting a positive influence of short-term unemployment on the effects of start-ups and a negative impact of long-term unemployment. The idea behind this conjecture is that the share of persons who are unemployed for less than one year does not necessarily imply an unfavorable economic environment but may be a reflection of regular labor market dynamics. We also expect that persons who have been unemployed for a short time are more likely to start their own business than those who have been out of work for a longer time period, possibly due to the latter suffering human capital ramifications, which would also affect their intent and their capability to start a business.

Regional labor productivity indicates a region's competitiveness and is measured as gross value added per employee. There is a pronounced positive relationship between this variable and the level of wages and income. We assume that high regional labor productivity and competitiveness, respectively, should also lead to relatively larger employment growth (Shapiro, 2006). As explained in section 2.3, we

expect that high labor productivity in a region will also be conducive to the employment effects of start-ups due to lower displacement and stronger supply-side effects.

Small firm presence is defined as the share of employees in establishments having less than 50 employees. We expect that a regional environment in which small businesses play a considerable role may be more favorable for survival and growth of start-ups than a regional economy with a high employment share of large establishments, which may particularly dominate the regional factor markets. However, if larger firms tend to be more competitive than smaller firms, regions with high shares of large firm employment may experience more pronounced supply-side effects. Hence, the overall influence of small firm presence on the effects of entries is a priori unclear.

The prevalent *technological regime* is used to discern the importance of small establishments to a region's R&D activity (Audretsch, 1995; Winter, 1984). It is measured by the proportion of R&D employees in establishments with less than 50 employees over the share of R&D employees in total employment.[31] A technological regime is called 'entrepreneurial' if a high share of innovation activity is conducted by small firms; in this environment, entrants have a relatively good chance to compete successfully. In a 'routinized' regime, the incumbent large firms have the innovative advantage, thus reducing the survival probabilities of smaller firms.

[31] Acs and Audretsch (1987) introduce an output-oriented measure for the technological regime. In their approach, it is the number of innovations per employee introduced by small firms (with less than 500 employees) as compared to the number of innovations per employee in all firms.

Table 2-1 Definition of the variables and expected signs for their interaction terms with new business formation

Variable	*Definition*	*Expected sign*
Start-up rate	Number of start-ups in a region over the regional workforce[a]	+
Population density	Number of inhabitants in a region per square kilometer (log)[c]	+
High education level	Share of employees in a region with a university degree[a]	+
Medium education level	Share of employees with secondary degree and/or vocational training (skilled labor)[a]	+
R&D employees	Share of employees with tertiary degree working as engineers or natural scientists [a]	+
Unemployment rate	Share of unemployed persons in the regional workforce[b]	+/-
Short-term unemployment rate	Share of persons in the regional workforce who have been unemployed for less than one year[b]	+/-
Long-term unemployment rate	Share of persons in the regional workforce who have been unemployed for more than one year[b]	-
Labor productivity	Gross value added[c] per employee[a] in a region	+
Small business presence	Share of employees in small-sized private-sector businesses (< 50 employees) in a region[a]	+/-
Entrepreneurial regime	Share of R&D employees in establishments with less than 50 employees over the share of R&D employment in total employment in the respective region, industry, and year[a]	+

Sources: [a] Social Insurance Statistics; [b] Federal Employment Services; [c] Federal Statistical Office

2.5 Results

In a first step of the analysis, we estimate the effect of new business formation on regional employment change without accounting for other variables that may shape this relationship (model I in Table 2-2). We find a statistically highly significant positive coefficient for the average start-up rate and a strongly significant negative coefficient for the squared term indicating an inverse u-shaped relationship. This means that the effect of new business formation on employment change is at first positive with decreasing marginal effects and then, after a maximum is attained, it decreases. The pattern implies that there are decreasing marginal returns for a policy that attempts to boost the regional level of start-up activity in an effort to stimulate employment and that the effect of an increasing start-up rate on employment could even be negative in regions where the level of new business formation is already rather high.[32] The negative sign for the constant term indicates that without any new business formation regional employment change would have been negative.

Including population density into our model reveals a negative direct impact on employment change but a positive effect of the interaction with the start-up rate (model II). The negative effect as such indicates a below average employment growth in agglomerations. According to the positive coefficient of the interaction term, the effect of start-ups on employment increases with regional density. This confirms the results of Fritsch and Mueller (2004, 2008) and van Stel and Suddle (2008), who find that the effects of new business formation are more

[32] This inverse u-shaped pattern does not result from observations with relatively extreme values. The respective coefficients remain quite stable when such outlier regions are removed from the sample.

pronounced in agglomerations than in moderately congested or rural regions. Since population density has a rather dominating effect, this variable is always included in the further analysis. According to our expectations, a region's share of highly qualified employees exerts a strongly positive influence on regional employment growth (model III). Surprisingly, it has no significant impact on the employment effect of start-ups, which is perhaps a result of the pronounced correlation between this indicator and population density. However, there is a significant direct and indirect effect for the share of employees with a medium education level (model IV), indicating the importance of medium skilled workforce for employment growth, particularly for growth of new businesses. In Germany, medium skilled workers tend to possess completed apprenticeships, post-secondary education, and considerable on-the-job-experience. Their regional availability might, therefore, be particularly important for the success and growth of start-ups which typically do only seldom employ personnel with an academic degree. The regional share of R&D employees exerts a positive effect on employment creation by new business (model V). This supports our conjecture that innovation activity may foster the emergence of high-quality start-ups and that high R&D levels can also stimulate innovative responses of the incumbents to the challenges exerted by newcomers.

Since a high unemployment level is related to relatively poor employment performance of a region, the negative coefficients for the direct effects of the unemployment rate in model VI is hardly surprising. Distinguishing between short-term and long-term unemployment (model VI and VII), we find that a high level of short-term unemployment seems to negatively influence the employment effects of start-ups while the coefficients for the long-term unemployment rate remain insignificant.

Table 2-2 Regression results

Variable	I	II	III	IV	V	VI	VII	XIII	IX	X	XI
Start-up rate	0.091***	0.058**	0.060***	0.079***	0.056***	0.042**	0.101	0.051	0.050**	0.064**	0.110***
	(5.38)	(2.87)	(3.02)	(2.85)	(2.77)	(2.33)	(1.60)	(0.69)	(2.43)	(3.26)	(3.93)
Start-up rate squared	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.005*	-0.004	-0.002***	-0.001**	-0.003***
	(4.39)	(3.63)	(3.24)	(3.61)	(0.45)	(2.87)	(1.85)	(1.20)	(3.47)	(2.15)	(3.77)
Population density (log) (POP)		-0.034	-0.011	0.025	0.026	-0.051	0.125	0.042	-0.002	0.073	-0.064
		(0.27)	(0.10)	(0.21)	(0.21)	(0.45)	(0.86)	(0.29)	(0.01)	(0.59)	(0.47)
POP * start-up rate (log)		0.005***	0.003*	0.004**	0.003*	0.004***	0.012*	0.017**	0.004***	0.004***	0.002
		(3.68)	(1.73)	(-2.23)	(1.95)	(3.15)	(1.88)	(2.59)	(3.49)	(2.91)	(1.41)
High education level (HEL)			1.947**								
			(2.60)								
HEL*start-up rate			-0.018								
			(0.44)								
Medium education level (MEL)				0.555**							
				(2.32)							
MEL * start-up rate				0.028**							
				(2.18)							
R&D Employees (RDE)					-1.077						
					(1.45)						
RDE * start-up rate					0.123*						
					(1.79)						

Table 2-2 continued

Variable	I	II	III	IV	V	VI	VII	XIII	IX	X	XI
Unemployment rate (U)						-0.961***					
						(3.39)					
U * start-up rate						0.006					
						(0.28)					
Short-term unemployment rate (STU)							0.349				
							(0.48)				
STU * start-up rate							-0.153*				
							(1.73)				
Long-term unemployment rate (LTU)								0.042			
								(0.03)			
LTU * start-up rate								-0.153			
								(0.94)			
Labor productivity (LP)									0.555		
									(0.64)		
LP * start-up rate									0.06		
									(0.67)		
Small business presence (SBP)										0.095	
										(0.43)	
SBP * start-up rate										-0.038*	
										(1.98)	

Table 2-2 continued

Variable	I	II	III	IV	V	VI	VII	XIII	IX	X	XI
Entrepreneurial regime (ER)											0.131**
											(2.09)
ER * start-up rate											-0.012
											(1.62)
Market potential	0.132**	0.124**	0.094*	0.114*	0.098*	0.053	0.072	0.034	0.125**	0.034	0.137**
	(2.03)	(2.18)	(1.81)	(1.91)	(1.77)	(1.01)	(1.11)	(0.48)	(2.44)	(0.48)	(2.19)
Constant	-2.660***	-2.656***	-2.044**	-2.965***	-2.239**	-1.211	-3.083***	-1.923	-2.490**	-1.918*	-2.509***
	(3.23)	(2.90)	(2.24)	3.39)	(2.32)	(1.44)	(3.13)	(1.58)	(2.63)	(1.90)	(2.73)
Control for industry composition	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]	Yes[a)]
Year dummies	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***	Yes***
Pesaran test	0.315	0.461	0.358	0.610	0.159	0.555	0.699	0.755	0.715	0.429	0.661
	(0.247)	(0.645)	(0.720)	(0.542)	(0.874)	(0.579)	(0.354)	(0.301)	(0.475)	(0.668)	(0.509)
R squared (adj.)	0.65	0.73	0.84	0.83	0.83	0.84	0.92	0.92	0.75	0.80	0.76
Log-Likelihood	2,442	2,457	2,477	2,463	2,463	2,490	1,989	1,999	2,467	2,469	2,206

Notes: First row: estimated coefficient; second row: t-value or level of significance (Pesaran test), respectively. *Statistically significant at the 10 percent level; **statistically significant at the 5 percent level; ***statistically significant at the 1 percent level; [a)] jointly significant at the 1 percent level.

According to our estimation results, regional labor productivity has neither a statistically significant direct nor an indirect effect caused by new businesses on employment change (model IX). A significantly negative coefficient is found for the interaction of the start-up rate with the indicator of small business presence (model X), suggesting that regions with relatively high shares of small firm employment tend to draw lower employment growth from new business formation than regions with a high employment share in larger firms. While the measure of the entrepreneurial character of the regional technological regime indicates a positive direct effect on employment change, the coefficient for the interaction term remains insignificant. The statistically positive coefficient for the market potential variable indicates that spatial proximity to a high number of inhabitants and, thus, potential customers is conducive for regional employment growth. A test for cross-sectional dependence (Pesaran, 2004) did not indicate any significant remaining spatial autocorrelation in our models.

Models with more than two additional variables other than the start-up rate did not lead to meaningful results which may be caused by severe multicollinearity problems since these models contain the start-up rate more than four times. Several other variables proved not to be statistically significant including the presence of academic and non-academic research institutions, the number of patents per employee, and the regional share of workforce in occupations classified as ‘creative’ (Florida, 2005).

To shed more light on the two main findings of the regression analysis – the decreasing employment impacts of start-up rates and the dominating effect of population density – we calculate the marginal effects of these variables on the employment change that is induced by the start-ups. The marginal effects, which are based on the regressions

reported in Table 2-2, allow us to determine the impact of start-ups on employment at different levels of the start-up rate and various degrees of population density.

Figure 2-1 shows the employment effects of new businesses dependent on the level of the start-up rate. The dashed lines represent the upper and lower bound of the 95 percent confidence interval. The effect of the start-up rate on employment change is significant at the 5 percent level whenever the upper and lower bounds of the confidence interval are both above (or below) the zero line. Figure 2-1 demonstrates that the significantly positive employment effects of new businesses decline when the start-up rate increases and even become negative when the average start-up rate exceeds a value of 17, which is the case for only one out of the 71 regions in our sample[33]. This means that start-ups have a relatively strong positive impact on employment in regions with low levels of new business formation activity and that the marginal returns of new business formation in terms of additional employment decrease with rising start-up rates. If new business formation activity exceeds a certain level, it will have a significantly negative effect, leading to a decrease in employment. Thus, efforts to stimulate new business formation above a certain level are counterproductive, at least as far as employment levels are concerned. This finding accords with the notion that there is an optimum 'equilibrium' number of businesses in a certain industry or region at a particular stage of development (Audretsch et al., 2002; Carree et al., 2007) and that in excess of this equilibrium may hamper economic growth.

[33] The respective region is the planning region "Oberland" south of Munich. Many of the start-ups recorded in this region may be relocations out of the prospering Munich region.

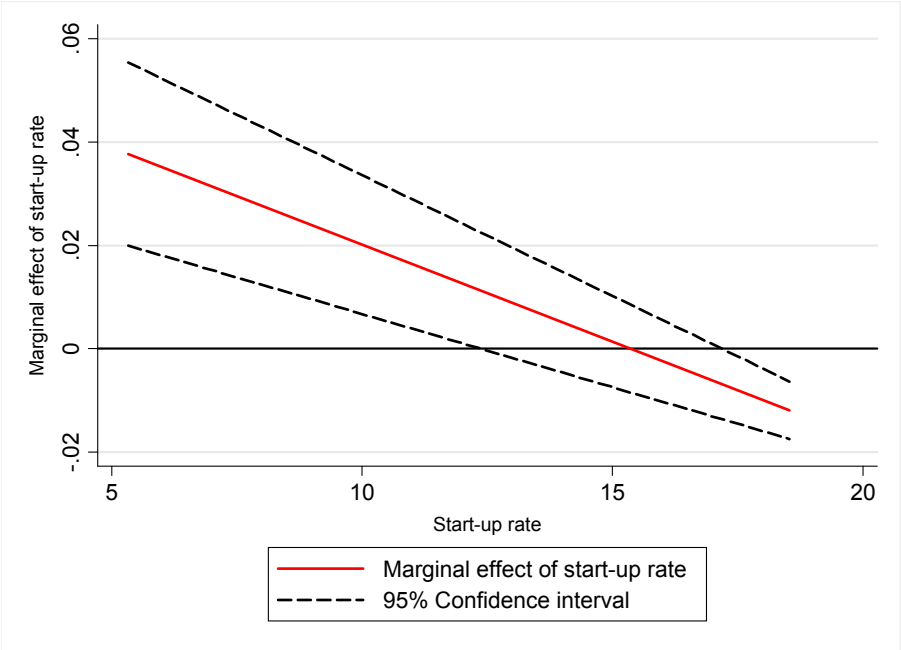

Figure 2-1 Marginal effect of start-up rate on employment change in West German regions

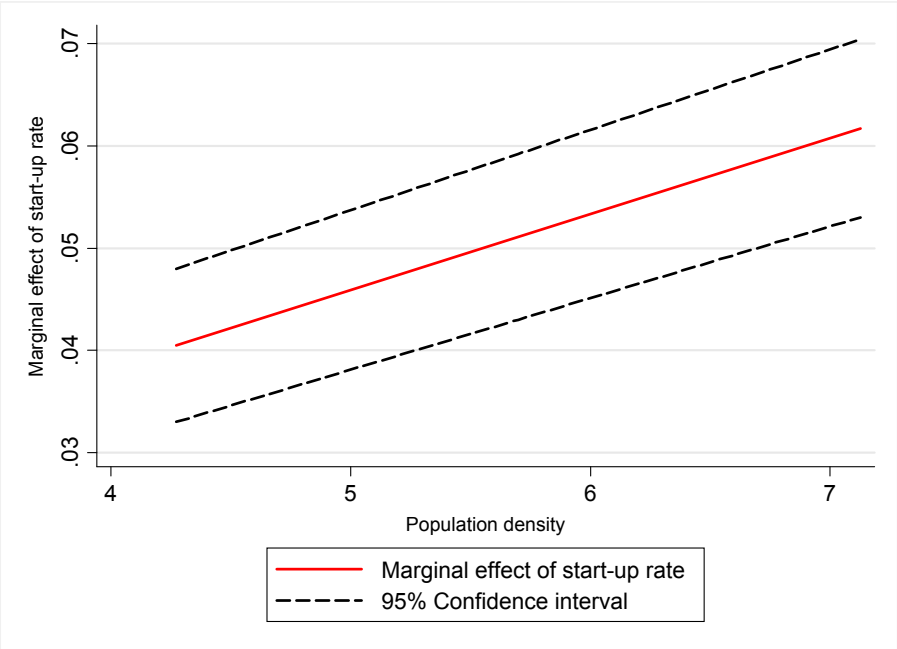

Figure 2-2 Marginal effect of start-up rate on employment change in West German regions for a changing population density

Figure 2-2 displays the marginal effect of the start-up rate on employment change dependent on the degree of agglomeration. The marginal impact of new business formation strongly increases with population density, indicating the highest employment effect on start-ups in agglomerations. This finding confirms the results of Fritsch and Mueller (2004, 2008) as well as those of van Stel and Suddle (2008), who found that the employment effects of new businesses are considerably more pronounced in agglomerations than in regions with a lower population density.

2.6 Conclusions

We could show that the effect of new business formation on employment varies considerably between regions. Generally, the positive effect of new business formation becomes smaller with an increasing start-up rate, indicating decreasing marginal returns for a policy aimed at stimulating regional start-up activity. This suggests that regions with a relatively low level of start-ups may benefit more from an increase in the start-up rate than the regions in which the start-up rate is already rather high will. Our analysis clearly shows that the positive effects of new business formation on employment growth are more pronounced in high density areas than in rural regions. Moreover, regions with a large share of medium skilled workers and a high level of innovative activity benefit significantly more from new business formation than do other regions. Although the total unemployment rate seems to be unimportant, a high share of short-time unemployed has a negative influence on the employment effect of start-ups. Moreover, the growth impact of new businesses turns out to be negatively related to the employment share in small establishments. The regional share of highly-skilled employees, labor productivity as well as the

entrepreneurial character of the technological regime are insignificant factors when it comes to the employment growth effects of new business formation.

We offer the general conclusion that start-ups tend to make a positive contribution to regional employment but that the size of the effect may vary considerably depending on regional characteristics, the most significant of which is population density. This implies that policies aimed at stimulating new business formation with the hoped-for result of employment growth will be most effective in high density areas with a relatively low start-up rate, a high share of medium-level skills, and a high share of innovation activity. The same policy will be relatively ineffective, and possibly even harmful to employment growth, in rural areas with high start-up rates.

Given the limited number of regions in our sample, some caution is necessary when interpreting the results. We have made a good start at identifying some of the key variables that govern the effects of small business formation on employment, but other approaches, particularly regional case studies, are necessary for a thorough exploration of the effects. For example, we were able to control for the effect of start-up quality only rather indirectly by using indicators such as qualification level of the regional workforce which turned out to be statistically significant. Better, more direct indicators of start-up quality, when or if such become available, could increase confidence in the findings reported here and result in better quality and more direct policy making.

3 Are More Start-Ups Really Better? Quantity and Quality of New Businesses and Their Effect on Regional Development[34]

3.1 Introduction

It is widely believed that new businesses lead to economic growth and to an increase in employment (for an overview see Carree and Thurik, 2003). Consequently, a main focus of entrepreneurship policy in nearly all countries is to increase the number of start-ups (e.g., Audretsch et al., 2006; Lundström and Stevenson, 2005). But are more start-ups really better for economic development than fewer start-ups?

Recent research has shown that in most regions new business formation does, indeed, have a positive long-term effect on economic development, but there are also regions which simultaneously have relatively high levels of new business formation and below average growth rates or where the effect of start-ups on employment is even negative (Audretsch and Fritsch, 2002; Mueller et al., 2008). Some recent analyses (Fritsch and Schroeter, 2010a; Bosma et al., 2010) find that the marginal employment effect of a rising regional start-up rate is decreasing and may even become negative at a certain level of new business formation.

In this paper, we propose a model that is able to explain these observations. Based on an overview of empirical findings about the effect of new business formation on regional employment (section 3.2), we first review the available theories that might explain why the growth

[34] This chapter is largely based on Fritsch and Schroeter (2010b): Are more start-ups really better? Quantity and quality of new businesses and their effect on regional development.

enhancing effect of start-ups decreases with their increasing number (section 3.3). Our assessment shows that these theories are not well suited to explain this empirical result. In particular, we argue that the market-'overcrowding' approach, which dominates the respective literature, is not appropriate in the case of innovative start-ups. The model that we develop in section 3.4 is based on the assumption that start-ups may considerably differ with regard to their quality and that new businesses of different quality can have diverging effects on regional growth. Moreover, we introduce the costs of creative destruction, which is caused by the entry of new competitors and the resulting turbulence. Our model can explain why the marginal effect of a rising number of new businesses on regional employment growth is decreasing and how this effect may even become negative. In particular, our model implies that a higher number of start-ups is not necessarily better for regional growth, but rather that the quality of new businesses is of crucial importance for their effect on economic development. Based on our model, we deal with possible reasons for differences in the effect of new businesses formation on economic development (section 3.5) and discuss a number of policy implications (section 3.6).

3.2 Recent Empirical Evidence on the Effect of New Business Formation on Employment

Recent empirical studies on the effect of new business formation on employment (see Fritsch, 2008, for an overview)[35] are at a regional

[35] Acs and Mueller (2008); Arauzo-Carod, Liviano-Solis, and Martin-Bofarull (2008); Audretsch and Fritsch (2002); Baptista, Escária, and Madruga (2008); Carree and Thurik (2008), Fritsch and Mueller (2004, 2006, 2008); van Stel and Storey (2004); Mueller et al. (2008); van Stel and Suddle (2008).

level because an analysis at the level of industries leads to serious difficulties in the interpretation of the results. The reason is that if industries follow a life cycle, then the number of entries and the start-up rate will be relatively high in the early stages of the life cycle when the industry is growing and it will be relatively low in latter stages when the industry is stagnant or declining (Klepper, 1996). Obviously, the resulting positive correlation between the start-up rate and the development of industry employment in subsequent periods may be considerably shaped by the industry life cycle and cannot be unequivocally regarded as an effect of entry on development. Indeed, entirely different results are found if, for example, the relationship between the level of start-ups and subsequent employment change is analyzed on the level of regions and on the level of industries (see Fritsch, 1996). Therefore, geographical units of observation are much better suited for such an analysis than industries.

It has been shown in recent research that the effect of new business formation on economic development is rather long-term in nature and evolves over a period of up to ten years.[36] The way in which the entry of new competitors shapes the development of a region can be interpreted as a challenge-response interaction that leads to a process of creative destruction as already described by Joseph A. Schumpeter (1942). Several effects of new business formation on employment may be distinguished:[37]

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[36] Acs and Mueller, 2008; Andersson and Noseleit, 2010; Arauzo-Carod et al., 2008; Audretsch and Fritsch, 2002; Baptista et al., 2008; Baptista and Preto, 2010; Bosma et al., 2010; Dejardin, 2010; Fritsch and Mueller, 2004, 2006, 2008; Koster, 2010; van Stel and Storey, 2004; Mueller et al., 2008; van Stel and Suddle, 2008).

[37] The effects of entry on regional development are exemplified here with employment change as indicator of economic development. Because information on regional employment is more easily available than information on regional GDP, this

- *First*, the setting up of new businesses leads to an employment increase obviously because extra personnel are needed to operate the additional capacities (*direct employment effect)*.

- *Second*, competition between the new and the incumbent businesses on input as well as on output markets spurs market selection. As far as this market selection process works according to a 'survival of the fittest' scenario, the least productive firms have to reduce their level of economic activity or must exit the market (*displacement effect*). Because such a scenario leads to an increase in average productivity, employment should decrease if output remains at a constant level. Hence, although starting a new business means creating additional capacities that require personnel to operate them, the effect of new business formation on the number of jobs in the economy does not necessarily need to be positive but could just as well be negative.

- *Third*, the competition between new businesses and the incumbents may lead to improvements in the supply-side of the economy that result in higher competitiveness.[38] The main *supply-side effects* of entry could be

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variable has been used in nearly all of the recent empirical analyses of the issue. Carree and Thurik (2008) have shown that the same pattern of effects results for GDP change as an indicator for development.

[38] These improvements may occur on the side of the start-ups as well as on the side of the incumbents. The emergence of these improvements, therefore, does not necessarily require newcomers to be successful and survive. As long as entry induces improvements on the side of the incumbents, it will generate positive supply-side effects even if most of new businesses fail and have to exit the market shortly after entry. Therefore, even the failed start-ups may also make a significant contribution to the improvement of supply and competitiveness.

These supply-side effects are rather indirect in character and are not necessarily limited to the industry to which a start-up belongs, but rather may also occur in

- *securing efficiency* and stimulating an increase in productivity by contesting established market positions;
- *acceleration of structural change*, e.g. incumbents are substituted by newcomers;
- *amplified innovation*, particularly, the creation of new markets; and
- *greater variety* of products and problem solutions.

These supply-side improvements may induce employment growth and increase welfare. They are the reason why new business formation may lead to a positive employment effect. For the emergence of these supply-side effects, it is of critical importance that market selection works in accordance with a 'survival of the fittest' scenario. If the market mechanism forced the relatively efficient firms to exit and allowed the inefficient firms to survive, the result would be a decrease in the economy's competitiveness.[39]

Empirical analyses of the employment effect of new business formation have shown that the relationship between new business formation and development is, to a considerable degree, shaped by the

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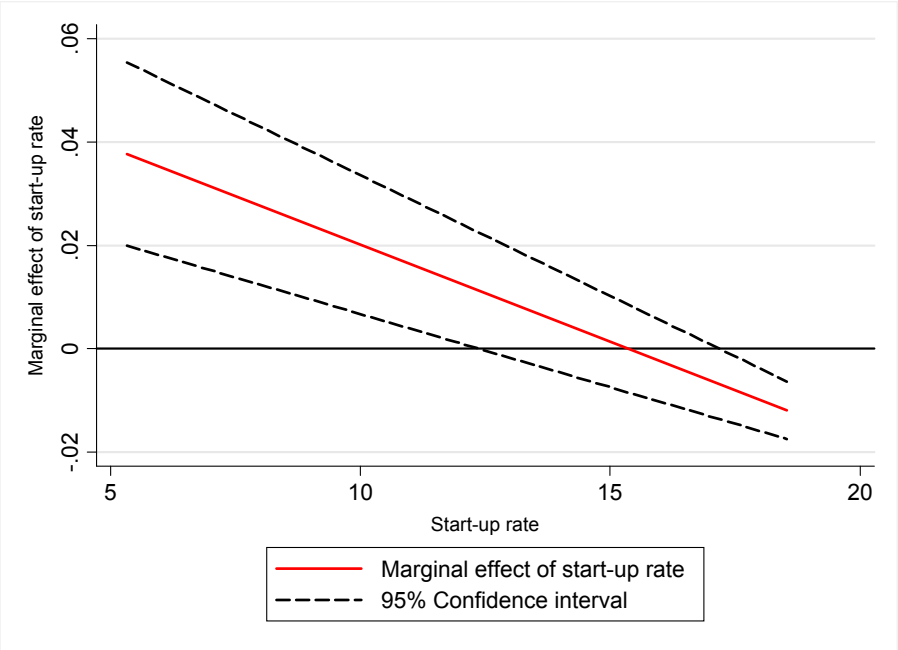
completely different industries that use the improved supply as input. For a regional analysis, it is important to note that a considerable part of the supply-side effects may occur in the industry's establishments that are located in other regions. Therefore, the size of the supply-side effect is probably underestimated, and it only focuses on development in the region where the start-ups occurred. If empirical analyses find considerable supply-side effects in the same region, this can be regarded as an indication of the importance of space in competitive processes.

[39] Empirical analyses have shown that these three effects occur during different phases. The generation of additional employment due to the creation of new businesses occurs at about the time of the establishment of the new entities. This phase is followed by a second phase in which inefficient suppliers have to exit, leading to an employment decline. The third phase, when the supply-side effects begin to occur, starts to dominate the development about five to six years after market entry (Fritsch, 2008; Fritsch and Noseleit, 2009a).

regional conditions. In particular, it was found that while many regions are able to draw substantial employment growth out of the process of new business formation, the effect may be insignificant or even negative in other regions (Fritsch and Mueller, 2008; Mueller et al., 2008; Stel and Suddle, 2008). According to Fritsch and Schroeter (2010a), the regional variation of the effect is closely related to population density which can be regarded as a catch-all indicator for a multiplicity of regional conditions such as availability of resources, quality of the workforce, regional knowledge spillovers, etc. Fritsch and Schroeter (2010a) identify an inversely u-shaped relationship between the regional level of new business formation and its effect on regional development. At low levels of new business formation, the effect on employment change is positive. Increasing levels of new start-up rates are then related to a positive but decreasing marginal effect. After the maximum amount of the positive effect of new business formation on employment is attained, any further increase in the start-up rate leads to a reduction of this employment increasing effect; thus, the marginal effect even becomes negative. This suggests that there are decreasing marginal returns for a policy that attempts to boost the regional level of start-up activity in order to stimulate employment. Estimating for West German regions, Fritsch and Schroeter (2010a) find that the marginal effect of an increasing level of new business formation on regional employment becomes significantly negative with a start-up rate of above 17 new businesses per 1,000 employees in a year (Figure 3-1). An inversely u-shaped relationship between firm dynamics and total factor productivity growth has been found for the Netherlands (Bosma, et al., 2010).



Source: Fritsch and Schroeter (2010a)

Figure 3-1 Marginal effect of the start-up rate on employment change in West German regions

A number of empirical studies suggest that start-ups in manufacturing generate a stronger direct and overall employment effect than new businesses in other economic sectors (e.g., van Stel and Suddle, 2008; Fritsch and Weyh, 2006; Schindele and Weyh, 2009). This is particularly remarkable because entries into manufacturing are relatively few due to high entry barriers in terms of minimum efficient size and capital intensity. However, these high entry barriers in manufacturing may induce a higher quality of entries due to a self-selection of potential entrepreneurs.[40]

[40] Relatively strong effects of start-ups on economic development have also been found for new businesses in knowledge-intensive sectors (Baptista and Preto, 2010).

The quality of a start-up means the intensity of the challenge in terms of competitive pressure that newcomers exert on the incumbents, which is the driving force of the effect that new businesses have on economic development. The quality of a new business may be indicated by factors such as the qualification of the entrepreneur, the amount and quality of resources that are mobilized for the new business, the marketing strategy that is pursued, their productivity as well as the innovativeness of the supplied goods and services. The quality of start-ups is an important element in our model that we present in section 3.4.

3.3 Why should the Effect of New Business Formation on Regional Employment be Negative? A Review of the Literature

Reviewing the literature on the effect of market-entry, one can find two explanations for a declining marginal effect or an overall negative effect of new business formation on employment. One possible reason for a negative employment effect of entry could be that competition does not work according to a 'survival of the fittest' scenario. This means that firms with relatively low productivity will remain in the market while those with higher productivity have to reduce their output or exit. As a result, overall economic performance will decline. A possible source of such a malfunction of the market mechanism could be public interventions such as subsidies for start-ups which give them a non-performance based competitive advantage over the non-subsidized incumbents (Fritsch and Mueller, 2004). If such subsidies should, indeed, lead to an increased level of start-up activity, this could explain why the marginal effect of new business formation decreases with an increase in the start-up rate.

A second line of argument for a negative employment effect of entry is based on the notion that start-ups may lead to overcrowding in

the market and that such overcrowding leads to reduced welfare and growth. The overcrowding argument implies that there exists an optimum number of employees or of firms that can persist in a particular market for a longer period of time. This is also referred to as a market's 'carrying capacity' in the organization ecology literature (Hannan and Freeman, 1977; Carre and Thurik, 1999). Hence, if the number of competitors in a market has reached a certain threshold, long-term total employment will remain more or less constant if more firms enter.[41] A related line of reasoning presumes that there exists an equilibrium rate of business ownership and that self-employment rates that exceed this equilibrium rate[42] will be unstable and cause lower growth rates (Audretsch et al., 2002). The common explanation for entrepreneurs entering markets which are already rather crowded states that entrepreneurs may be overconfident with regard to their chances and risks (Arabsheibani, 2000; Koellinger et al., 2007). Such over-conficence seems to be, indeed, quite common among firm founders, and one may even argue that it constitutes a necessary ingredient of new ventures given the high risk of failure that would otherwise be

[41] A number of theoretical models (e.g., Chamberlin, 1933; Spence, 1976a,b; Dixit and Stiglitz, 1977; Mankiew and Whinston, 1986; Sutton, 1991; Anderson et al., 1995) can be found in the literature in which market entry may lead to a deadweight loss of social welfare or to an efficiency decline. This negative effect may especially occur if entry is related to high fixed or sunk costs and if the market size is constant. Empirical evidence for this argument has been found in studies of the US movie theaters (Davis, 2006) and the radio broadcasting industry (Berry and Waldvogel, 1999). Like the concept of carrying capacity, these models are rather static in character and are based on the assumption that entry is entirely imitative or that new products are complete substitutes for the old products, resulting in newcomers having to "steal business" from the incumbents in order to survive. Davis (2006) in his study on the effects of market entry in the US cinema market found evidence that high-quality entry leads to market expansion, suggesting that the net effect of entry is positive.

[42] Carree et al. (2002) introduce a model that derives an equilibrium relation between the business ownership rate and the level of economic development in a country. The equilibrium rate of business ownership is defined as a function of GDP per capita and is found to be u-shaped.

deterrent to entry (ibid). Excessive entry can occur in markets with low barriers to entry (e.g., certain service industries) or if public subsidies are available that lead to reduced costs of venture creation. Founders of such businesses might be especially those individuals who face relatively low opportunity costs, e.g. due to being unemployed.

Excessive entry and market overcrowding may cause different kinds of costs which are to a large extent external to newcomers. Such costs of creative destruction can, for example, arise from excessive production, which drives output prices below their equilibrium level (Parker, 2007). Moreover, the relatively high factor demand may bid up input prices (Manove and Padilla, 1999). If supply in the market requires high sunk costs, firms will tend to stay in the market even if the costs of production cannot be fully covered. Hence, competition may become ruinous and lead to reduced welfare. A negative welfare effect of overcrowding may also occur because many ventures stay relatively small; thus, scale economies remain unexploited and resources could have been allocated more productively (Carree et al., 2002, 2007). In general, excessive entry and subsequent exit lead to relatively high costs of creative destruction in terms of transaction costs, costs of adjustment on financial and labor markets as well in terms of sunk costs in the event of an exit (see section 3.4 for a detailed description of these costs).[43]

The market-'overcrowding' approach has a number of shortcomings in explaining a negative marginal effect of new businesses on regional economic growth. First, it does not explain a

[43] In case of a business-ownership rate below the equilibrium level, the 'growth penalty' results from a relatively low level of competition that leads to losses of static and dynamic efficiency of the economy (Audretsch et al., 2002; Carree et al., 2002).

decreasing marginal effect in a constellation where the number of firms is below the optimal level. If the number of firms in a market is below the optimum, additional entries should more likely lead to an increase in regional welfare (e.g., due to the benefits of more intense competition) than to a decrease. Hence, the curve of the marginal growth effect of entry can be expected to first rise and then fall as the number of regional start-ups increases. Second, many markets are geographically much larger than a region or a country; therefore, it may appear doubtful to define an optimal number of firms for a certain region. Third, the assumption that a market has a given carrying capacity that underlies the market overcrowding argument holds, however, mainly for non-innovative entry and is not or only to a much lesser degree valid for innovative new businesses. The reason is that the volume of market demand depends on the characteristics of a good and on its price, which is mainly determined by the respective costs. Assuming a given carrying capacity this implies unvarying product characteristics as well as constant costs, i.e. non-innovative entry. For innovative entry, a market's carrying capacity is not well defined and can hardly be predicted with any certainty. Therefore, the notion of excessive entry and overcrowding makes only limited sense, particularly if the new venture is based on product innovation.[44] The argument is even questionable for non-innovative entry in the event that the response of the incumbents to the newcomers' challenge includes an innovation.

[44] For a process innovation, the variation of the market volume may be predicted on the basis of the variation of the product price and the respective price elasticity. Such a prediction of the market volume is much more difficult in case of product innovation, especially if the new product creates a completely new market. Theoretical arguments (Cohen and Klepper, 1996) as well as empirical evidence suggest that the great majority of innovative new businesses are based on product innovation, not on process innovation.

In a nutshell, the existing economic literature suggests that a negative effect of new business formation on economic development may result from market overcrowding caused by over-optimism of founders and excessive entry. This market-'overcrowding' approach could especially explain why the marginal effect of new business formation decreases with a rising level of start-up activity. However, the argument is mainly relevant for non-innovative, low-quality start-ups that exert no or only slight pressure on the incumbents. In case of innovative entry or of an innovative reaction of incumbents, the carrying capacity of the respective market can only hardly or not at all be defined so that the overcrowding argument does not apply. Hence, a negative employment effect of new business formation may be especially expected if there is a high level of non-innovative entry. Distortions caused by public subsidies may be relevant, but they cannot explain why the marginal employment effect of new business decreases with an increase in the start-up rate.

3.4 A Model of Regional New Business Formation and Creative Destruction

Our model aims at explaining differences in the effect of new business formation on regional development. It compares the gross effects and the costs of creative destruction caused by market entry. The basic argument of this model is that the marginal effect of new business formation will decline with the number of start-ups because the costs of creative destruction increase more than the respective gross effects.

We begin with the *gross effect of creative destruction on regional development*, which is initiated by the entry of new businesses into the market. In reviewing recent empirical evidence about the effect of new business formation on regional employment growth (section 3.2), we

have argued that the decisive positive economic outcome is the improvement of regional competitiveness (section 3.2). We assume that this effect critically depends on the *quality of new businesses*. By quality, we mean the magnitude of the challenge that new businesses exert on the incumbents. The greater this challenge is, the more intensive the pressure on the incumbents to implement improvements in order to stay competitive must be. The quality of a new business may be given by such factors as the qualification of the entrepreneur, the effort of preparing the start-up in terms of planning, the amount and the quality of resources that are mobilized for the new business, the marketing strategy that is pursued as well as the quality and especially the innovativeness of the supplied goods and services. Obviously, start-ups may greatly differ with regard to these aspects of quality and, hence, may constitute a different challenge to the incumbents.

According to the model of entrepreneurial choice (Knight, 1921; Lucas, 1978; Holmes and Schmitz, 1990; Kihlstrom and Laffont, 1979), potential entrepreneurs compare the benefits that they anticipate to gain through dependent employment (DE*) with those they expect to accrue from self employment (SE*). These benefits may be pecuniary income as well as non-pecuniary gains such as work-satisfaction and the possibility to realize own ideas. Accounting for non-pecuniary benefits is important because a number of empirical analyses have found strong indication that the decision to start an own business can be hardly explained by pecuniary rewards alone (e.g. Carter et al, 2003; see Parker, 2009, 107-110, for an overview). The probability of setting up a new firm Pr^{su} can then be represented as:

(1) $Pr^{su} = (SE^* - DE^*)$ with $d\,Pr^{su} / d\,(SE^* - DE^*) > 0$,

i.e. the probability of setting up a new business is positively related to the expected net benefit of doing so, which works as an incentive. High-quality concepts should also have a higher probability of being realized because they may have less problems in acquiring the necessary resources such as capital. Under the assumption that high-quality business concepts have a greater expected net benefit than start-ups of a relatively low quality they should be more likely to be realized (Shane, 2001a). That high-quality business concepts have higher expected net benefits than low quality concepts (e.g., purely imitative new businesses)[45] is based on the notion that they typically involve a higher level of originality such as some kind of innovation that results in larger expected outcomes than those that can be expected from non-innovative ideas.[46]

A positive value of *(SE* - DE*)* is only a necessary but not a sufficient condition for a business idea to be realized. There are a number of reasons why not every concept with a positive expected net

[45] The notion of low quality start-ups resembles Baumols' 'replicative entrepreneurs', i.e. those founders who start a firm similar to already existing businesses (Baumol, 2005). However, low quality start-ups make up a much larger group than the replicative entrepreneurs as they also include badly prepared entrepreneurs.

[46] If the development of a high quality business idea requires investments in terms of money, time, effort and personal dedication, these prior investments can be assumed to constitute major sunk costs that might stimulate the willingness to launch a venture and to stick to the entrepreneurial endeavor (Arkes and Blumer, 1985). This corresponds to recent research that found entrepreneurial cognition and decision-making to be strongly influenced by emotions and passion (e.g., Baron, 2008; see Grichnik et al., 2010 for an overview). In particular passion, i.e. the "enthusiasm, joy and even zeal that came from the energetic and unflagging pursuit of a worthy, challenging and uplifting purpose" (Smilor, 1997, 342), has a strong motivational effect that stimulates individuals to take action, overcome obstacles and stay engaged in the pursuit of goals. Entrepreneurial passion enhances the willingness and persistence of individuals get engaged in the entrepreneurial process, to take risks involved in venture creation and to allocate more resources to the new firm (Cardon et al., 2009, 2005)

benefit will lead to the set up of a new business. For instance, the decision to start a new business is associated with a rather high level of uncertainty that may be accounted for by some deduction of the expected benefits from self employment. Moreover, a positive value of *(SE * - DE*)* will probably need to exceed a certain threshold in order to initiate action in terms of setting up a firm. This threshold should depend on factors such as the potential entrepreneur's personality (Rauch and Freese, 2007; Zhao and Seibert, 2006), particularly her or his level of risk aversion (see Ekelund et al., 2003, and the overview by Parker, 2009).

There is good reason to assume that start-ups with high expected net benefits are a rather rare event. This is particularly clear for highly innovative new businesses. It was already Schumpeter (1934) who stated that only a tiny share of new businesses is innovative while their majority is imitative. In Germany, for example, only less than 400 start-ups appeared to be sufficiently promising to Venture Capital investors to receive first-round financing in the year 2007 (BVK, 2008, p.9). Estimating the total number of start-ups in Germany in the year 2007 to be about 400,000, this is only one out of a thousand new businesses. In the USA this share is even smaller.[47] Because these high-quality start-ups tend to be concentrated in certain locations, particularly large agglomerations, there are many regions in which such a highly promising new business emerges only once every couple of years or even less frequently.

[47] Shane (2009) reports that since the year 1970 Venture Capital firms in the US have invested on average into about 820 new firms per year. According to the 2009 Yearbook of the US National Venture Capital Association, this number amounted to 1,179 in the year 2008 (National Venture Capital Association, 2009, p. 11, p. 31). Compared to more than two million new companies set up in the United States per year, this makes less than one out of two thousand.

Since new businesses are generally set up close to the founders' residence (Stam, 2007), the regional population is the dominant source of business concepts. These concepts may include ideas which have been generated somewhere else, but the potential entrepreneurs tend to be rooted in their region. Arranging business concepts of the potential entrepreneurs in a region according to their expected net benefit, starting with the most promising concept, results in a curve that converges to very low positive values of expected net benefit (Figure 3-2). If actors behave as rational utility maximizers, business concepts with a negative expected return will not be implemented.

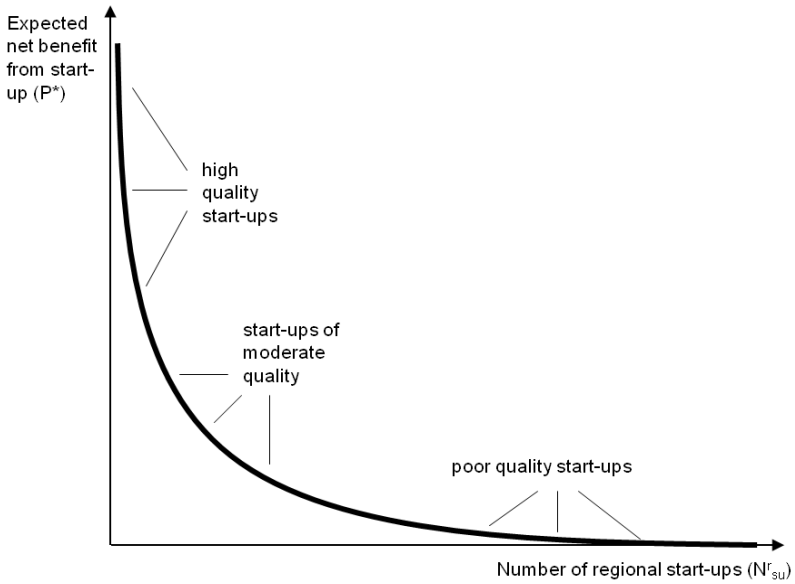


Figure 3-2 Expected net benefits from a start-up and the number of start-ups

Our assumption that the probability for a business concept to be realized is higher the greater the expected net benefits implies that policy measures that aim to increase the number of regional start-ups by lowering administrative hurdles or by subsidizing new businesses will particularly stimulate low quality start-ups that are not or rarely

competitive and, thus, are rather likely to fail relatively soon after entry. Hence, within such a 'revolving door-regime' high entry and exit rates will not yield improvements of employment or productivity; rather, they represent a largely unproductive churning at the fringe of the market (Audretsch and Fritsch, 2002). Assuming the regional supply of business concepts as given, every increase in the number of regional start-ups ups (N_r^{su}) leads to a decline in the average expected net benefit NB_r* of the start-ups, which are realized in a region (r), i.e.

(2) $d\overline{NB}_r^* / dN_r^{su} < 0$.

We further assume that the *gross effect* (GE_r) of creative destruction on regional development depends on the quality of the realized business concepts. High quality start-ups will induce strong gross effects by challenging established market positions (cf. also section 3-2). In contrast, for low quality start-ups supplying similar products and using about the same technology, the gross effect should be close to or equal to zero. According to recent empirical studies the effects of new business formation on regional development emerge over a period of several years (cf. section 3-2). Assuming that the quality of business concepts is closely related to their expected net benefits, this implies that an increase in the number of start-ups leads to higher gross effects on regional development but that the marginal gross effect will be decreasing, i.e.

(3) $dGE_r / dN_r^{su} < 0$.

Hence, given the limited number of high-quality start-ups, the regional gross effect of new business formation in a region converges towards an upper limit (UL_r) as the number of start-ups increases (Figure 3-3), i.e.

(4) $\lim_{N_r^{su} \to \infty} GE_r = UL_r$.

This does not imply that the gross effect of a purely imitative entry is always zero because contesting an established market position may induce an efficiency increase or even product innovation on the side of the incumbents. Convergence of the gross effect towards zero means, however, that this effect becomes weaker with the number of imitative entries. Hence, increasing the number of start-ups beyond a certain limit will not lead to any additional gross effect for regional development.

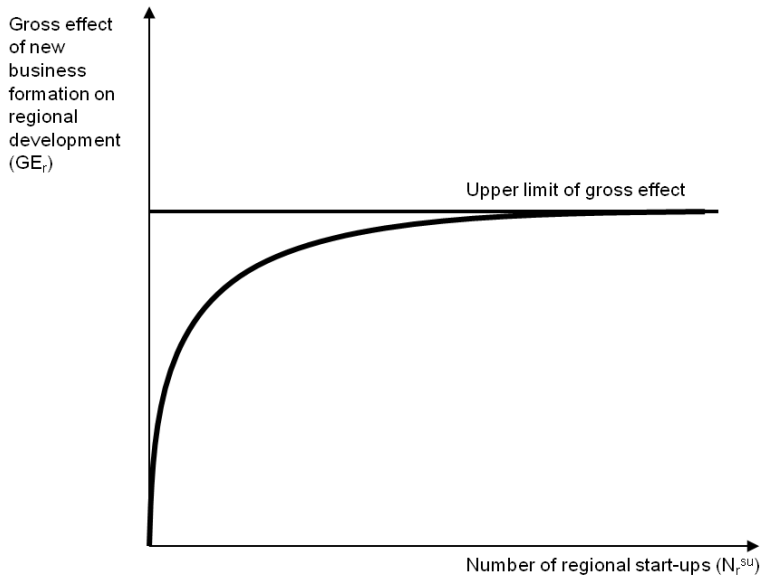


Figure 3-3 Number of start-ups and gross effects from new business formation

The *regional costs of the creative destruction* (C_r^{CD}) comprise two main sub-categories: costs for temporary excess capacities built up by the newcomers in order to contest the markets of incumbents as well as the costs for reallocating resources. Costs of excess capacities comprise not only the resources spent for not fully utilized capacities but also unrealized economies of size in production. The costs for

reallocating resources occur because real markets do not function as efficiently and costless as the textbook model asserts. Rather, market turbulence is always disruptive with regard to, among others, customer relations, supply chains, social networks, and the labor market and leads to revaluations of resources. Hence, creative destruction causes substantial costs for individuals and firms as well as for the economy as a whole (Caballero and Hammour, 1998; Robinson et al., 2006). The reallocation costs of creative destruction particularly involve:

a) The transaction costs of starting a venture. These include all kinds of effort caused, e.g. by establishing relationship with suppliers and customers, by hiring personnel and acquiring necessary financial resources, by contract negotiations and obtaining legal advice as well as by entry regulation such as effort for business registration and for obtaining permits (Djankov et al., 2002).

b) Sunk costs of firm-specific investments on the side of the incumbent and / or the start-up, such as market-specific knowledge, R&D investment, specific machinery, firm-specific qualification of the personnel as well as investments in the relationships to suppliers, to customers, and to other partners in a firm's network that are no longer useful. This also includes the transaction costs that other actors have invested into the relationship of the exiting firm. Moreover, in the event of bankruptcy, closure may involve unpaid debt.

c) Transaction costs that emerge in form of expenses for business deregistration and as contract penalties owed to non-compliance of stipulations.

d) Welfare losses for the economy as a whole that may result from under-utilization of resources such as frictional unemployment and

the respective lower income of laid-off personnel as well of losses that may result from cutthroat competition.[48]

Due to these different kinds of costs, creative destruction not only has positive but also negative effects on regional output and employment. Since large parts of these costs are external to newcomers,[49] entrepreneurs do not account for these externalities in their decision to enter a market so that no internal mechanism exists which prevents a negative net-effect of new business formation that occurs if the regional costs of creative destruction (C_r^{CD}) exceed the respective gross effect (GE_r).

Like the regional gross effects (GE_r).of new business formation, the regional costs of creative destruction also relate to a longer time period. It is plausible to assume that the costs of creative destruction increase with the number of regional start-ups, i.e.

(5) $dC_r^{CD} \;/\; dN_r^{SU} > 0$.

There is no upper limit to these costs as the number of start-ups increases because every additional entry, regardless of its quality, will generate at least some extra effort. The costs of creative destruction may considerably differ between start-ups according to the size of a venture and the displacement effects that it causes. They should be

[48] Non-utilized capacities and unrealized size economies lead to reduced productivity and may cause less pronounced supply-side effects of new business formation (section 3-2).

[49] For a successful entry, the costs summarized under a) are completely internal while the costs mentioned under c) are completely external and the costs under b) and d) are to the largest part also external. For an unsuccessful newcomer, the costs under a) and c) are completely internal, the costs under b) will be basically internal and the costs under d) will be for the most part external.

higher for high-quality and innovative start-ups as compared to low-quality and purely imitative new businesses for several reasons. First, intensive preparation of a venture requires resources and probably market-specific investment that will be sunk if the start-up fails. Second, if an entry is innovative, it may require intensive marketing and R&D effort, a considerable part of which will be sunk in case of failure. Third, high-quality and innovative start-ups that intensely challenge the incumbents will probably induce stronger displacement effects than entries of lower quality. If, as we have assumed, the average quality of entries in a region decreases with the number of entries, the marginal costs of creative destruction should also be decreasing, i.e., $(dC_r^{CD} \ / \ dN_r^{CD})' < 0$ as is shown in Figure 3-4.

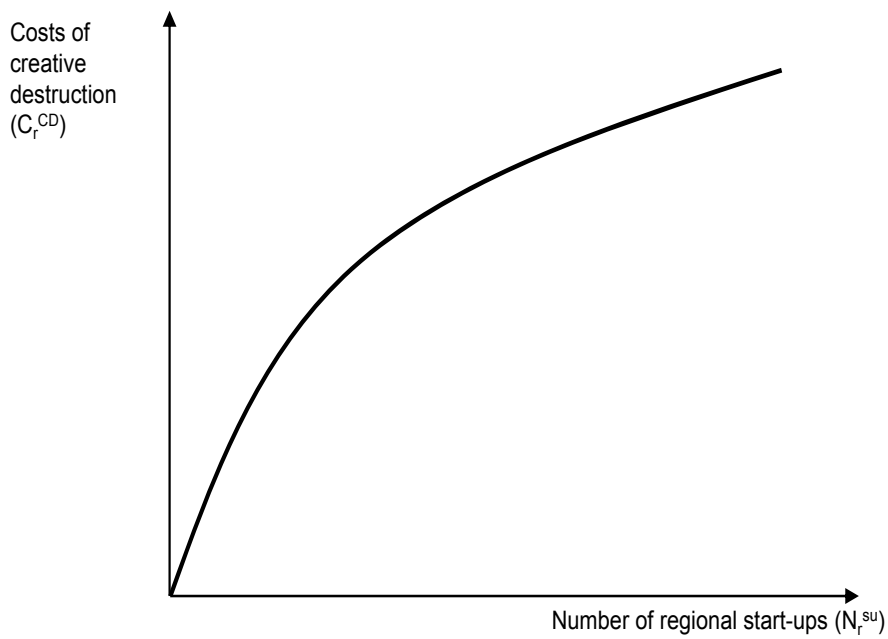


Figure 3-4 Number of start-ups and costs of creative destruction

The net effect (NE_r) of regional new business formation is the gross effect minus the respective costs of creative destruction,

(6) $NE_r = GE_r - C_r^{CD}$.

A positive net effect from new business formation in terms of economic development occurs if the gross effect is higher than the related costs. Since the costs of creative destruction increase with the number of start-ups while the gross effect converges towards an upper limit, both curves intersect at a certain number of start-ups (Figure 3-5).

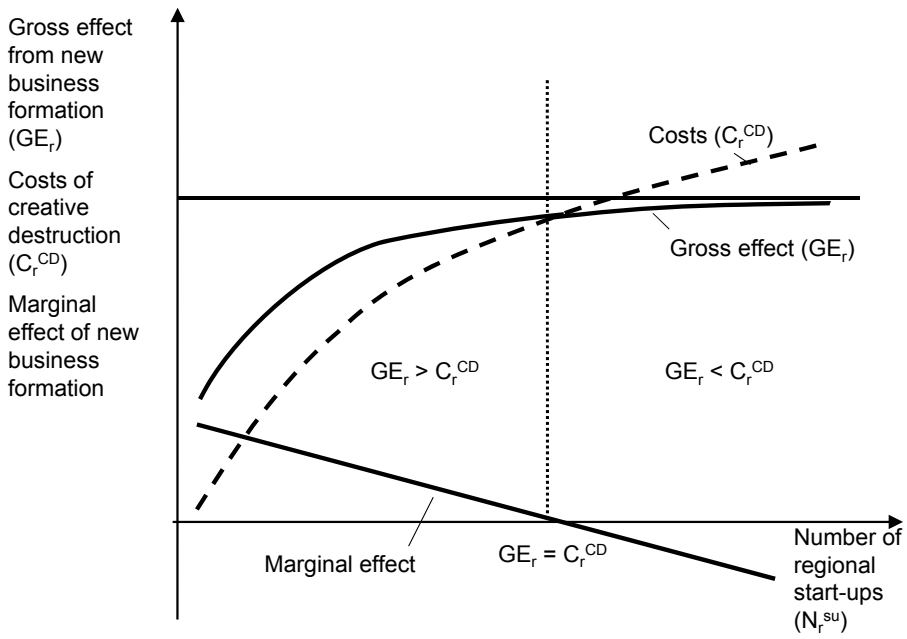


Figure 3-5 Gross effect and marginal effect of new business formation on regional development, cost of creative destruction, and number of start-ups

Any further increase in this number would lead to a negative marginal net effect of new business formation because the marginal costs of creative destruction exceed the marginal gross effect.[50] We conclude

[50] As far as the costs of creative destruction lead to lower regional productivity, the decrease in the marginal effect of new business formation on regional development should be more pronounced for growth measured in terms of GDP than in terms of employment.

that, from the perspective of economic growth, there can clearly be too many start-ups in a region.[51]

Is it plausible that start-ups occur which lead to negative net effect for economic development, e.g. a decline in GDP or in employment? According to our model, such start-ups with a negative marginal effect on regional growth may, indeed, occur because the motivation of starting a business is based on expected private returns while a large part of the gross effects (GE_r) as well as of the costs of creative destruction (C_r^{CD}) are external to the founder. If, for example, a start-up challenges the incumbents and has to exit the market because the incumbent firm reacts by supplying a superior and economically more successful solution, the benefit for the founder may be negative while there is a pronounced positive effect in terms of improved competitiveness for the regional economy. Likewise, if an entry is successful and displaces an incumbent, the costs of creative destruction, e.g. exit of competitors, must not be borne by the founder of a new business. Since the largest part of the regional costs and effects of new business formation are external to the founder, there is no reason why the factual number of start-ups should be equal to the socially desirable number of entries. Moreover, as already mentioned in section 3.3, the number of entries may exceed the optimal level because many entrepreneurs tend to be over-optimistic with regard to the prospects of their venture. There is no mechanism in our model that steers the number of entries towards the optimal level.

[51] For an alternative model to explain excess entry by low-quality entrepreneurs, see Parker and Praag (2010).

Summarizing the results attained so far, we can state that our model can explain the observation that the marginal effect of new business formation on regional employment decreases with the number of start-ups (cf. section 3.2). The main policy implications are rather obvious:

- First, a policy that tries to increase the number of start-ups by lowering the administrative hurdles or by subsidizing new businesses will particularly stimulate low-quality start-ups that have only a small positive or even a negative marginal effect on economic development (Greene et al. 2004). Such a strategy may lead to a revolving door regime characterized by "early failures, and precarious and temporary job creation" (Santarelli and Vivarelli, 2007, p. 464) instead of innovation and, thus, substantial and sustainable economic growth.

- Second, since the effect of new business formation on regional development critically depends on the quality of start-ups, a growth-oriented policy should try to stimulate the quality of start-ups, not their mere number (Santarelli and Vivarelli, 2007; Piergiovanni and Santarelli, 2006; Shane, 2009). This suggests a focus on high-quality innovative business concepts. Such a strategy may particularly require major investments in human capital, which constitutes the essential precondition for high-quality entrepreneurship. Hence, improving the general knowledge and the skills of the regional workforce should lie at the heart of every growth-oriented entrepreneurship policy (Piergiovanni and Santarelli, 2006).

In a nutshell, our model provides a theoretical underpinning for a policy that fosters the quality instead of the quantity of new business formation in order to create economic value and growth.

3.5 Interregional Differences in the Effect of New Business Formation

Regions may differ considerably with respect to their economic potential such as the number entrepreneurs. In order to make meaningful interregional comparisons with regard to new business formation, it is common practice to relate the number of start-ups to this economic potential. According to the so-called labor market approach, the number of employees is taken as a denominator of a start-up rate. The start-up rate according to the labor market approach can also be regarded as the probability of a member of the regional workforce to set up a firm in a given period. This view corresponds to the basic model of entrepreneurial choice, which we applied at the outset of our model in section 3.2. For the purpose of interregional comparisons, we now focus on start-up rates. The net effect of new business formation is measured as the rate of regional growth. Hence, we relate two variables that can be compared across regions regardless of differences in the economic potential of these regions.

3.5.1 Differences in the Quality of Start-ups and Different Regional Growth Regimes

As we have argued above, the quality of the start-ups may be an important source of regional differences in their effect on employment growth. This is illustrated in Figure 3-6. While high-quality start-ups are more or less completely missing in region I, there are some high-quality ventures in region II and several in region III. Accordingly, the growth

effect of new business formation is much higher in region III as compared to the other two regions as shown in Figure 3-7. The assumption of varying qualities of new businesses among regions is confirmed by empirical studies which have found a larger share of start-ups affiliated with knowledge-intensive and high-tech industries in agglomerated regions than in moderately congested and rural areas (Audretsch et al., 2006; Bade and Nerlinger, 2000; Schroeter, 2009).

Another possible reason for the varying scale of the effect of entry among regions is the differences in the characteristics of the regional growth regimes, particularly differences in the characteristics of the region-specific competitive process. The regional growth regime is the set of institutional and economic conditions which has an effect on regional development. One main element is the type and the intensity of competition of regional firms with businesses within and outside the respective region. This can pertain to a number of issues such as the type of market selection ('survival of the fittest' versus 'survival of the less productive'), the most important parameters for competition (e.g., price versus product quality), a region's technological regime (entrepreneurial versus routinized) as well as the intensity of competition on input and on output markets. One may well expect that a relatively high level of competition will spur market selection and will ultimately lead to a relatively high economic competitiveness of the surviving entrants and the surviving incumbent businesses. Hence, a new business of a certain quality could lead to different employment effects in the framework of different regional growth regimes. The curves I, II, and III in Figure 3-7 could also represent the employment effect of start-ups of a given quality under the conditions of different regional growth regimes. In this example, region III has the greatest effectiveness in transforming the challenges of entry into growth.

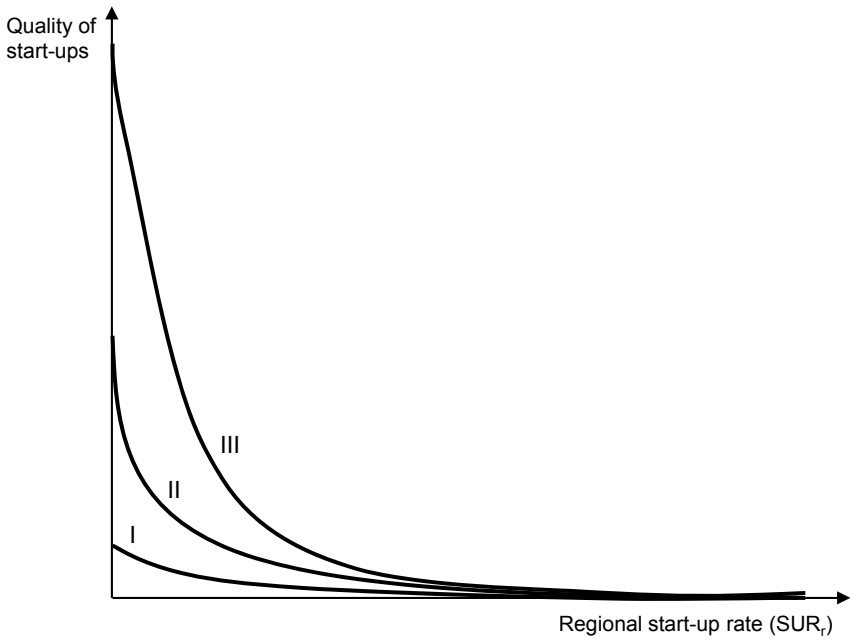


Figure 3-6 Regional differences in the quality of start-ups

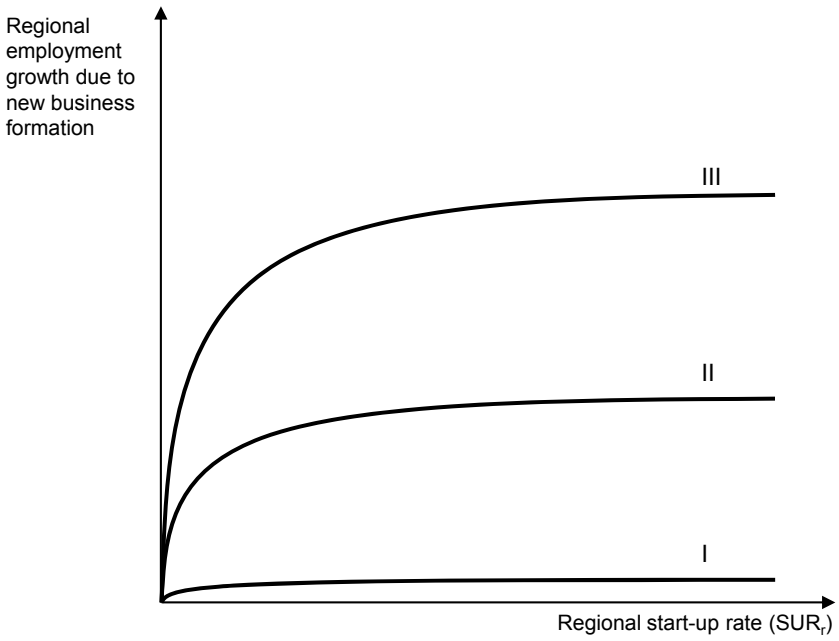


Figure 3-7 Regional differences in the effect of start-ups on growth

Empirical research has shown that the effect of new business formation may largely differ between regions and that region-specific factors play an important role in this respect (see for example Fritsch and Schroeter, 2010a). However, we still know only rather little about the reasons for such regional differences. A factor that turned out to have a rather dominating influence on the employment effect of start-ups in empirical analyses is population density. Hence, curve III in figure 7 could represent the agglomerations, curve II the moderately congested areas, and curve I the rural regions. In the next section, we discuss possible reasons why population density can have such a strong influence.

3.5.2 Why is the Effect of New Business Formation on Employment Growth Higher in Agglomerations?

There is strong empirical evidence that the effect of new business formation on employment is much more positively pronounced in agglomerations than in moderately congested areas and in rural regions (Fritsch and Mueller, 2004, 2008; Fritsch and Schroeter, 2010a; van Stel and Suddle, 2008). Schroeter (2009) argues that the greater employment effect of an entry in agglomerations mainly emanates from a relatively larger share of high-quality start-ups in those areas in addition to the relatively intense competition.

The relatively high share of innovative, high-quality start-ups that can be found in many agglomerations may be explained by the special resource endowment and other characteristics of high-density areas. Following the view that entrepreneurship is a process of perceiving opportunities and transforming these opportunities into ventures that create economic value and growth (Shane, 2000; Shane and Eckhardt, 2003), the quality of new businesses should vary across regions

depending on the pool of innovative opportunities as well as on the quantity and quality of resources available to implement these opportunities (Shane, 1996; Acs and Armington, 2004). Compared to moderately congested areas and rural regions, agglomerations offer relatively favorable conditions for the creation, dissemination, and exploitation of innovative opportunities, which is reflected in a higher share of high-quality start-ups. These characteristics include a rich resource base, a high level of innovation activity, a great diversity of economic activities as well as close spatial proximity of actors that fosters knowledge spillovers and learning. A relatively high average quality of start-ups in agglomerations may also result from a higher education level (e.g., a higher share of persons with a tertiary degree) of the members of the regional workforce, which represent the potential entrepreneurs (Schroeter, 2009).

Another important feature of agglomerations is the relatively high intensity of competition due to the greater number of firms demanding similar inputs or supplying goods and services to the same regional market. Therefore, market selection should be particularly intense in agglomerations, causing – if the market works according to a survival of the fittest scenario – a relatively strong supply-side effect of entry that is likely to be reflected in a larger employment growth in these areas. This supposition is supported by empirical studies that have found a higher level of start-ups (Fritsch and Falck, 2007) but a lower probability of survival in agglomerations as compared to areas with a lower density of economic activity (Engel and Metzger, 2006; Weyh, 2006). A higher intensity of competition and higher resource costs in agglomerations may, however, also lead to higher costs of creative destruction in these areas. The empirical evidence of more pronounced net effects on new business formation in high-density areas does, however, suggest that in

most of these regions these higher costs are overcompensated by a better ability to transform the impulses of entry into regional growth.

3.6 Summary and Conclusions

Recent empirical research suggests that the marginal effect of new business formation on regional employment declines with an increasing level of start-up activity and that the marginal effect can even become negative for particularly high rates of entry. The main explanation of this phenomenon that can be found in the literature is based on the notion of market 'overcrowding'. This approach is, however, rather unsatisfactory for two reasons. First, it cannot explain a decreasing marginal effect of entry in constellations where the number of the suppliers on a market is below the optimum. Second, the approach holds only for non-innovative entries but not for innovative new businesses.

We proposed a model which is able to explain the decreasing marginal employment effect of start-ups by comparing the regional gross effects and the regional costs of new business formation. Assuming that the regional effects of entry critically depend on the quality of the new firms, we argue that quality and, hence, the economic gross effect of new businesses decline with their number. Since the reallocation costs that are associated with entry and creative destruction increase more than the respective gross effect, the marginal net effect of new business formation declines as the number of start-ups increases, and it may even become negative if the costs of creative destruction outweigh the gross effects. This implies that the level of new business formation in a region may be 'too high' from the perspective of economic growth.

Furthermore, our model suggests that there are two main sources of interregional differences in the effect of new business formation on employment. The first factor is different qualities of start-ups. The quality of start-ups pertains to the challenge that newcomers represent for the incumbents such as their degree of innovativeness. The second possible cause of interregional differences in the employment effect of new business formation could be differences in the capability of the regional growth regime to transform the incentives which are generated by entry into growth. Both factors should be more pronounced in agglomerations, leading to a considerably higher impact of new business formation in these regions as compared to the other regions with lower levels of density.

There are at least three main policy conclusions that can be drawn from our model. First, policy efforts aiming at an increase in the mere number of start-ups will yield only a slightly positive or even a negative marginal economic effect on growth. Second, instead of stimulating the mere quantity of new businesses, policy measures should try to promote the quality of start-ups in order to create economic value and growth. This can pertain to issues such as improving the qualifications of entrepreneurs, securing the availability of important inputs, and particularly stimulating the innovativeness of regional entries. Third, policy could aim at strengthening the ability of the regional growth regime of transforming the impulses of new businesses into regional growth. However, little is known about the factors that determine this

type of quality of a regional growth regime so that there is considerable need for research.[52]

To answer the question “are more start-ups really better?” posed in the title of the paper: more start-ups are not at all necessarily better. It is the quality of the start-ups, especially the intensity by which they challenge the incumbent businesses, that counts.

[52] See Schroeter (2009) for a discussion of possible reasons why new business formation has a considerably larger effect on economic development in agglomerations as compared to rural regions.

4 The Effect of New Business Formation on Employment – The Dominance of Density[53]

4.1 Introduction

It is widely acknowledged that new business formation is an engine of employment and growth. Therefore, the promotion of entrepreneurial activity has become a central instrument of economic growth policy in many countries (e.g., Audretsch et al., 2006; Lundstöm and Stevenson, 2005). However, recent empirical analyses suggest that the relationship between new business formation and economic development is not straightforward and that it is to a considerable degree shaped by regional conditions. Whereas many regions are able to draw substantial employment growth out of the process of new business formation, the effect may be insignificant or even negative in other regions (Fritsch and Mueller, 2008; Mueller et al., 2008; Stel and Suddle, 2008). In particular, there is growing evidence that the regional variation of the employment effects is closely related to the degree of agglomeration of economic activity, which can be regarded as a catch-all indicator for a multiplicity of regional conditions affecting new business formation and its economic impact. The effects of start-ups on employment turned out to be much more pronounced in agglomerations than in moderately congested and rural areas, presumably due to the special characteristics of these areas (e.g., Fritsch and Mueller, 2004, 2008; Fritsch and Schroeter, 2010a). For an entrepreneurship policy, this implies that the promotion of start-ups in agglomerated areas will most

[53] This chapter is largely based on Schroeter (2009) The effect of new business formation on employment – The dominance of density

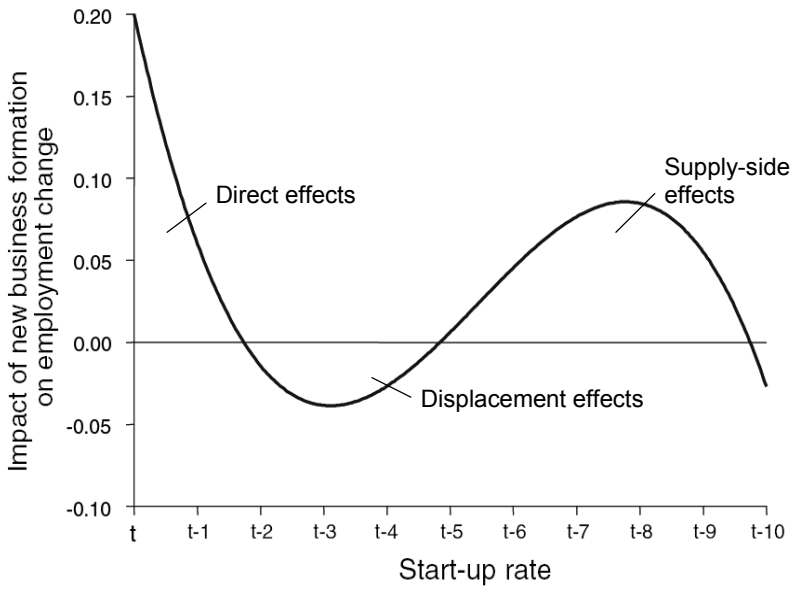
promising as this will be expected to produce the largest economic effects.

However, the existing literature has not yet provided a detailed explanation of the underlying reasons for the distinct employment effects of start-ups in agglomerated areas. The aim of this paper, therefore, is to fill this gap by linking the specifics of agglomerations to the employment effects of new business formation. This paper suggests that the specific characteristics of urban areas, which have been extensively described in the literature on agglomerations economies and urban growth, have a further – yet unexplored – effect on economic development. They positively affect the employment effects of new business formation in two different ways. On the one hand, they support the emergence of high-quality start-ups, which are known to induce stronger employment effects than other types of new businesses. On the other hand, the relatively higher share of high-quality new ventures as well as the higher business density in agglomerated areas cause an intense competition in urban regions that reinforces the market selection and, thus, causes stronger employment effects of new businesses in agglomerations. This paper, therefore, contributes to the explanation of regional differences in the effects of entry. But it also adds to the vast literature on agglomerations benefits by introducing and explaining a new aspect of agglomeration benefits.

The paper proceeds as followed. Section 4.2 provides an overview of recent empirical results on the influence of congestion on the employment effects of new businesses. Subsequently, we discuss several explanations for the impact of density on the employment effects of start-ups (section 4.3). Section 4.4 concludes.

4.2 The Impact of Density on the Employment Effects of New Business Formation – an Overview of the Empirical Evidence

There is growing empirical evidence that the relationship between new business formation and regional development is to a considerable degree shaped by regional conditions. The degree of agglomeration, mostly measured as population density, seems to be a critical determinant in this respect (Fritsch and Mueller, 2004, 2008; Fritsch and Schroeter, 2010a; Mueller et al., 2008; van Stel and Suddle, 2008; Baptista and Preto, 2010; Mueller, 2006a). Fritsch and Mueller (2004, 2008) found that the effects of start-ups on employment are more pronounced in the West German agglomerations than in the moderately congested areas and even stronger than in rural regions. By applying the Almon polynomial lag procedure, they were able to identify the 'wave' pattern (Figure 4-1) in the employment effects of new businesses as well as the impact of density on this pattern.



Source: Fritsch and Mueller (2004)

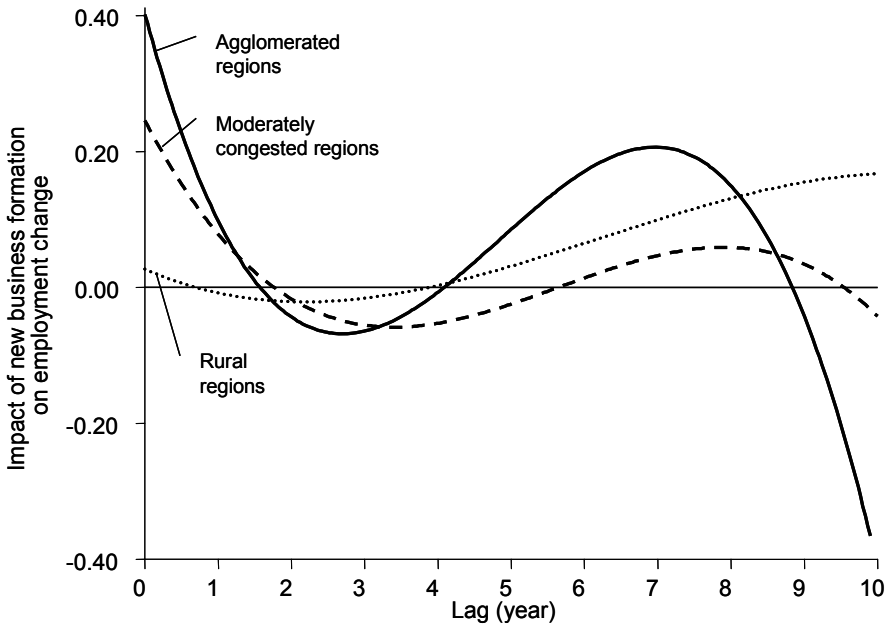
Figure 4-1 Effect of new business formation on employment change over time in West Germany

According to the empirical evidence, the effects of entry on regional employment are lagged and occur in three phases. In the first phase, the setting up of new businesses leads to an employment increase, obviously because extra personnel are needed to operate the additional capacities. This can be regarded as a direct employment effect of new businesses. At the same time, competition between the new and the incumbent businesses on input as well as on output markets spurs the market selection. As long as this market selection process works according to a 'survival of the fittest'-scenario, the least productive firms have to reduce their level of economic activity or must exit the market. Because such a scenario leads to a rise in average productivity, employment should decrease as far as output remains at a constant level (displacement effects). But the employment effect then may become positive again. By challenging established market positions, new businesses stimulate competition, which results in improvements in the competitiveness of the economy and finally in more output and employment (supply-side effects of new businesses).[54] They are the reason why one should expect positive employment effects of new business formation (see also Fritsch and Noseleit, 2009a). For the emergence of these supply-side effects, it is of critical importance that market selection works in accordance with a 'survival of the fittest' scenario. If the market mechanism forced the relatively efficient firms to exit and allowed the inefficient firms to survive, the

[54] The main supply-side effects induced by new businesses could be (a) securing efficiency and stimulating an increase in productivity by contesting established market positions; (b) the acceleration of structural change, e.g. incumbents are substituted by newcomers; (c) amplified innovation, particularly, the creation of new markets; and (d) a greater variety of products and problem solutions. These improvements may occur on the side of the start-ups as well as on the side of the incumbents. The emergence of these improvements, therefore, does not necessarily require the newcomers to be successful and survive.

result would be a decrease in the economy's competitiveness. After about ten years after the start-ups occurred, their effects on economic development fade away.

The magnitude of the effect in each phase as well as the total employment impact of new businesses was found to be strongly shaped by the degree of agglomeration as Figure 4-2 illustrates.



Source: Fritsch and Mueller (2004)

Figure 4-2 Effect of new business formation on regional employment according to the degree of agglomeration

The short-term (direct) effects of start-ups as well as the long-term (supply-side) effects are much more pronounced in agglomerations. Although the negative medium-term (displacement) effects are also slightly larger than in the other spatial categories, the stronger direct effects and supply-side effects lead to a larger overall employment impact of new businesses in agglomerations. Fritsch and Mueller (2004, 2008) hypothesize that the stronger effects of new firms in

agglomerations are, the result of a high intensity of competition as well as a high share of innovative start-ups.

Following Frisch and Mueller (2004, 2008), van Stel and Suddle (2008) analyzed the employment effects of new business formation in urban and rural regions in the Netherlands and come to comparable findings. While the total employment impact of start-ups was found to be positive in urban regions, the effect of new businesses in rural areas turned out to be negative. Moreover, in their study on the relative importance of the different employment effects of new businesses, Fritsch and Noseleit (2009a) revealed that the indirect effects, which make up the largest part of the employment contribution of start-ups, strongly vary across spatial categories, whereas the direct effects are almost equal in the different region types. The indirect effects in agglomerations and in congested areas resemble the wave-pattern of the overall effect found by Fritsch and Mueller (2004, 2008) and were largest in agglomerated areas. In contrast, the supply-side effects of new businesses in rural regions are only significant for the first year after inception and even show a negative sign. The authors assume that the spatial proximity of actors and the resulting intense competition are responsible for the greater effects of start-ups in agglomerations. Fritsch and Schroeter (2010a) also found evidence that the regional variation of the employment effects of German start-ups is closely related to population density. Finally, Baptista and Preto (2010) detected that knowledge-based start-ups generate higher employment growth in gazelle regions, i.e. highly agglomerated areas displaying high shares of rapidly growing firms. In contrast, density does not influence the employment effects of non-innovative businesses. The authors suppose that greater business dynamics and agglomeration

effects are especially beneficial for innovative firms, but less or even not important for non-innovative businesses.

4.3 Why is the Influence of Density so Dominant?

Empirical results provide strong evidence that the pronounced regional differences in the magnitude of employment effects of new businesses are closely related to the density of economic activity. However, the underlying reasons for this connection have not been examined in detail yet.

The benefits emanating from the concentration of economic actors have been widely analyzed in the literature as an explanation for the concentration of industries and innovation as well as for the growth of cities (for an overview, see Rosenthal and Strange, 2004). Economic actors benefit from co-location because of cost savings with regard to transportation and transaction costs (Baptista, 1998; Audretsch, 2003b; Veltz, 1996). But more importantly, the proximity of economic actors facilitates knowledge spillovers and mutual learning that can be regarded as the main drivers of innovation, the engine of growth (Romer, 1986; Lucas, 1988). Depending on the source of agglomeration economies, one distinguishes between localization economies, emanating from the concentration of firms in one industry, and urbanization economies, i.e. externalities arising from the concentration of diverse and unrelated economic activities or from the mere city size (e.g., Ohlin, 1933; Hoover, 1937; Rosenthal and Strange, 2004; Parr, 2002). Localization economies refer to the advantages of large specialized labor markets, input-output linkages within an industry, specialized physical (e.g., transportation infrastructure) and knowledge (e.g., universities and public research institutions) infrastructure as well

as intra-industry knowledge spillovers. In contrast, urbanization economies result from the scale and diversity with regard to specialized suppliers and supporting business services, labor markets, physical and knowledge infrastructure as well as knowledge spillovers among industries (Jacobs, 1969; Parr, 2002).

In addition, some authors state that competition is a further virtue of agglomerations. It was especially Jacobs (1969), who argued that it is competition among diverse industries in cities that fosters knowledge spillovers and learning and, thus, leads to innovation and growth. Porter (1990) also underlined the importance of local competition for innovativeness and growth, but in agglomerations or clusters of single industries. He argues that local competition accelerates the imitation and improvement of innovations and forces local firms to innovate. The resulting ruthless, innovation-based competition between local competitors generates competitiveness and growth.

This paper suggests that the specific characteristics of agglomerations, i.e. urban areas and their surroundings, also give rise to the relatively larger employment impact of start-ups compared to areas with lower levels of density. They can, therefore, be considered as a type of agglomeration benefits that have not been previously discussed in the literature. The special urban features positively affect the employment effects of new business formation in two different ways. First, a relatively broad knowledge and resource base, high diversity, large local demand and the proximity of actors contribute significantly to the emergence of high-quality start-ups, which are known to induce larger employment effects than other types of new fims. Second, the relatively larger share of high-quality new ventures as well as the higher business density cause an intense competition that spurs the market selection and finally leads to a higher performance of the surviving

firms, which is – amongst others – reflected in larger employment effects of entry in agglomerations (Figure 4-3).

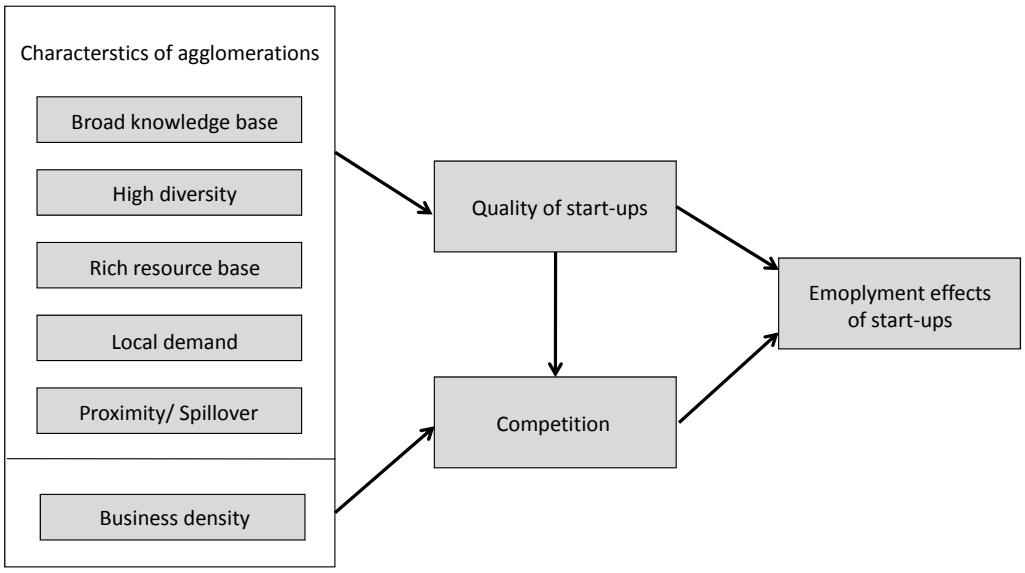


Figure 4-3 Relationship between the characteristics of agglomerations, quality of start-ups, competition and the employment effects of new businesses

The importance of new ventures' quality with regard to the magnitude of their economic effects and the spatial pattern of high-quality start-ups are discussed in section 4.3.1 and 4.3.2. Section 4.3.3 examines the role of agglomerations in fostering the emergence of high-quality start-ups, followed by an explanation how the intense competition in agglomerations contributes to the relatively large employment effects of start-ups in urban areas (section 4.3.4).

4.3.1 The Impact of New Firms' Quality on the Magnitude of their Employment Effects

Not all new firms contribute equally to economic development (e.g., Leibenstein, 1968; Sternberg and Wennekers, 2005). But the growth

impact of new businesses strongly depends on the magnitude of the challenge they impose on incumbents to implement improvements in order to stay competitive. This competitive pressure and the response of the incumbents can be regarded as the one of the key determinants of the positive supply- effects side effects of new business formation (cf. section 4.2, see Fritsch, 2008 for an overview). Therefore, the stronger this challenge, the larger the overall economic effects of start-ups are. It is plausible to reason that the competitive pressure exerted by new ventures is tightly linked to their quality which may be determined by such factors as the qualification of the entrepreneur, the amount and quality of resources that are mobilized for the new business, the marketing strategy that is pursued as well as the quality and the innovativeness of the supplied goods and services. Therefore, it is plausible to assume that high-quality start-ups are likely to impose a larger competitive pressure on incumbents than new firms of lower quality and, thus, induce greater direct and, more importantly, larger supply-side effects than other new ventures.

Empirically, there is growing evidence that the employment effects of new businesses strongly depend on the quality of the entrants.[55] The empirical identification of high-quality start-ups is, however, rather difficult and there are various approaches to measure 'quality'. Innovativeness is one important aspect of quality. Firms and industries are usually classified as innovative if they spend more than 3.5 percent of their sales to R&D (Grupp and Legler, 2000). Based on the knowledge- and R&D-intensity of industries and on the innovativeness of their product programs, the OECD (2005) differentiates between

[55] e.g., Engel and Metzger, 2006; Metzger and Rammer, 2009; Baptista and Preto, 2010; van Stel and Suddle, 2008; Falck, 2007; Fritsch and Noseleit, 2009b.

‘high-technology’, ‘medium-high-technology’, ’medium-low-technology’, and ‘low-technology’ industries. Firms in service industries are not innovative in the same way as ventures in manufacturing. They do not have a standardized product program but provide support according to the individual needs of their customers. Hence, service industries which may be relevant for innovation processes are entirely defined according to the knowledge-intensity of their inputs. Theses knowledge-intensive service industries comprise for example ‘computer services’, ‘research and development in natural sciences and engineering’ or ‘business consultancy’. Following this definition of quality, Engel and Metzger (2006) show in their study on the direct effects of new firms in Germany, that cohorts of superior-tech and high-tech businesses experience by far the strongest positive employment development, and that those in technology-intensive services perform better than new firms in non-technology services. A follow-up study by Metzger and Rammer (2009) confirmed these results, indicating the largest employment contribution of new firms in entry cohorts of superior-tech and high-tech as well as technology-intensive services. Considering the total effect of new businesses in Portugal, Baptista and Preto (2010) showed that the effect of knowledge based firms, defined as ventures in high and medium technology manufacturing industries and in knowledge-based services, on subsequent employment development is substantially larger than for other firms.

The quality of new businesses may also be reflected by their survival in the market. Assuming that only competitive new firms are able to survive for a longer time, Falck (2007) found on the level of industries that new businesses that survived for at least five years (‘long-distance runners’) had a significantly positive impact on GDP growth while the effect of entries that stayed in the market for only one

year ('mayflies') was statistically insignificant or significantly negative. Similarly, Fritsch and Noseleit (2009b) could confirm this result on the level of regions. According to their analysis, start-ups which survived four years or longer have a significantly positive effect on employment growth while the effect of new businesses that survived less than four years was insignificant or even significantly negative.

Finally, investigating the employment development of entry cohorts in Germany, Fritsch and Weyh (2006) as well as Schindele and Weyh (2009) detected that start-ups in manufacturing create more jobs that those in services. Moreover, in their study on the overall effect of new businesses in the Netherlands, van Stel and Suddle (2008) found the employment development caused by new ventures to be the largest for new businesses in manufacturing industries. These results may hint a higher quality of start-ups in manufacturing compared to those in services. Assuming that the relatively high entry barriers in terms of minimum efficient size and capital intensity in manufacturing industries may induce a higher quality of new firms due to a self-selection of potential entrepreneurs, this could explain the comparatively larger economic effect of start-ups in manufacturing industries.

4.3.2 The Spatial Distribution of High-quality Start-ups

Empirical results suggest that ambitious, i.e. innovative and growth oriented entrepreneurship, predominantly occurs in agglomerated areas (Bosma, 2009). In addition, agglomerations are found to show a relatively higher share of start-ups in knowledge-intensive service industries and innovative manufacturing industries than moderately congested and rural areas (Audretsch et al., 2006; Bade and Nerlinger, 2000). Figure 4-4 shows the average start-up rates of high-quality new firms, defined as innovative and knowledge-intensive new businesses,

on the level of German districts for the period between 2000 and 2004.[56] There are on average 1.52 new firm formations per 1000 employees in Germany that can be classified as innovative or knowledge-intensive. This rate, however, differs strongly across districts ranging from 0.94 to 3.18. Obviously, Germany's largest cities Hamburg, Berlin, Cologne, Frankfurt, Munich and their surrounding areas are main centers of high-quality start-up activity. The same pattern can be found in East Germany, where innovative and knowledge-intensive new firms seem to be concentrated in the large cities like Dresden, Leipzig, Chemnitz, Halle and Magdeburg and regional high-order centers like Neubrandenburg and Schwerin. But the spillover effects of these centers to the adjacent districts seem not to be as strong as in Western Germany.

Figure 4-5 displays the share of high-quality start-ups in all start-ups in German districts for the same period. On average, 16 percent of the new firms are associated with knowledge-intensive and innovative industries. As expected, the share of high-quality new businesses varies again considerably between districts ranging from seven to 30 percent. Also Figure 4-4 clearly indicates that innovative start-ups are concentrated in cities. They are again particularly clustered in the relatively large agglomerations of Berlin, Hamburg, Cologne, Frankfurt, and Munich in West Germany as well as in Dresden, Leipzig, Chemnitz, Halle and Magdeburg in the Eastern part. But also smaller

[56] Innovative start-ups comprise all new firms in manufacturing industries with a R&D-intensity of at least 3.5 percent as well as new ventures in knowledge-intensive services. Knowledge-intensive start-ups refer to new firms in services and are entirely defined according to the knowledge-intensity of their inputs. They comprise for example 'computer services', 'research and development in natural sciences and engineering' or 'business consultancy'. A detailed description of the activities involved is provided by Nerlinger and Berger (1995).

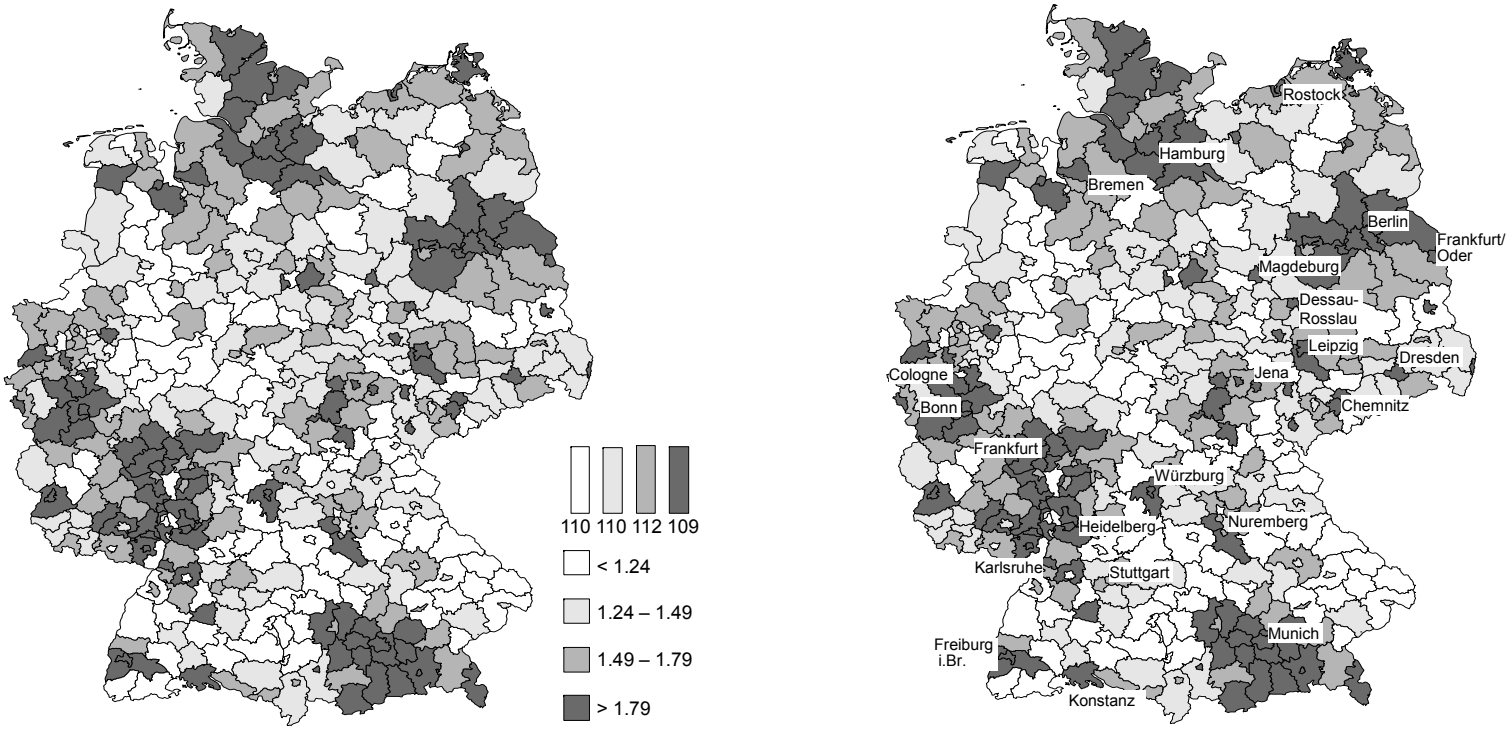


Figure 4-4 Start-up rate of high-quality new firms in German districts between 2000 and 2004

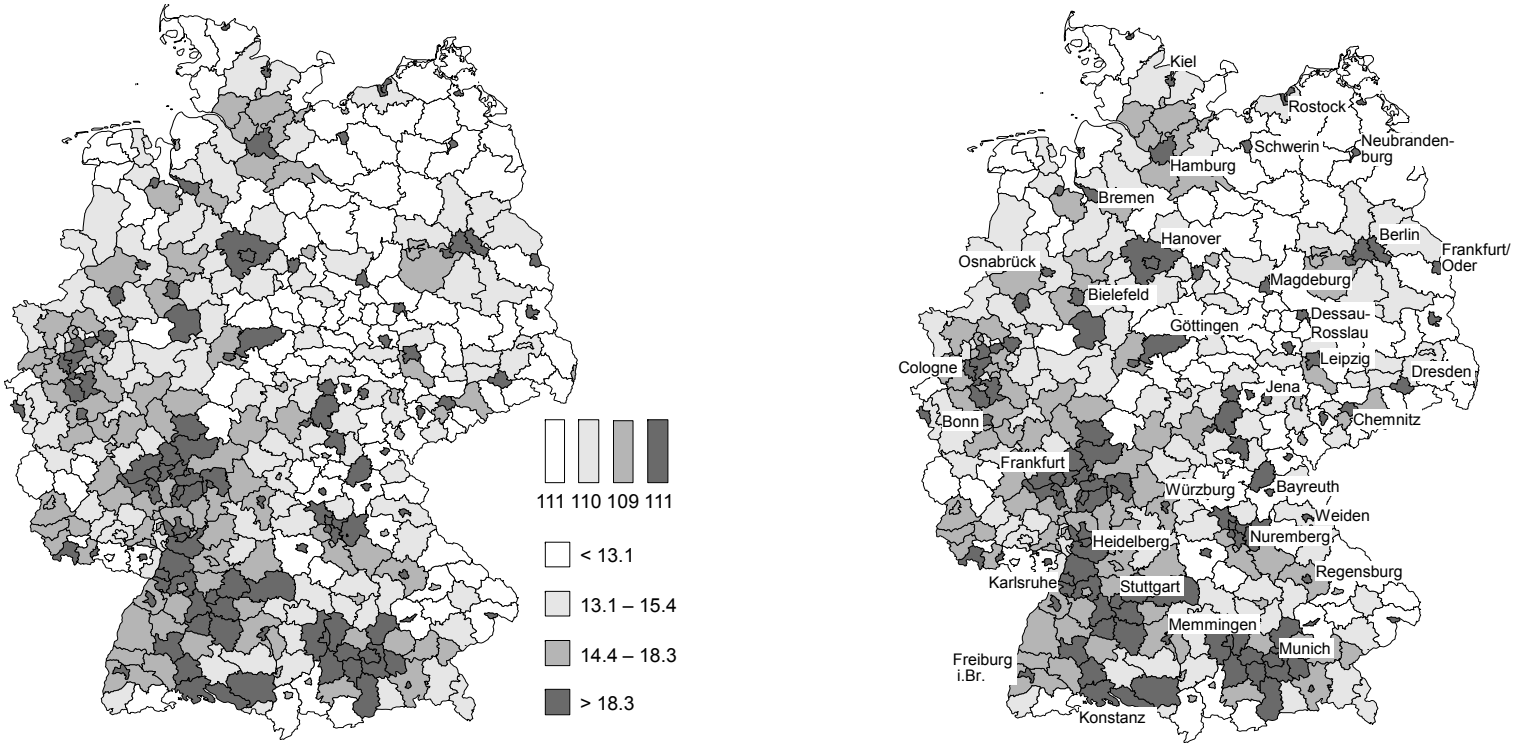


Figure 4-5 Average share of high-quality start-ups in all new firms in German districts between 2000 and 2004 in %

urban areas of West Germany like Osnabrück, Memmingen, Bayreuth or Weiden, which represent regional high-order centers, show relatively large shares of high-quality start-ups.[57]

4.3.3 Structural Characteristics of Agglomerations and their Effect on the Quality of Start-ups

Supposing that high-quality start-ups impose a greater challenge on incumbents than other types of new ventures, the higher share of such new businesses in agglomerations may be responsible for the more pronounced effects of new business formation in these regions. However, this leads to the question why innovative start-ups are more frequent in agglomerated areas than in other types of regions.

In explaining this, we follow the view that entrepreneurship is a process of perceiving opportunities and transforming them into innovative products and processes that create economic value and growth (Shane, 2000; Shane and Venkataraman, 2001; Shane and Eckhardt, 2003). Accordingly, the number and the quality of new businesses should vary across regions depending on the pool of innovative opportunities as well as on the quantity and quality of resources available to use these opportunities (Shane, 1996; Acs and

[57] Figure 4-4 and 4-5 are based on data, which stem from the establishment file of the German Social Insurance Statistics, which provides the number of new businesses and employees (for a description, see Fritsch and Brixy, 2004). This database comprises information on all establishments that have at least one employee subject to obligatory social insurance. Thus, start-ups consisting of only owners are not included. Unfortunately, the German Social Insurance Statistics is completely on the level of establishments and does not allow to separate new firms from new plants and new branches that are created by existing firms. In order to avoid distortions caused by new large subsidiary plants of incumbent firms, new establishments with more than 20 employees in the first year of their existence are not counted as start-ups. Moreover, start-up and employment data in agriculture and fishery, energy, mining, railway, and postal services are excluded because of highly regulated market conditions that strongly diverge from the rest of the economy.

Armington, 2004). We argue that because of their specific characteristics, agglomerations offer relatively better conditions for the creation, dissemination, and exploitation of innovative opportunities than moderately congested and rural areas. Empirically, this is reflected in a higher share of high-quality start-ups, which are in turn responsible for the relatively large employment effects of entry in urban areas. The advantages of agglomerations in this respect accrue from the combination of a broad knowledge base, a great diversity of economic activities, a strong and diverse local demand, a rich resource base, and the proximity of actors that fosters knowledge spillovers (Figure 5).

The following sections elaborate on how the urban particularities impact the creation, dissemination, and exploitation of innovative opportunities and, hence, the emergence of high-quality entrepreneurship.

4.3.3.1 Knowledge Base

New knowledge is a major source of entrepreneurial opportunities (Acs and Varga, 2005). A region's potential to generate, explore, and exploit new knowledge strongly depends on its knowledge base, i.e. the knowledge and competences embodied in science and research institutions (e.g., universities and other research establishments), in private sector firms as well as in the regional workforce (van Winden et al., 2007). Empirically, the knowledge base is reflected by the regional level of human capital, the stock of creative capital (van Winden et al., 2007), the local university and research facilities as well as by search activities related to science and technology. Agglomerations show a relatively larger knowledge base than less congested and rural areas, which affects the emergence of high-quality start-ups in different ways.

Human capital, traditionally measured as years of schooling, percentage of skilled labor, or share of highly-educated employees tends to be concentrated in agglomerated areas (Glaeser, 1999). Empirical studies suggest a positive relationship between measures of human capital and entrepreneurial activity in a region (Audretsch and Feldmann, 2004; Anderson et al., 2005; Acs and Armington, 2004). Human capital increases the knowledge stock, the cognitive capabilities, and the skills of individuals (Schultz, 1959; Becker, 1964; Mincer, 1974) which are crucial for the entrepreneurial process. People with a higher level of human capital are more likely to create new ideas, to gain information about market niches, and to posses the skills necessary to run a business. Therefore, people with a quantitatively or qualitatively higher human capital endowment are assumed to be better at creating, perceiving, and exploiting entrepreneurial opportunities (Shane, 2000, 2005). Empirical studies indeed confirm that most founders of innovative and growth ambitious firms have attained a university degree (Bosma et al., 2009; Bosma, 2008; Metzger et al. 2010; Cantner and Goethner, 2010). Correspondingly, Baptista and Mendoca (2010) found regional start-ups rates of knowledge-based manufacturing and service firms to be strongly influenced by the regional number of students and graduates, while the educational level of the regional workforce only impacted the start-up rates in knowledge-intensive services. Similarly, Audretsch et al. (2006) confirmed a positive effect of the number of students on new firm formation rates in technology-oriented industries in Germany.

Recent literature claims that the traditional, education-based measures of human capital only partly reflect the intelligence, creativity, experience, and entrepreneurial capabilities of individuals (e.g., Florida 2002, 2005, 2008). Florida proposes an occupation-based measure of

human capital, specifically a set of creative professions including science, engineering, arts, and knowledge-based occupations of finance, law, healthcare, and education which are also referred to as the 'creative class'.[58] According to Florida, the creative human capital stimulates a region's economy by introducing new ideas, new technology, or new content. Hence, it can be regarded as a crucial determinant of the generation of innovative entrepreneurial opportunities. In addition, the 'creative class' probably possesses the skills necessary for recognizing and implementing innovative business opportunities. Finally, assuming that creative people are more prone to (economic) independence, it is plausible to assume that these persons have a higher inclination to launch a venture than non-creative people (Acs et al., 2008). Supporting these conjectures, Lee et al. (2004) identified a significantly positive relationship between the share of creative employment in a region and the level of start-ups. Boschma and Fritsch (2007) detected a high correlation between the share of highly skilled, creative people and start-ups in high-tech sectors for Germany, Finland, Sweden, and Norway.[59] Since creative capital is conventionally measured by educational attainments and most members of the creative class are skilled and highly educated, its

[58] This indicator is supposed to display how education is applied and transferred into skills and productivity instead of reflecting potential capabilities gained by education. However, many of the occupations that are defined as creative are associated with high levels of education. Thus, there is a strong overlapping between educational and occupational measures that has often been criticized in the literature (e.g., Markusen et al., 2006; Glaeser, 2004). Nevertheless, educational attainment does not affect economic development if it is not applied. For example, it is doubtful whether an engineer working as deliverer is really creative and influences the creation and use of knowledge in society.

[59] The creative class indicators even outperformed the education-based indicator of human capital for Finland and Norway, whereas education shows a higher correlation with the overall start-up rate in Sweden and no difference could be found for Germany.

spatial distribution closely corresponds to that of human capital, i.e. creative human capital also tends to be concentrated in city-regions (see also Florida, 2002, 2008; Fritsch and Stuetzer, 2008).

The clustering of skilled and creative labor in agglomerated areas is strongly connected to the presence of higher education establishments and research facilities, in particular universities. Their clustering exerts a strong positive effect on the formation of high-quality start-ups in two respects. First, the research efforts of universities and research institutions are major sources of innovative business opportunities (Audretsch et al., 2004; Shane, 2003, 2005), in particular for high-tech new ventures (Stam, 2010). These opportunities emanate from new technological or scientific knowledge, which is created within, but frequently not exploited by these organizations. Start-ups often commercialize this knowledge and, thus, act as important mechanism that transforms new knowledge into innovations (e.g., Audretsch, 1995; Acs et. al, 2009; Audretsch and Lehmann, 2005; Shane, 2001a, 2001b, Zucker et. al, 1998). However, empirical research suggests that (academic) knowledge spillovers are locally bound as new knowledge is mostly tacit, complex or 'sticky' nature, i.e. highly contextual and, thus, need to be transferred by personal interaction (Polanyi, 1967; von Hippel, 1994).[60] Therefore, accessing and absorbing spillovers from sources of new knowledge is not invariant to geographic location, but the costs of such a transfer increase with geographical distance (Audretsch, 1998; Krugman, 1998).

[60] See e.g., Jaffe et al., 1993; Anselin et al., 1997, 2000; Autant-Bernard, 2001; Arundel and Geuna, 2004; Acs et al, 2002 for academic spillovers. For a comprehensive overview on studies investigating knowledge spillovers and their spatial dimension in general, see Christ, 2009.

Accordingly, empirical results suggest that new firms in innovative and knowledge-intensive industries tend to locate close to universities and other institutions conducting R&D supposedly in order to access knowledge spillovers. For Germany, Audretsch et al. (2006) and Audretsch and Lehmann (2005) show that, in general, universities with a higher knowledge capacity and a greater knowledge output tend to generate more technology-based and knowledge-oriented start-ups and that geographic proximity is important for accessing and absorbing spillovers from universities, particularly for knowledge and output that is more tacit in nature. Also for Germany, the findings of Bade and Nerlinger (2000) suggest that R&D activities of public research institutes are crucial for the number of top-tech start-ups in manufacturing and new high-tech ventures in services. Likewise, in a study on the location of new high-tech firms in Texas, De Silva and McComb (2009) found evidence that the presence of research centers and universities that actively conduct R&D increases the likelihood of such start-ups to occur. Moreover, the probability of high-tech start-ups decreases with a growing distance to these knowledge centers. Moreover, Baptista and Mendoca (20010) showed on the level of Portuguese municipalities that knowledge spillovers from universities are an important determinant of the location of knowledge-intensive start-ups in manufacturing and services. A study by Karlsson and Nystrom (2006) explored knowledge spillover from universities to positively affect new firm formation in knowledge-intensive services on the level of municipalities in Sweden. Finally, Woodward et al. (2006) present evidence that R&D expenditures at universities exert a positive, statistically significant influence on the local number of new plants in high-tech industries in US counties.

Second, universities and research institutions contribute to the local level of human capital as they attract and employ highly qualified academics and labor, and educate graduates both making up a group of potential founders of innovative new businesses (for an overview, see Rothaermel et al., 2007; Astebro and Bazzazian, 2010b). Research results strongly hint at local effects of academic and student start-ups, i.e. they are founded in the same region as the university or in close proximity to it (for a recent overview, see Astebro and Bazzazian, 2010b). Astebro and Bazzazian (2010b) report that about 80 percent of the firms that spun out from the Ludwig-Maximillian University (LMU) in Munich between 1977 and 2009 locate within only 20 kilometers of the LMU. Similarly, a study by Roberts (1991) shows that academic spinoffs from MIT (Cambridge) are started in Cambridge and spinoffs from MIT's Lincoln Lobs in Lexington tend to locate there. In a more recent study on the MIT, Shane (2004) reveals that about 50 percent of the spinoffs are launched within 20 kilometers of MIT. Using data of start-ups between 2003 and 2005 for Sweden, Baltzopoulus ans Broström (2009) show that entrepreneurs exhibit an increased likelihood of locating their firms in their place of studies. These founders presumably locate in proximity to a university or research center in order to access knowledge spillover and to use social networks (Lerner and Malmeindier, 2008).[61]

In a nutshell, we can conclude that, generally, agglomerated areas show are relatively better knowledge base in terms of innovative business opportunities and the qualification level of the workforce than

[61] Additionally, spin-offs from universities and research organizations locate close to these incubators as the founder may still be employed there, wants to use the facilities of the incubator (e.g., labs, computer equipment) or still cooperates with these institutions (Egeln et al., 2004).

other regions, and, thus, provide better conditions for the emergence of high-quality start-ups.

4.3.3.2 Diversity

Diversity is another distinctive characteristic of agglomerations. Following Jacobs (1969), diversified cities provide the best environment for spurring creativity and innovation, which are the underlying forces of entrepreneurship. The main benefit of social and economic variety is that of so-called new combinations (Schumpeter, 1934), i.e. the recombination of existing pieces of knowledge from different backgrounds that result in new ideas and business opportunities. Particularly, the combination of ideas from totally unrelated fields may increase the probability of discovering radically new solutions (Boschma and Lambooy, 2002). Entrepreneurial opportunities may arise by linking ideas from different fields or by finding a new application for an already existing idea or concept (Desrochers, 2000, 2001).[62] Therefore, the local diversity of economic actors and resources can be regarded as a further important source of innovative opportunities because it provides the scope for the cross-fertilization of competences and knowledge from unrelated fields.

[62] Prominent examples for the former are Thomas Edison, whose idea for the screw base of his light bulb was based on the unscrewed the cover of a kerosene can (Smil, 2005) and the inventor of the shipping container, Charles McLean, whose invention was inspired by watching bales of cotton being hauled by laborers, with the trailer eventually becoming the container (Jung, 2005). Well-known examples for the new use of existing know-how are templates that were first developed by railroad companies and later adapted by American telegraph companies to handle the flow of multiple message to and from multiple locations (Bunker and Ciccantell, 2005) or the integration of sheet steel punch and presswork technology by Ford which were originally used in the bicycle industry.

Nevertheless, a recent stream of literature claims that it is not variety per se, but the complementarity of diverse competences that is decisive for the generation of knowledge and innovation (e.g., Frenken et al., 2007; Boschma and Immarino, 2007). It is assumed that knowledge and ideas will only spill over if the cognitive distance between actors is not too large (Nooteboom, 2000; Boschma, 2005), i.e. they have to be related by complementary knowledge bases and competences that are necessary to secure effective communication, understanding, and learning (Bosma and Immarino, 2007; Cohen and Levinthal, 1990). For example, what can a farmer learn from a laser-producing company despite the fact that they are neighbors? Therefore, related instead of unrelated variety is said to be crucial for learning and creating new ideas. As (the probability of) related variety is often largest in cities (Frenken et al., 2007), it is plausible to assume that this is also true for the amount of innovative entrepreneurial opportunities emanating from the cross-fertilization of knowledge of related fields.

Following the 'economic geography of talent'- hypothesis introduced by Florida (2002, 2004, 2008), the diversity of urban centers also attracts highly qualified, creative people (the so-called 'creative class'). He argues that people in creative occupations base their location decision not only on job opportunities, but equally important on factors such as an urban climate of tolerance and openness towards new ideas or different styles of living. These places show low barriers to entry for human capital, therefore attracting a broad range of talent across racial, ethnic, and other lines (Florida et al., 2008). Creative people seem to prefer these environments as they allow for unorthodox ideas and their diversity serves as a source of inspiration for innovative activities (Andersen and Lorenzen, 2005). Furthermore, they are also attracted by the variety of urban amenities, like cinemas, bars,

museums, art galleries, restaurants, or trendy shops (Florida, 2002; Glaeser et al., 2001).

According to Florida, regions that provide a welcoming and open environment to creative people will benefit economically as they are more innovative and entrepreneurial and attract creative businesses like high tech-firms. He, thus, challenges the orthodox view that regional growth is driven by 'hard' locational factors like low taxes or a rich supply of physical infrastructure. Instead, he postulates that the main economic asset of places stems from a tolerant, diverse, and open-minded urban culture that attracts and retains creative, highly qualified people who in turn create new knowledge, innovation, and growth (Florida 2004, 2005).[63] It is, hence, the concentration of diverse, creative and highly-qualified actors, which is more likely in agglomerated areas than in other regions, which constitutes an important source of innovative entrepreneurial opportunities and makes them more likely to be realized (Lee et al., 2004; Audretsch and Keilbach, 2007). Therefore, although causalities are not easy to identify, there seems to be a mutually reinforcing interdependence among certain characteristics of cities (e.g., cultural or ethnic diversity), the concentration of talented and creative people, and the quantity and quality of entrepreneurship.

[63] Consequently, Florida challenges the common wisdom that human capital is attracted to economically prospering places. On the contrary, he claims that regional growth is expected to be a result of the presence of creative and talented people. Or in the terminology of Florida, jobs will follow people, instead of people following jobs (Florida, 2004a).

4.3.3.3 Resource Base

The exploitation of entrepreneurial opportunities requires various resources such as human capital, intermediate goods, and business services. High-quality start-ups show specific requirements with regard to these inputs that can be best met by the diverse and specialized input markets in agglomerations.

On the one hand, this refers to the supply of skilled workers. Theoretical considerations and empirical evidence suggest that human capital of employees is a crucial resource for the creation and development of new ventures (e.g., Acs and Armington, 2004). Therefore, it can be assumed that the level and the diversity of human capital available in a region is an important determinant of the location of high-quality start-ups. Especially high-quality start-ups demand qualified and highly-specialized employees (Stuart and Sorensen, 2003) who tend to be concentrated in agglomerations for several reasons. First, the scale and the diversity of economic activities contribute to the emergence of a large and diverse pool of specialized human capital (Glaeser, 1998). Moreover, the presence of academic education and the concentration of knowledge-intensive activities attracts, retains, and increases highly qualified and specialized human capital. Finally, skilled workers are attracted and retained by a diverse and creative (social) environment that is most likely to be found in urbanized areas (Florida, 2002, 2004, 2008). Therefore, high-quality start-ups are more likely to find highly skilled and specialized employees that match their requirements in the large and diverse urban labor markets.

On the other hand, the local presence of a large and diverse supply of intermediate goods and business services is an important input factor particularly for the exploitation of high-quality

entrepreneurial opportunities. Agglomerations provide pools of specialized intermediate good suppliers with special technical knowledge and assets that support the development and implementation of new knowledge (Simmie, 2003). They are complemented by high-end business services, like consulting, financing, marketing, tax, and legal advice, as well as R&D services which tend to concentrate in agglomerations as well Shearmur and Doloreaux, 2008). Since high-quality start-ups are frequently associated with product or process innovation, their demand for input is at least highly special but mostly innovative. Thus, they benefit from being located in agglomerations due to the possibilities of picking and matching highly-specialized inputs throughout the whole entrepreneurial process.[64] In addition, as far as the provision of intermediate goods and business services is associated with some kind of innovation, frequent personal interaction, and thus, proximity to these suppliers might be crucial. This particularly holds for contract or cooperative R&D activity that involves the transfer of tacit, i.e. not completely codified, knowledge, which requires personal contact. Hence, the local presence of specialized services and intermediate good suppliers in agglomerated areas is an important input factor for high-quality businesses.

Finally, due to the risks associated with the development and introduction of innovations, most high-quality start-ups are funded by

[64] Of cause, high-quality start-ups also profit from lower transport costs and lower costs of intermediate inputs and business services in agglomerations that have been widely discussed in the literature on agglomeration benefits (for an overview, see Rosenthal and Strange, 2004; Duranton and Puga, 2004). However, these benefits do not exclusively affect high-quality start-ups, but rather all (new) ventures and are, therefore, not considered.

Venture Capital (VC) companies.[65] Empirical results suggest that VC firms are highly clustered in space, especially in large urban centers.[66] Spatial proximity between the investor and the financed firm might be crucial as VC companies do not only give money, but also consult and monitor their portfolio firms; services that require frequent and direct personal interactions (Gompers, 1995; Lerner, 1995; Sapienza and Gupta, 1994; Petersen and Rajan, 2002). In addition, transaction costs of monitoring and supervising increase with distance (Mason and Harisson, 2002b; Stuart and Sorensen, 2001). Therefore, most empirical studies found venture capitalists to prefer investments that are nearby (Sorensen and Stuart, 2001; Gompers, 1995; Fried and Hisrich, 1995; Hellmann and Puri, 2002; Kaplan and Strömerg, 2004). However, there is also counterevidence. For example, Fritsch and Schilder (2007, 2008) show for Germany that proximity of VC firms and their portfolio companies is not a necessary precondition for an investment. VC companies tend to syndicate distant investments with partners that are closer to the portfolio firm in order to overcome the problems attached to investments that are located far away. Nevertheless, the authors acknowledge that the surprising unimportance of spatial distance may also be related to the relatively balanced spatial structure in Germany that allows for a relative good accessibility of most locations, and a shortage of promising VC investment opportunities in Germany. As a result, the local presence of VC companies can, but is not necessarily

[65] This especially holds for technology-oriented new businesses whose (potential) investors face strong difficulties in evaluating early-stage technologies, uncertainty about the R&D results and their market potential, few tangible assets as well as high failure rates of technology-based start-ups (Stuart and Sorensen, 2003; Athreye and Keble, 2000; Kortum and Lerner, 2000; Florida and Kenney, 1988).

[66] See for example, Sorensen and Stuart, 2001; Powell et al., 2002; Leinbach and Amrhein, 1987; for the US VC market, Mason and Harrison, 1999, 2002a; Martin, 1989; Martin et al., 2005 for the UK VC market, Martin et al., 2002 for the French and German markets.

an important benefit of urban centers in fostering high-quality entrepreneurship, depending on different factors such as the accessibility of places outside the centers of VC firms .

4.3.3.4 Local Demand

The literature on new business formation identifies local market demand as an important determinant of start-up activity (e.g., for the USA see Armington and Acs, 2002; for Germany see Fritsch and Falck, 2007; Audretsch and Fritsch, 1994). In particular, the large and diversified local markets in agglomerations (Glaeser, 2007; Glaeser et al., 2001) offer a variety of niches that can be exploited by new firms (Acs et al., 2008). In addition, the concentration of innovative activities and headquarter functions implies a high demand for the provision of high-quality services and assets (Davis and Henderson, 2008). Therefore, agglomerations provide favorable demand conditions that are conducive to the emergence of high-quality start-ups. However, the importance of local market conditions should not be overstated for these new businesses as they are frequently aiming at inter-regional or international markets. A crucial part of high-quality new businesses are even 'born global,' i.e. they enter foreign markets right after or shortly after their foundation (see Rennie, 1993; Rialp et al., 2005 for an overview of the literature). Empirical evidence is strong for high-tech manufacturing firms, but also for high-quality services that serve international markets right from the start or shortly thereafter (e.g., Mahnke and Venzin, 2003; Schmidt-Buchholz, 2001; Metzger et al., 2008).[67] Nevertheless, local markets remain relevant, especially if

[67] Prominent examples are internet-based service ventures, like Amazon or eBay, and software firms like Intershop.

transactions comprise the provision of specialized goods and services, whose production requires frequent and/or face-to-face interactions. Thus, large and diversified local demand markets in agglomerations remain an important determinant of the emergence of high-quality start-ups.

4.3.3.5 Proximity

Proximity of economic actors is a key characteristic of agglomerations. The crowding of individuals creates opportunities for intended and unintended personal contacts and, therefore, stimulates the quick flow and exchange of knowledge and ideas (Jacobs, 1969). Hence, geographic propinquity provides opportunities to learn by sharing knowledge and imitating successful routines (Malmberg and Maskell, 2002). In this manner, proximity also affects the generation, dissemination, and exploitation of entrepreneurial opportunities and, thus, the emergence of high-quality start-ups.

The importance of propinquity basically emanates from the special attributes of knowledge. While information has a singular meaning and interpretation and can be easily codified, transmitted, received, and stored, knowledge is vague and difficult to codify. Especially new knowledge is often tacit, complex, or ‘sticky’, i.e., highly contextual and thus best transferred via face-to-face interaction and through frequent and repeated contact, which requires spatial proximity (von Hippel, 1994). Therefore, the costs of transmitting tacit knowledge rise with distance (Audretsch, 1998; Krugman, 1998). If proximity enables and fosters the flow of ideas and knowledge, such spillovers should be strongest within agglomerations. Consequently, urban areas might also stimulate the emergence of high-quality start-ups since new and existing ideas, which are an important source of entrepreneurial

opportunities, disseminate much faster and more complete to potential applicants in an environment that allows for frequent intended or haphazard personal interaction.

The importance of propinquity in accessing and exploiting externally created knowledge for start-ups has been widely investigated in the literature. Locating close to the sources of new knowledge increases the expected profits of new firms by lowering the costs of accessing this knowledge (Audretsch and Lehmann 2005). These savings arise because the absorption of externally created knowledge is much cheaper than its internal generation and the cost of accessing knowledge spillover decrease with the proximity to its source (Harhoff 2000). Since high-quality start-ups are based on innovations that are likely to cause substantial development investments, these benefits should be particularly high for this kind of business. Correspondingly, numerous empirical studies confirmed the importance of localized knowledge spillovers emanating from research organizations and from incumbent firms for the emergence of high-quality start-ups (e.g., Bade and Nerlinger, 2000; Audretsch et al., 2006; Audretsch and Lehmann, 2005; Baptista and Mendoca, 20010; Karlsson and Nystrom, 2006).

Nevertheless, the mechanisms underlying knowledge spillovers are less clear (Storper and Venables, 2004). Empirical studies suggest that new or tacit knowledge is best disseminated and exchanged within social networks (Piore and Sabel, 1984; Saxenian, 1994; Sorensen and Stuart, 2001), which constitute social relations between actors that are based on trust and reciprocity. Compared to the government structures market and hierarchy they are, thus, an advantageous alternative for obtaining fine-grained information, tacit knowledge and resources as well as for common problem solving (Putnam, 2000; Adler and Kwon, 2002; Uzzi, 1996). However, social networks do not connect individuals

randomly. Rather, spatial proximity of individuals is crucial for the development of social ties as it increases the possibility of frequent and personal encounters which are a precondition for trust building. Geographic propinquity often implies cognitive (common knowledge and interpretation schemes) and institutional proximity (e.g., common language, social norms, and habits). Since people appear to prefer social relations with people, who share backgrounds and interests (Lazarsfeld and Merton, 1954), cognitive and institutional propinquity are a further precondition for the development of social ties (Sorensen, 2003; Boschma, 2005). For these reasons it is plausible to assume that agglomerated areas (should) exhibit relatively large and dense social networks.

Embeddedness in social networks is also found to be crucial for identifying entrepreneurial opportunities and mobilizing necessary resources.[68] Social networks facilitate the access of new knowledge and information about technological developments, market conditions, and potential business partners and, therefore, support the creation and the recognition of business opportunities (Nahapiet and Ghoshal, 1998). Furthermore, social relations are used to govern and limit the risks associated with the venture. Potential entrepreneurs rely on them to gain valid information about risks and verify the potential of their business ideas by asking for advice and feedback (Birley, 1985). Finally, new firms often experience a 'liability of newness' and the perceived risks of resource holders in affiliating a new venture increases with the innovativeness of the business concept. Therefore, especially high-quality start-ups will face severe problems in gaining

[68] e.g., Aldrich and Zimmer, 1986; Shane and Cable, 2002; Shane and Stuart, 2002; Nicolaou and Birley, 2003; Stuart and Sorensen, 2003, 2005; Davidsson and Honig, 2003; Elfring and Hulsink, 2003; Sorensen, 2003; Jack and Anderson, 2002.

potential investors, employees, suppliers, collaborators, and customers (Stuart and Sorensen, 2003; Elfring and Hulsink, 2003). The embeddedness in social networks can have a signaling or reputational effect, helping innovative start-ups to overcome these uncertainties and to secure tangible commitments from skeptical resource holders (e.g., Shane and Cable, 2002; Shane and Stuart, 2002; Nicolaou and Birley, 2003).

4.3.3.6 Differences Across Agglomerations

In the previous sections, it was argued that due to their specific characteristics, urban areas offer relatively better conditions for the creation, dissemination, and exploitation of innovative entrepreneurial opportunities compared to non-urban, less agglomerated regions. However, this is not a deterministic view on agglomerated environments. Rather, huge differences in the endowment of these characteristics can be observed among agglomerations: On the one hand, there are agglomerated areas like Silicon Valley, Munich, Amsterdam, Lyon, or Jena that provide favorable conditions for high-quality start-ups with regard to all phases of the entrepreneurial process. Although these urban areas are quite heterogeneous with regard to, e.g., their size and industry structure, they all exhibit a strong public and private research performance, diversified labor markets (especially with respect to highly qualified and specialized human capital), a broad resource base as well as large and diversified local demand markets. Moreover, these resources are reinforced and activated by rich networks linkages that foster knowledge spillover and mutual learning (see e.g. van Winden et al., 2007; Saxenian, 1994; Oßenbrügge and Zeller, 2002; Albrecht, 2005; Cantner et al., 2003).

On the other hand, there are agglomerated areas lacking one or even more of these characteristics; therefore, having more difficulties generating high-quality entrepreneurship. For example, hosting universities and research institutes does not automatically imply significant business opportunities and a high level of innovative start-up activity. Rather, research suggests that factors such as the quality of the research output, (entrepreneurial) culture, the supporting schemes for new business formation and the intensity of interaction with other actors in the regional innovation system significantly affect the level of new businesses creation out of these institutions (e.g., Di Gregorio and Shane, 2003; Saxanian, 1995; Feldman and Desrocher, 2003; Zucker et al., 1988, for a recent overview, see Astebro and Bazzazian, 2010a, b).[69] Moreover, some agglomerated areas like Manchester or Enschede still struggle with the legacy of past specialization in traditional manufacturing industries that are in decline or that have strongly declined in recent decades. They, therefore, tend to suffer from less diversified economic activities, a relatively large share of low-skilled labor, and a negative 'working-class' image that impedes the attraction of creative and highly skilled labor (van Winden et al., 2007). Finally, agglomerations can also be afflicted with an 'overembeddedness' of actors in social networks. As Grabher (1993) has impressively shown in his study on the Ruhr area, strong and long lasting social relationships

[69] The Massachusetts Institute of Technology (MIT), the University of Cambridge (UK) and the University of Austin, Texas are compelling examples how high-quality research and/or an elaborated support policy for the commercialization of university-based knowledge can lead to significant rates of innovative start-ups and the emergence of a regional high-tech cluster (Roberts and Easley, 2009; Garnsey and Heffernan, 2005; Library House, 2006, 2007; Smilor et al., 2007). In contrast, Feldman and Desrocher (2003) depict how the "reluctance to allow commercial interests to influence faculty research agendas and an abhorrence to engage in activities that might involve proprietary restrictions on knowledge dissemination" at the John Hopkins University slowed down the emergence of a high-technology cluster in the Baltimore area despite its scientific quality.

(so-called strong ties) may also be harmful for a region´s development if they suppress the generation and the implementation of new ideas and creativity. Hence, strong social networks can also turn into a disadvantage for agglomerations, which hinders the emergence of high-quality start-ups.

Consequently, not all agglomerations show equally favorable conditions for the foundation of high-quality start-ups as they are dependent on the presence and fortune combination of many resources. Nevertheless, the nexus of opportunity generation, dissemination, and exploitation that drives high-quality entrepreneurship, innovation, and growth is more likely to be found in agglomerated areas than in less agglomerated or rural regions.

4.3.4 The Impact of Competition on the Employment Effects of New Business Formation

The positive employment impact of new business formation mainly arises due to the emergence of positive supply-side effects (see, Fritsch, 2008; Fritsch and Noseleit, 2009a, b). They occur if start-ups challenge established market positions and, thus, stimulate competition. A high-level of competition, spurs the market selection and leads to a higher performance and competitiveness of the surviving new and established businesses, which, in turn, is likely to induce employment growth and welfare (cf. section 4.2). Therefore, the intensity of competition is closely related to the magnitude of new ventures' employment contribution. The larger economic impact of entry in agglomerations may, hence, be attributed to a higher degree of competition in urban areas. The higher level of competition is reflected by empirical analyses that find a higher level of start-ups (Fritsch and Falck, 2007) but a lower probability of survival (Fritsch et al., 2006;

Engel and Metzger, 2006; Weyh, 2006) in these areas. On the hand, it is plausible to assume that the intense competition is caused by a larger share of high-quality start-ups in agglomerations which are greater challenge for incumbents than their lower-quality counterparts (cf. section 4.3.1); on the other hand it seems to be related to a higher business density in agglomerations, i.e. more firms demanding inputs and providing products and services on the same market.

Concerning the input side, the density of economic actors in agglomerations causes a relatively high level of competition for all kinds of localized resources, like business premises, human capital, or most services, which results in higher input prices. Therefore, businesses in agglomerations have to be relatively efficient in order to compete successfully with competitors locating elsewhere and facing lower factor costs. Due to new business formation, competition on input markets is reinforced as the demand and, hence, the prices for inputs are likely to rise. This affects new as well as incumbent firms and forces them to become more efficient in their use of resources in order to stay in the market. If the market selection process works according to the 'survival of the fittest'-scenario, less efficient businesses are crowded out and only the most efficient start-ups and incumbents will be able to compete successfully. As a consequence, the surviving new and established businesses show considerable improvements in their competitiveness, which is likely to result in employment growth. As the scale of these supply-side effects depends on the level of local competition, it is plausible to assume that the employment effects of start-ups are relatively larger in agglomerated areas than in moderately congested and rural areas where the degree of competition is less intense.

Similarly, the relatively strong employment effects of start-ups in agglomerations can also be explained by a correspondingly high degree

of competition on regional output markets. Again, the entry of new businesses intensifies the competition and the selection process which finally stimulates the competitiveness of the local economy and, therefore, probably yields in employment growth. There are several ways in which the competition in output markets can foster employment growth on the supply-side of the market. The main supply-side effects entry may be securing efficiency and stimulating an increase in productivity by contesting established market positions; the acceleration of structural change, e.g. incumbents are substituted by newcomers; amplified innovation, particularly, the creation of new markets; and a greater variety of products and problem solutions (Fritsch and Mueller, 2004, 2008; see also Fritsch, 2008 for an overview).

4.4 Conclusions

Recent empirical results suggest that the magnitude of employment effects induced by new businesses is closely related to the density of economic activity. However, the underlying reasons for this relationship have not been investigated in detail yet. This paper tried to answer this question by relating the particularly large employment impact of start-ups in agglomerations to the special features of the urban environment. On the one hand, it was shown how the specific resource endowment of urban areas may facilitate the emergence of high-quality start-ups, which are known to induce larger direct and, more importantly, indirect employment effects than other types of new ventures. Following the view that entrepreneurship is a process of perceiving opportunities and transforming them into innovations that create economic value and growth, the number and the quality of new businesses should differ across regions depending on the pool of innovative opportunities as well as on the quantity and quality of resources available to use these

opportunities. This paper, therefore, argued that agglomerations offer relatively better conditions for the generation, dissemination, and exploitation of innovative opportunities than moderately congested and rural regions. The advantages of agglomerations in this respect emanate from the combination of a broad knowledge base, a great diversity of economic activities, a strong and diverse local demand, a rich resource base, and the proximity of actors that fosters knowledge spillovers and learning. On the other hand, it was argued that the magnitude of the employment effects is strongly related to the level of competition. An intense competition spurs the market selection and causes a higher competitiveness of the surviving firms that is likely to be reflected in larger employment growth by entry. As the level of competition and, hence, the improvements on the supply-side of the markets are larger in agglomerations than in other regions, the employment effects of new businesses are also more pronounced in urban areas.

Several policy implications can be drawn from the previous considerations. First, policy should be aware of the influence that regional characteristics exert on the employment impact of start-ups. Launching programs that foster the foundation of new ventures will, therefore, differ in their economic effects among regions. Second, the efficiency of such measures will be particularly large in agglomerated areas as these regions show larger employment effects of entry than moderately congested and rural areas. The present paper illustrated that this effect is the result of a relatively large share of high-quality start-ups as well as of an intense competition in agglomerated areas. Third, policy should focus on the promotion of high-quality start-ups as they are more likely to induce larger supply-side effects and employment growth than other types of new businesses. Since their

emergence depends on the presence of a multiplicity of resources necessary to generate and exploit innovative entrepreneurial opportunities, corresponding policy efforts would require a holistic approach affecting the quality and the quantity of these inputs. Furthermore, it is evident that the intensity of competition is a key determinant of the magnitude of the employment impact induced by new businesses. However, this effect presupposes that the market selection results in a 'survival-of the-fittest'-scenario. For this reason, the forth policy implication should be to secure and enhance the quality of the market selection process and, particularly, avoid measures disturbing the 'survival-of-the-fittest'-mechanism. Finally, if the quality of start-ups and the intensity of competition are the underlying reasons for the magnitude of the employment effects of start-ups in agglomerations, supporting these key determinants may also be a promising strategy for the promotion of new businesses in moderately congested and rural areas.

5 Does Quality make a Difference? Employment Effects of High- and Low-Quality Start-ups[70]

5.1 Introduction

Recent empirical evidence suggests that the magnitude of the effect of new business formation on employment and economic growth is closely related to the quality of new businesses.[71] Generally, the quality of a start-up denotes the intensity of the challenge in terms of competitive pressure that a newcomer exerts on the incumbents. This challenge can be regarded as the main driving force of the effect that new businesses have on economic development (for an overview see Fritsch, 2008). The quality of a new business may be indicated by factors such as the innovativeness of the supplied goods and services, the qualification of the entrepreneur, the marketing strategy that is pursued, the amount and quality of resources that are mobilized for the new business as well as its productivity.

The present paper investigates the relationship between the quality of new businesses and the magnitude of their employment effects for West German regions in the period between 1988 and 2002. The quality of start-ups is measured by their affiliation with broad economic sectors (manufacturing and services) as well as with industries.[72] We analyze the employment contribution of new ventures

[70] This chapter is essentially based on Fritsch and Schroeter (2010b): Does Quality make a Difference? Employment Effects of High- and Low-Quality Start-ups.

[71] E.g., Baptista and Preto, 2010; Falck, 2007; Fritsch and Noseleit, 2009b; Engel and Metger, 2006 and Metzger and Rammer, 2009.

[72] Another aspect of the quality of new businesses is their competitiveness in terms of survival on the market. Falck (2007) found on the level of industries that new businesses that survived for at least five years ('long-distance runners') had a significantly positive impact on GDP growth while the effect of entries that stayed in

by distinguishing between the employment development in entry cohorts which represents their direct employment effect and their overall impact on growth including their indirect effect. Our basic hypotheses are that

a) cohorts of high-quality start-ups have a relatively strong direct employment effect, i.e. they create comparatively more jobs than other new firms and
b) high-quality start-ups represent a stronger challenge for incumbent suppliers and, therefore, generate stronger overall effects on regional development than their lower-quality counterparts.

Section 5.2 explains in more detail why the quality of a start-up should make a difference and gives an overview on the respective empirical evidence that is available so far. Section 5.3 focuses on data and measurement issues. The results of the empirical analysis are presented in section 5.4.The final section 5.5 discusses conclusions for policy as well as for further research.

5.2 Why Should the Quality of Entry be Important for its Employment Effects?

Recent empirical studies have shown that the effect of new business formation on regional development occurs over a longer period of

the market for only one year ('mayflies') was statistically insignificant or significantly negative. Fritsch and Noseleit (2009b) could confirm this result on the level of regions. According to their analysis start-ups which survived four years or longer have a significantly positive effect on employment growth while the effect of new businesses that survived less than four years was insignificant or even significantly negative.

time.[73] Typically, several phases of the effects can be distinguished. In the first phase, the setting-up of new businesses leads to an employment increase, obviously because extra personnel is needed to operate the additional capacities. This can be regarded as the *direct employment effect* of new businesses. However, there are two other categories of effects that new businesses may exert on employment. One of these categories is the *displacement effect*, which results from the competition between the new and the incumbent businesses on input as well as on output markets. The entry of new ventures spurs the market selection and as long as this market selection process works according to a 'survival of the fittest'-scenario, the least productive firms have to reduce their level of economic activity or must exit the market. Because such a scenario leads to a rise in average productivity, employment should decrease as far as output remains at a constant level. There are, however, several ways in which competition by entry of new businesses can stimulate improvements on the supply-side of the regional economy that may lead to improved competitiveness and higher employment levels. The main *supply-side effects* of entry can be securing efficiency by contesting established market positions, an acceleration of structural change, amplified innovation and greater variety of products and problem solutions (see Fritsch, 2008, for a more detailed exposition). These supply-side effects are the reasons why one should expect positive employment effects of new business formation.

Hence, new businesses may lead to employment growth because they stimulate competition by challenging the incumbents. The effect of

[73] Acs and Mueller, 2008; Andersson and Noseleit, 2010; Arauzo-Carod et al., 2008; Audretsch and Fritsch, 2002; Baptista et al., 2008; Baptista and Preto, 2010; Bosma et al., 2010; Carree and Thurik, 2008; Dejardin, 2010; Fritsch and Mueller, 2004, 2006, 2008; Koster, 2010; van Stel and Storey, 2004; Mueller et al., 2008; van Stel and Suddle, 2008).

entries on economic growth depends on the competitive pressure that they exert on the incumbents as well as on the incumbent's response. This means that improvements may occur on the side of the start-ups as well as on the side of the incumbents and, therefore, do not necessarily require the newcomers to be successful and survive in order to make a contribution. Therefore, the development of the new businesses, as measured by employment in start-up cohorts, reflects only a part of their effect on growth. In addition, displacement and supply-side effects have to be considered in order to assess the overall contribution of new business formation on growth. In fact, Fritsch and Noseleit (2009 a, b) show that the indirect effects of new business formation are quantitatively much more important than the direct effects.

New businesses may differ considerably with regard to the challenge they exert on the incumbents. This challenge is closely related to the quality of the new ventures, which can be indicated by various factors such as the innovativeness of the supplied goods and services, the qualification of the entrepreneur, the amount and quality of mobilized resources, the marketing strategy that is pursued, as well as their productivity. Recent empirical studies suggest that start-ups in manufacturing generate a stronger employment effect than new businesses in other economic sectors (e.g. van Stel and Suddle, 2008). This is particularly remarkable because entries into manufacturing industries are relatively few due to high entry barriers in terms of minimum efficient size and capital intensity. However, these high entry barriers may induce a higher quality of entries due to a self-selection of potential entrepreneurs, which could explain the comparatively larger economic effect of start-ups in manufacturing industries. Besides, purely imitative entry of suppliers which just replicate the already available product program based on identical production processes and

at the same costs represents a far lesser challenge than innovative start-ups with completely new products or production processes that allow for much lower prices. It is, therefore, not very farfetched to assume that innovative entries may have a larger positive effect on growth than start-ups which are entirely imitative (for a more detailed exposition of the argument see Fritsch and Schroeter, 2009).

There are only few empirical studies investigating the employment effect of start-ups differentiated by their sector affiliation or innovativeness. Concerning the direct employment effect of new businesses, empirical analyses for Germany provide evidence that the number of employees in start-up cohorts rises in the first one or two years but then declines quite quickly and even falls below the initial employment level after about eight years. This general pattern, however, differs largely between sectors. The number of employees in cohorts of manufacturing start-ups grows stronger and remains above the initial employment level for a longer period of time than in services (Fritsch and Weyh, 2006; Schindele and Weyh, 2009).

Concerning innovative new ventures, one may well assume a particularly positive employment development within these firms compared to non-innovative start-ups as they profit from new and growing demand for their innovative products or services. Nevertheless, innovations are always associated with uncertainty regarding their market success and, if they involve R&D activities, also with respect to the success, costs and duration of these efforts. But if innovative firms survive, it is plausible to expect them to grow rapidly. Empirical results on the survival of innovative firms are mixed. Studies by Audretsch (1995) for the US and Audretsch et al. (2000) for the Netherlands indicate a relatively greater risk of failure for start-ups in industries with high R&D levels. In contrast, using data from the ZEW Founder Panel

Metzger and Rammer (2009) present evidence for somewhat higher survival rates for new ventures in innovative than in other industries in Germany. Again for Germany, Fritsch and Schindele (2010) found a lower risk of failure for start-ups in high-tech industries applying data of the establishment file of the German Social Insurance Statistics. The results of Metzger and Rammer (2009) also suggest that new businesses in German innovative manufacturing industries and knowledge-intensive services create on average more jobs per start-up than entries in non-innovative and non-knowledge-intensive industries.

In order to assess the overall growth impact of new firms Audretsch et al. (2006) included the start-up rate (number of start-ups over population) into a regional production function as an input together with capital, labor, and R&D investment. In their analysis for West-Germany they found that start-ups in high-tech industries and in the information and communication industries had a statistically significant impact on the regional level of output as well as on the level of labor productivity. The coefficients for start-ups in these industries for explaining regional GDP were smaller than for the start-ups in all industries. However, when labor productivity is used as dependent variable the coefficient for high-tech entrepreneurship was higher. Causal interpretation of these results is, however, problematic since the empirical analyses are limited to the *level* of GDP and productivity, not to their development.

Analyzing the overall effect of new business formation on regional employment for Portuguese regions Baptista and Preto (2010) found that the employment contribution businesses in knowledge-based industries, defined as ventures in high and medium technology manufacturing industries and in knowledge-based services, is substantially larger than for other start-ups. Particularly, the

displacement effects as well as the supply-side effects of new ventures in knowledge-based industries were much more pronounced compared to start-ups in non-knowledge intensive industries.

5.3 Data and Measurement

Our analysis of the effect of new business formation on regional economic development over time is at the spatial level of West German planning regions (*Raumordnungsregionen*). Planning regions consist of at least one core city and the surrounding area. Therefore, the advantage of planning regions in comparison to districts (*Kreise*) is that they can be regarded as functional units in the sense of traveling to work areas and that they account for economic interactions between districts. Planning regions are slightly larger than what is usually defined as a labor market area. In contrast to this, a district may be a single core city or a part of the surrounding suburban area (see Federal Office for Building and Regional Planning, 2003, for the definition of planning regions and districts). We excluded East Germany from our study since many analyses show that the developments in East Germany in the 1990s were heavily shaped by the transformation process to a market economy. Therefore, it represents a rather special case that should be analyzed separately (e.g., Kronthaler, 2005). The Berlin region had to be excluded due to changes in the definition of that region after the unification of Germany in 1990.[74]

[74] For historical reasons, the cities of Hamburg and Bremen are defined as planning regions even though they are not functional economic units. In order to avoid possible distortions, we merged these cities with adjacent planning regions (Hamburg with the region of Schleswig-Holstein South and Bremen with Bremen-Umland). Therefore, we have 71 regions in our sample.

The data used in this study stem from the Establishment History Panel, which is based on official employment statistics. It is provided by the Institute for Employment Research (IAB) of the Federal Employment Agency. This database comprises information on all establishments that have at least one employee subject to obligatory social insurance. Due to the fact that the database records only businesses with at least one employee, start-ups consisting of only owners are not included. Unfortunately, the database is completely on the level of establishments and does not allow us to separate new firms from new plants and new branches that are created by existing firms. In order to avoid distortions caused by new large subsidiary plants of incumbent firms, new establishments with more than 20 employees in the first year of their existence are not counted as start-ups.[75] In addition, we excluded start-ups and employment data in agriculture and fishery, energy, mining, railway, and postal services because of highly regulated market conditions that strongly diverge from the rest of the economy. Data on population and population density are from the German Federal Statistical Office.

New business formation activity is measured by the yearly start-up rates calculated according to the labor market approach; namely, the number of start-ups per period is divided by the number of employees in the regional workforce (in thousands) at the beginning of the respective period (see also Audretsch and Fritsch, 1994). Start-ups are classified as innovative or non-innovative according to their affiliation to certain industries. This classification is mainly based on the knowledge- and R&D-intensity of industries as well as on the innovativeness of their

[75] The share of new establishments in the data with more than 20 employees in the first year is rather small (about 2.5 percent).

product programs (Grupp and Legler, 2000). Manufacturing industries are classified as innovative if their R&D-intensity, i.e. the ratio of R&D expenditures over sales, is 3.5 percent or higher. Since many service firms do not have a standardized product program but provide support according to the individual needs of their customers they are not innovative in the same sense as manufacturing firms. Hence, service industries which may be relevant for innovation processes are entirely defined according to the knowledge-intensity of their inputs. These knowledge-intensive service industries comprise for example 'computer services', 'research and development in natural sciences and engineering' or 'business consultancy' (see Appendix B-1).

On average, there were about 9.98 new businesses per 1,000 employees set-up in the period under inspection (1988 and 2002). The start-up rate in services was about 7.82 and only 2.16 in manufacturing. Start-ups in innovative manufacturing and knowledge-intensive services were much less frequent with rates of 0.26 and 1.10, respectively.

Table 5-1 Average start-up rates and shares of start-ups in different types of industries

	All start-ups	Start-ups in manufacturing	Start-ups in services
Start-up rate	9.98	2.16	7.82
Share in all start-ups (%)	100	22.97	77.02
Start-up rate in innovative manufacturing	-	0.26	-
Start-up rate in knowledge-intensive services	-	-	1.10
Share of start-ups in innovative manufacturing (%) in	2.79	12.10	-
Share of start-ups in knowledge-intensive service industries (%) in	11.02	-	14.28

New firms in knowledge-intensive service industries account only for about 11 percent of all start-ups and 14.28 percent of all new ventures in services. New firms in innovative manufacturing industries represent only a share of 2.79 percent of all start-ups and 12.1 percent of all new businesses set-up in the manufacturing sector. Hence, new businesses in innovative manufacturing industries are a very rare event (Metzger and Rammer, 2009; see also Licht and Nerlinger, 1998, for the period 1985-1992).

Our indicator for regional development is the average yearly change of employment (*E*) over a two-year period (percentage), i.e., between the current period t_0 and t_{+2}. A two-year average is used in order to avoid disturbances by short-term fluctuations.

5.4 Empirical Analysis

In a first step, we analyze the direct employment effect of new business formation. This involves, on the one hand, the development of start-up cohorts differentiated by their affiliation to sectors and to innovative and knowledge-intensive industries. This type of analysis provides particular insights into the direct employment impact of new firms in different sectors and different types of industries. It also includes an investigation of the survival rates of new ventures belonging to different sectors and industries as the employment evolution in start-ups cohorts is strongly linked to the success and failure of cohort firms. On the other hand, we look at the contribution of these different groups of new firms to overall employment (section 5.4.1). In a second step, we assess the overall employment contribution of new businesses according to their affiliation to sectors and industries, including direct and indirect effects generated by the new ventures (section 5.4.2).

5.4.1 The Direct Effect of New Business Formation on Regional Employment over Time

Our period of investigation between 1988 and 2002 covers 15 yearly cohorts of new businesses. To identify their general pattern of employment development, we aggregate these cohorts and calculate average values. The development of start-up cohorts in the different industries is presented as indices with the number of employees in the initial year given by an index level of 100 and the values of subsequent years representing the percentage share of the initial level. This presentation facilitates the comparison of cohort developments across sectors and industries.

Figure 5-1 displays the evolution of entry cohorts of all start-ups as well as of new firms in manufacturing and services. Consistent with previous findings for Germany, start-up cohorts in manufacturing perform much better than those in services (Fritsch and Weyh, 2006; Schindele and Weyh, 2009). The average number of jobs in manufacturing start-ups reaches a maximum of 114 percent of the initial employment after two years and then declines to the original level six years after foundation. After 15 years, the number of employees is about 90 percent of the initial employment number. In contrast, the highest average employment level of entry cohorts in services amounts to 108 percent in the first year and reaches its basic level already four years after foundation. Since most start-ups occur in the service sector, the cohort development of all start-ups is much weaker than for manufacturing and resembles more the evolution of start-up cohorts in services. The diverging employment development of entry cohorts in manufacturing and services seems to be related to differences in the survival rates of new firms in both sectors. While on average about 59 percent of new firms in manufacturing survive the first five years after

their inception, this number is about five percent lower within the group of start-ups in services. After 15 years, only 38 percent of the initial entries in manufacturing are still in the market compared to 32 percent in services. As with employment development, the survival pattern of entry cohorts in services strongly resembles that of all start-ups since new service firms make up the vast majority of all new businesses.

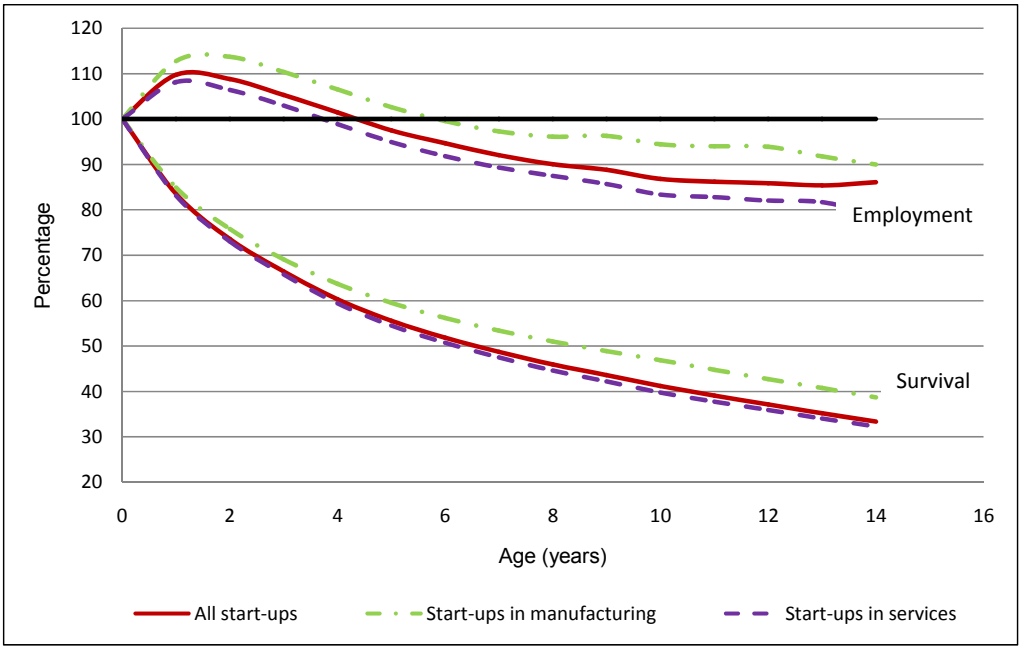


Figure 5-1 Evolution of employment and survival rates in entry cohorts of all start-ups, start-ups in manufacturing and start-ups in services

Employment development in cohorts of start-ups in innovative manufacturing industries clearly exceeds that of their non-innovative counterparts (Figure 5-2). Employment in the average start-up cohort in innovative manufacturing industries rises to 121 percent of the initial level in the second year after foundation compared to 109 percent for the start-ups in manufacturing industries classified as being non-innovative. Although employment declines in both groups during the subsequent years, the number of jobs in the innovative manufacturing

start-ups never falls below the level of the initial year. Moreover, their employment development remains fairly constant after seven years at about 106 percent of the initial number of employees.[76] By contrast, employment in the average start-up cohort in non-innovative manufacturing industries falls below the initial level after four years and continues to decline to about 85 percent of the basic employment level after 15 years.

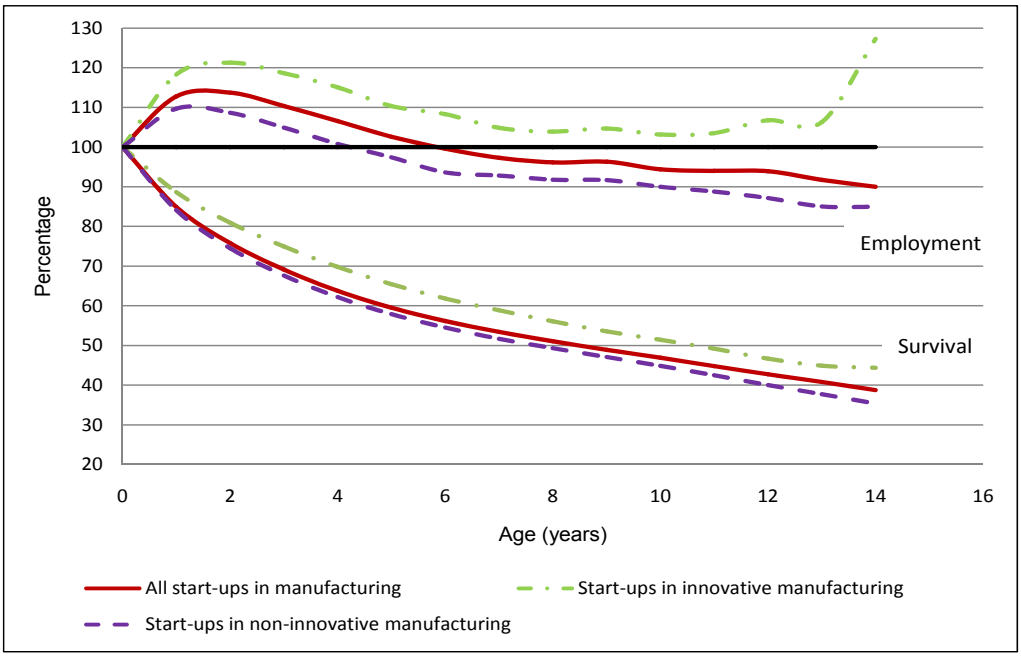


Figure 5-2 Evolution of employment and survival rates in entry cohorts of all manufacturing start-ups, start-ups in innovative and non-innovative manufacturing industries

Although the uncertainty associated with innovative business ideas might imply higher risks of failure for such start-ups, new firms in innovative manufacturing industries experience a higher probability of survival than their non-innovative counterparts, which might be an

[76] The sharp increase in the number of jobs after 14 years is caused by the cohort of 1988, which obviously represents a special case that should not be generalized.

important reason for their larger job contribution. After six years 65 percent of all new businesses in innovative manufacturing industries are still in the market compared to 58 percent of all entries in other parts of the manufacturing sector. This number goes down to 44 percent for the first and 35 percent for the second group after 15 years.

A comparison of the employment evolution in start-ups cohorts in knowledge-intensive and in non-knowledge intensive service industries (Figure 5-3) reveals that in the first group employment strongly increases after foundation and reaches 124 percent of the initial level after four years. In the subsequent years, the number of employees slightly declines but starts to grow again after ten years finally reaching 132 percent of the initial number of jobs. However, the high level of employment in the 14th and 15th year are caused by only two cohorts and should, therefore, be interpreted with caution. Nevertheless, the number of employees in the average cohort of knowledge-intensive start-ups remains clearly above the initial level and tends to grow almost over the whole period of inspection. Moreover, it considerably exceeds the employment contribution of cohorts in innovative manufacturing. This difference is quite remarkable and might be attributed to the growing demand for high-end services as well as to increasing outsourcing of such activities in advanced economies (see e.g., Peneder et al., 2003; Schettkat and Yocarini, 2007). Average development of start-up cohorts in non-innovative services is marked by a weak employment increase up to 106 percent of the initial level in the first year after their foundation. This is followed by a rapid decline that reaches the initial number of employees already after three years. After 15 years, only about three quarters of the original number of employees are still employed in the new firms. Similar to the survival pattern of new firms in innovative and non-innovative manufacturing industries,

knowledge-intensive start-ups in services are more successful than those in non-knowledge-intensive service industries as 60 percent and 39 percent of them survive the first six and 15 years while these rates are about seven and nine percent lower for the other group of new ventures. Although new firms in knowledge-intensive services have a higher probability of failure than in innovative manufacturing industries, they create on average more jobs within the first 15 years. In contrast, non-knowledge-intensive start-up cohorts in services show lower survival rates and lower employment development compared to entries in non-innovative in manufacturing.

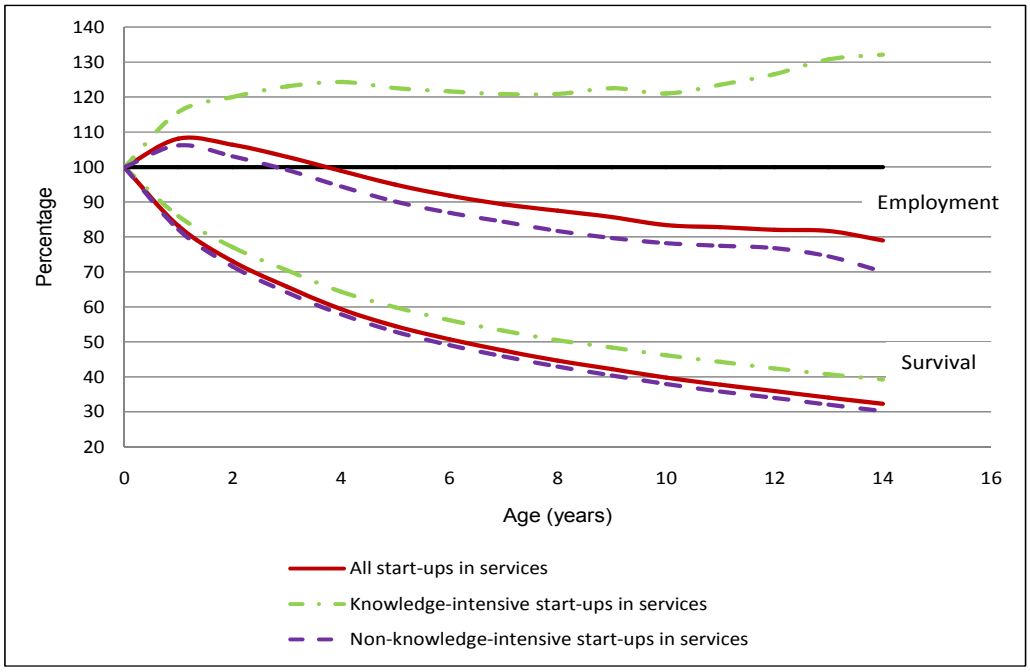


Figure 5-3 Evolution of employment and survival rates in entry cohorts of all start-ups in services, start-ups in knowledge-intensive and non-knowledge-intensive services

Although the job evolution of entry cohorts in manufacturing industries exceeds those in services considerably (Figure 5-1), the overall employment development of these two large economic sectors

in the German economy for the period from 1988 to 2002 shows a quite different picture (Figure 5-4).

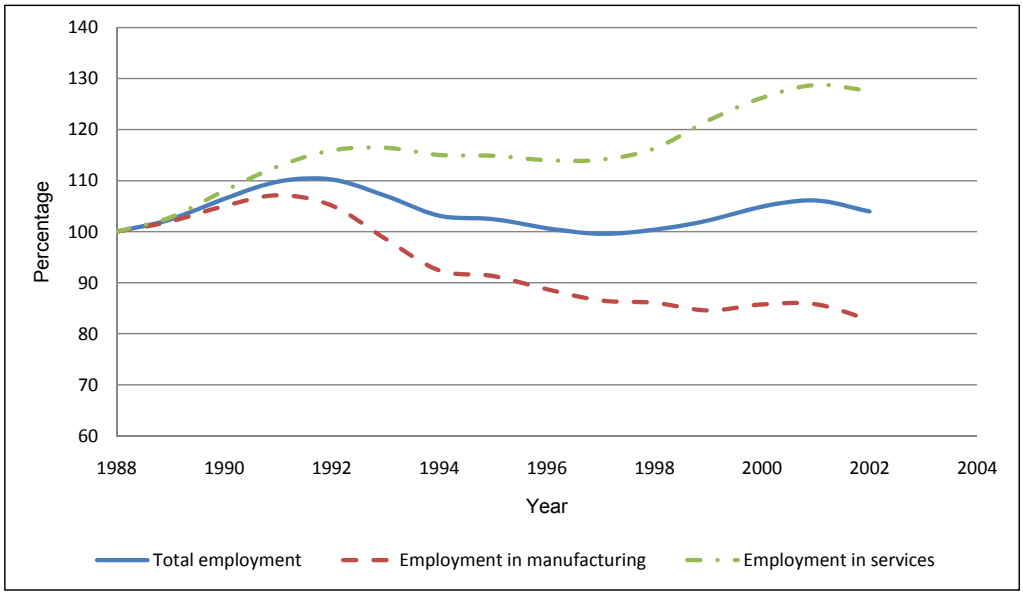


Figure 5-4 Evolution of total employment, employment in manufacturing and services

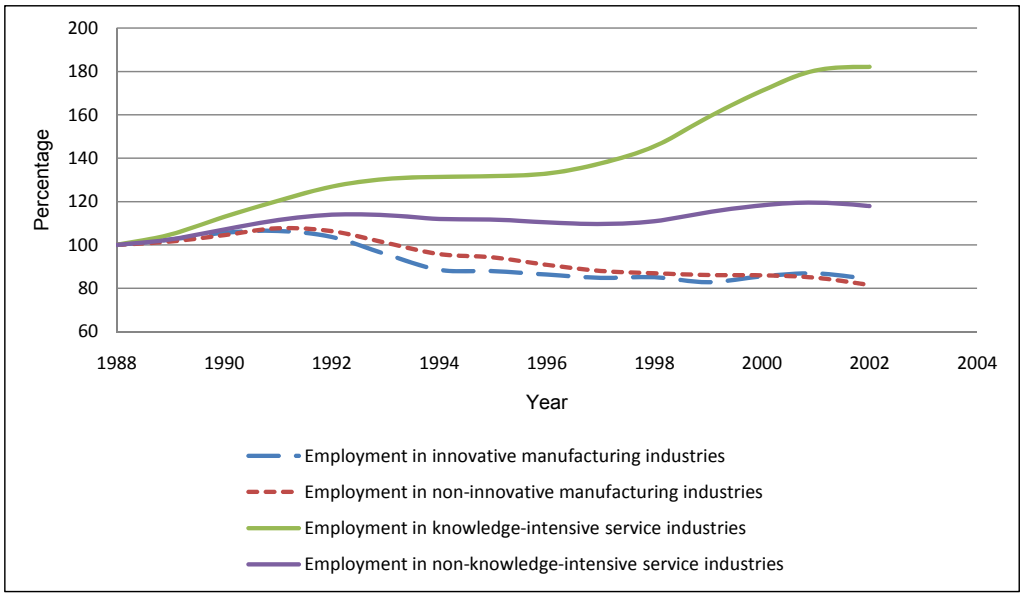


Figure 5-5 Evolution of employment in innovative and non-innovative manufacturing industries as well as in knowledge-intensive and non-knowledge-intensive service industries

While the number of jobs in services steadily grew, employment in manufacturing declined in 2002 to about 83 percent of the level in1988. Within the service sector, an impressive job increase of 82 percent can be found for the knowledge-intensive service industries while employment in non-knowledge-intensive services rise about 17 percent. In contrast, employment in innovative manufacturing and non-innovative manufacturing industries steadily decline between 1988 and 2002 (Figure 5-5). These shifts in the employment pattern are likely to indicate the general long-term trend towards the service sector as well as the growing demand for high-end services and the increasing outsourcing of knowledge-based activities in advanced economies (see e.g., Peneder et al., 2003; Schettkat and Yocarini, 2007).

Up to this point, we have investigated the evolution of employment in entry cohorts as well as their survival. However, in order to gain insights into the question whether new business formation leads to employment growth and whether there are differences in this contribution across start-ups, we now focus on their share in the total number of jobs in entry cohorts and in overall employment. Comparing the employment contribution of the 15 yearly cohorts at the end of the period under inspection (1988 and 2002) reveals some striking differences between the different groups of new firms. Figure 5-6 shows that new firms in manufacturing created roughly 35 percent of all jobs in entry cohorts although they represent only about 23 percent of all start-ups. The remaining 65 percent of the new jobs in new businesses are in service firms which make almost 80 percent of all new ventures. These figures show rather clearly that the manufacturing entries have a stronger direct employment effect than new businesses in the service sector. Such differences of the direct employment effect of new businesses become even more pronounced when distinguishing them

by their innovativeness and knowledge-intensiveness. Start-ups in innovative manufacturing contribute 16.6 percent to total cohort employment while accounting for only 2.79 percent of all new businesses. New firms in non-innovative manufacturing industries, which make a bit more than 20 percent of all new businesses, generate about 18.3 percent of all new jobs. Start-ups in knowledge-intensive service industries, which account for 11 percent of all start-ups, create 17.9 percent of all new employment in entry cohorts while the share of new jobs in non-knowledge-intensive services is about 47 percent which is considerably less than their share of 66 percent in the number of all start-ups.

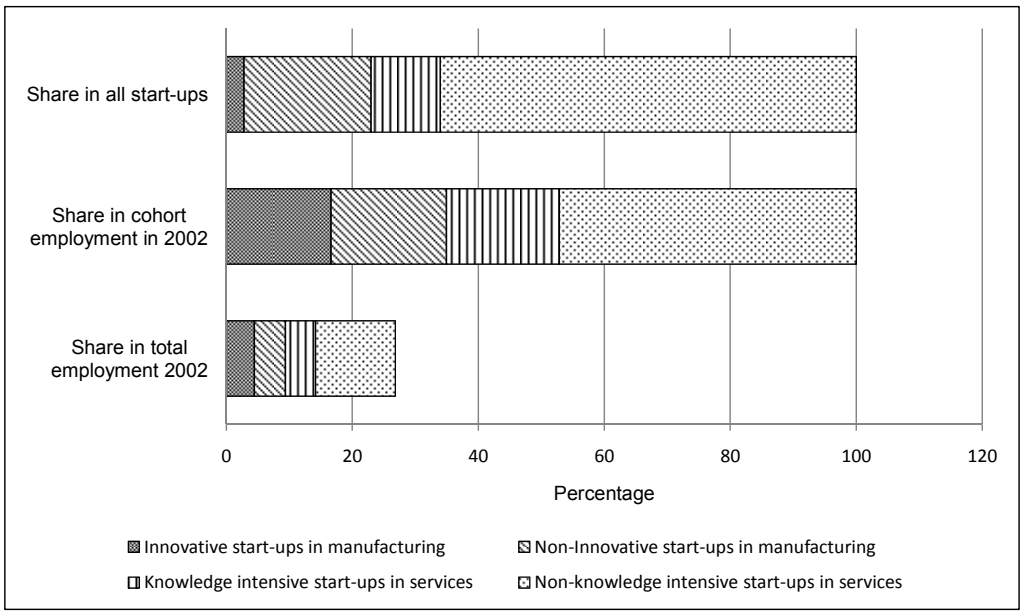


Figure 5-6 Share of start-ups and employment contribution of start-ups differentiated by their sector affiliation, innovativeness and knowledge-intensiveness

The share of employees in the 15 yearly entry cohorts at the end of the period under inspection (2002) in total employment amounts to about 27 percent (Figure 5-6). Most of these new jobs are in new service firms (almost 18 percent of all new jobs in 2002); new

manufacturing firms contribute about nine percent of overall employment in the year 2002. Given their small number, new firms in innovative manufacturing and knowledge-intensive service industries create a relatively large share in overall employment of 4.5 and 4.8 percent, respectively. The contribution of new businesses in non-innovative and non-knowledge-intensive industries to overall employment amounts to 4.9 and 12.6 percent.

In a nutshell, the preceding analysis showed that cohorts of high-quality start-ups contribute relatively more to employment growth than cohorts of their lower quality counterparts. On the one hand, this is reflected by an employment evolution of high-quality entry cohorts that clearly exceeds those of new businesses of lower quality. On the other hand, given their share in all new firms, high-quality start-ups create a comparatively larger job share both in cohort as well as in total employment. We can, thus, confirm our first hypothesis that high-quality start-ups create a relatively stronger direct employment effect than start-ups of lower quality.

5.4.2 The Overall Contribution of New Business Formation to Regional Employment over Time

Previous analyses of the effects of new business formation on employment over time for Germany (Fritsch and Mueller 2004, 2008) have found a statistically significant effect over a period of ten years. Therefore, we regresses the start-up rate of the current year (t_0) as well of the ten preceding years (t_{-1} to t_{-10}) on the average rate of employment change in region r between t_0 and t_{+2}. We estimate

$$\Delta EMP_{r,t} = \alpha + \beta \; average \quad start - up \; rate_{r,t0-t-10} + X_{r,t-1} + \mu_r + \varepsilon_{r,t}$$

whereas the start-up rate is calculated as a moving average over a period of ten years in order to allow for the time-lag that has been identified in previous analyses (Fritsch and Mueller, 2008), $X_{r,t-1}$ are other exogenous variables, μ_r is a regional fixed effect, and $\varepsilon_{r,t}$ is the error term. Panel estimation techniques were used that allowed to account for unobserved region-specific factors. Application of the Huber–White method provided robust standard error estimates.

The set of further variables ($X_{r,t-1}$) is included to account for other factors than the start-ups that are relevant for regional growth. In particular, we include population density as a catch-all variable for a number of local characteristics that might affect regional growth such as the wage level, real estate prices, quality of the infrastructure or qualification and diversity of the labor market. Since human capital is an important determinant of regional growth (Lucas, 1988; Glaeser et al., 1992), we add the regional share of highly-skilled employees to our model. In order to account for the influence of industry structure on employment growth (Glaeser et al., 1992; Peneder, 2002; Combes, 2000) we insert the employment shares of 27 out of 28 aggregated industries into our model. Finally, local employment growth may also be driven by the proximity to other markets. Hence, we included a Harris-type market potential function, which is a distance-weighted sum of GDP per population in all other planning regions (Redding and Sturm, 2008; Südekum, 2008). This variable particularly controls for spatial autocorrelation.

Table 5-1 shows our estimation results for the basic model and for different specifications of it. The effect of start-ups in all industries on regional employment growth is statistically significant at the 1-percent level (model I). Including only the new businesses in manufacturing (model II) leads to a considerably higher effect than in a model which

contains only the start-ups in services (model III). However, model II and III may overestimate the effects of start-ups since they only include start-ups in services or manufacturing, respectively. Hence, in order to avoid an omitted variable bias, all new ventures should be accounted for. In a model which contains start-ups in services and in manufacturing (model IV) both indicators are statistically significant with the effect of new ventures in manufacturing being larger than the effect for start-ups in services. This result is quite remarkable since start-ups in manufacturing make only about 20 percent of all new businesses while the start-ups in services account for about 80 percent.

Surprisingly, running our model only with start-ups in innovative manufacturing industries does not yield to any significant impact on regional employment growth (model V). By contrast, new businesses in knowledge-intensive services (model VI) have a distinct impact on regional growth (model VI). Likewise, non-innovative start-ups in services and manufacturing also exert a statistically significant influence on employment development, which is slightly smaller than the effect of knowledge-intensive new ventures (model VII). Including all three indicators into one model reveals a much larger growth effect induced by knowledge-intensive new firms than for non-innovative manufacturing and service start-ups. The indicator for start-ups in innovative manufacturing industries still remains insignificant (model VIII). With regard to the control variables we find a significantly positive effect of human capital intensity on regional employment growth which is in line with our expectations. The local industry structure also plays a role while regional population density and proximity to other markets remain insignificant.

Table 5-2 Employment effects of new business formation differentiated by the type of new firms

	I	II	III	IV	V	VI	VII	VIII
Start-up rate of all start-ups	0.294*** (3.38)							
Start-up rate in manufacturing		0.265** (2.36)		0.190** (2.08)				
Start-up rate in services			0.216*** (3.42)	0.105* (1.68)				
Start-up rate in innovative manufacturing industries					-0.002 (0.05)			-0.035 (0.84)
Start-up rate in knowledge-intensive service industries						0.200*** (2.68)		0.172** (2.27)
Start-up rate in non-innovative manufac-turing and non-Knowledge-intensive services							0.198*** (2.83)	0.157** (2.12)
Share of highly-skilled employment	0.054** (2.23)	0.058** (2.46)	0.052** (2.28)	0.054** (2.25)	0.057** (2.38)	0.057** (2.41)	0.053** (2.27)	0.054** (2.32)
Population density	-0.646 (1.21)	-0.452 (0.80)	-0.696 (1.29)	-0.395 (0.70)	-0.652 (1.18)	-0.820 (1.42)	-0.637 (1.18)	-0.727 (1.34)
Market potential	-0.284 (1.04)	-0.210 (0.78)	-0.237 (0.89)	-0.362 (1.54)	0.063 (0.23)	-0.151 (0.58)	-0.187 (0.68)	-0.239 (0.84)
Control for industry composition	Yes[a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]
Time dummies	Yes[a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]	Yes [a)]
Constant	-0.328 (1.14)	-0.317 (0.97)	-0.388 (1.37)	-0.363 (0.12)	-0.547* (1.75)	-0.534* (1.73)	-0.392 (1.33)	-0.405 (1.38)
Observations	284	284	284	284	284	284	284	284
R-squared	0.71	0.63	0.64	0.73	0.57	0.63	0.67	0.75
Log-likelihood	753.6	751.1	753.1	756.1	726.5	751.7	751.0	767.1

Notes: Robust t statistics in parentheses. ***: statistically significant at the 1 percent level; **: statistically significant at the 5 percent level; *: statistically significant at the 10 percent level. a): jointly significant at the 1 percent level.

Based on the preceding results, our second hypothesis, suggesting high-quality start-ups to generate larger overall employment effects than their lower-quality counterparts, can be confirmed with the limitation of new firms in innovative manufacturing industries. The insignificance of the effect of start-ups in innovative manufacturing industries on overall employment is quite surprising and contradicts our expectations. There are at least two explanations for this result. First, new businesses in innovative manufacturing industries are a very rare event as they make only 2.8 percent of all start-ups. Hence, their effect on overall employment may be too small to become statistically significant. Second, by regressing regional start-ups on employment change in the same region we cover only that part of the displacement and the supply-side effects that occur in the same region. This incomplete coverage of the indirect employment effects of new business formation may be relatively pronounced with regard to start-ups in innovative manufacturing industries since these new businesses tend to operate to a greater extent in interregional markets than those in non-innovative industries. It is therefore plausible to assume, that the insignificant results for start-ups in innovative manufacturing do not indicate a lacking employment impact, but are caused by problems of empirical assessment.

5.5 Discussion

Recent empirical analyses indicate a strongly positive relationship between the magnitude of the employment effects of start-ups and their quality. Our investigation confirms these findings with regard to the direct employment effect of start-ups, i.e. the employment in the new firms, and partly also for their impact on overall employment. Distinguishing different sectors, we find that new businesses affiliated

with manufacturing industries have a stronger direct and total employment effect than start-ups in services. Within these two large economic sectors the new businesses affiliated with innovative and knowledge-intensive industries make a relatively larger direct employment contribution than their non-innovative and non-knowledge-intensive counterparts. Our argument that start-ups in innovative and in knowledge-intensive industries also cause comparatively larger total employment effects due to a relatively strong competitive pressure that they exert on incumbents could only be confirmed for new ventures in knowledge-intensive services. The insignificance of the effect of start-ups in innovative manufacturing on overall regional growth may result from their relatively small number and from estimation problems with regard to their displacement and supply-side effects. Nevertheless, our results show very clearly that not all start-ups are equally important for growth and that the quality of the new businesses as indicated by their affiliation with sectors and innovative and knowledge-intensive industries plays an important role.

One main weakness of our analysis that it has in common with most other empirical work in the field pertains to the identification of innovative and knowledge-intensive services by their industry affiliation. Industry affiliation is only a rather imprecise criterion for identifying innovative start-ups because the respective industries comprise quite a number of non-innovative firms while highly innovative start-ups can and regularly do also occur in industries, which are not classified as innovative. The reason why this rough method is quite common practice in empirical analyses is that convincing alternatives are largely missing. We are also not aware of any comprehensive data set that allows for a better definition of innovative and knowledge-intensive start-ups in Germany as well as in other countries.

The empirical evidence clearly shows that it is only a relatively small share of all start-ups that is responsible for the main effect of entrepreneurship on growth. This suggests that a growth oriented policy should particularly focus on this type of start-up. Such a policy may comprise a number of different strategies. First, fight any kinds of severe market failures that hamper innovative new businesses such as an insufficient supply of Venture Capital and credit rationing. Second, stimulate the formation of more innovative start-ups. Third, support innovative start-ups also after entry.

The first strategy is conceptually unproblematic and may gain wide agreement. The main question here concerns the most suited policy instruments to achieve the goals. The second strategy – supporting the formation of innovative start-ups – offers a wide range of policy options. They comprise measures such as basic education in natural sciences, access to tertiary education, provision of entrepreneurial education programs, creating an entrepreneurial climate as well as implementing institutions which are conducive to innovative start-ups (see Henrekson and Johansson, 2009 for a more detailed discussion of these issues). Since these instruments are rather indirect in nature and targeted at the pre-entry phase they do not bear the risk of disturbing the 'survival-of the-fittest'-scenario, which is a precondition for the emergence of positive supply-side effects of new business formation. Hence, introducing measures that try to enhance the quality of start-ups in the pre-entry phase seem to be a recommendable strategy.

The third strategy comprises all kinds of support for new ventures which are already in operation. The scope for a reasonable support of existing young businesses is quite limited as this might lead to severe distortions of the market selection process. This may include deadweight losses as well as substitution effects (Santarelli and

Vivarelli, 2002; Vivarelli, 2004). In the first case, new firms obtain public support (e.g. subsidies) although they do not need them in order to survive and grow. In the latter case, subsidies keep less efficient start-ups in the market while competition would have forced them to exit. Such a distortion of the market selection process hampers the emergence of supply-side effects of new business formation, which tend to be quantitatively much more important than their direct effect, i.e. the jobs created in the young firms (see Fritsch and Noseleit, 2009a and b, for details). Hence, subsidizing firms after market entry, no matter of what quality they are, is not only a waste of taxpayer's money but may also be harmful for growth. This option can, therefore, not be recommended.

Our results clearly suggest that not all start-ups are of equal importance for growth and that the quality of new businesses plays an important role in this respect. The relationship between the quality of new businesses and its effect on overall economic development is a largely unexplored field that provides interesting and promising possibilities for further research. While this paper largely focused on innovativeness and knowledge-intensity future studies should also investigate further aspects of quality such as the qualification of the entrepreneur and the business concept as well as the amount and quality of resources that are mobilized for the new business. A main bottleneck for such research is the measurement of quality. With regard to the innovativeness of start-ups further research should particularly focus on a more reliable and precise definition of innovativeness than industry affiliation, which is dominating empirical research in this field.

6 Summary and Conclusions

This thesis contributes to the literature on the role of entrepreneurial activity for regional development as it investigates the causal mechanisms between new business formation and regional employment growth. In particular, the thesis focuses on the previously mostly unexplored role of regional characteristics and new firms' quality on the magnitude of employment effects generated by start-ups. The main results from each chapter, as well as the policy implications that can be drawn from these findings, are summarized and discussed in the next section (6.1). Based on these insights, section 6.2 introduces some guidelines for the design of an entrepreneurship policy that focuses on high-quality start-ups. Limitations of this thesis and implications for future research are presented in section 6.3.

6.1 Main Results and Policy Implications

> *"The big advances have always come from better recipes, not just more cooking*."
> (Romer 1993, p.9)

Previous research finds strong indications that the growth impact of new business formation varies, sometimes very much so, between regions. Some regions profit substantially from new venture creation; others experience only low or even negative employment effects. The underlying reasons for these findings, however, are not well understood. Chapter 2 of this thesis expands the literature by exploring determinants causing regional differences in the employment impact of start-ups for West German regions. It is found that the employment effect of start-ups differs strongly between regions and that start-ups in general have a positive impact on employment change. However, this effect becomes smaller with an increasing number of new firms. The marginal effect of new business formation even becomes negative for

very high start-up rates. This suggests that regions with a relatively low level of new firm formation will benefit more from an increase in new venture creation than will regions already exhibiting higher start-up rates. Moreover, the employment contribution of new firms was found to be strongly influenced by the degree of agglomeration, i.e., high-density areas profit most from start-up activity with regard to job creation. In addition, regions with a large share of medium-skilled workers and a high level of innovative activity, as measured by the proportion of R&D employees, benefit more from new ventures than do other regions. On the other hand, a large share of small-business employment, as well as a high short-time unemployment rate, has a negative influence on the employment effect of start-ups. This implies that policies fostering start-ups will be most effective in agglomerated areas with a high share of medium-skilled workers, a high level of innovative activity, and a relatively low start-up rate.

Chapter 2 reports a decreasing marginal employment effect of new businesses that can even become negative for very high rates of entry. Chapter 3 builds on this result and provides a theoretical explanation, something that so far has been missing from the literature. A model is developed in which the gross effects and costs of new business formation for regional development are compared. It is argued that the regional gross effects of start-ups are tightly associated with their quality and that this quality declines as the number of new businesses increases. Hence, the regional gross effect of new venture creation converges toward an upper limit for an increasing number of new firms. Moreover, entry is assumed to be associated with costs of reallocating resources. These costs of creative destruction increase with the number of start-ups but have no upper limit as every entry will generate at least some extra costs. Comparing the gross effects and costs of creative destruction, the basic argument of the model is that the

marginal net effect of new business formation will decline as the number of start-ups increases because the costs of creative destruction increase more than the respective gross effects. The model implies that a higher number of start-ups is not necessarily better for regional growth, but that, in fact, the level of entry can be 'too high' from the perspective of economic growth. Furthermore, it suggests that there are two main sources of interregional difference in the employment effect of start-ups. The first factor can be ascribed to variation in the quality of start-ups across regions. The second possible cause of such difference might be due to varying capabilities of regional growth regimes to transform the incentives generated by entry into actual growth. Both factors should be more pronounced in agglomerations, leading to a considerably higher impact of new business formation in these regions as compared to other areas.

Chapter 4 provides an explanation of the empirical results that employment effects of new ventures are much more pronounced in agglomerations than in moderately congested and rural areas. The chapter contributes to the field by linking the literature on employment effects of start-ups to insights from the literature on agglomeration benefits and urban economics. In particular, it is argued that the specific characteristics of urban areas, namely, the combination of a broad knowledge base, great diversity of economic activity, strong and diverse local demand, a rich resource base, and knowledge spillovers, contribute to the emergence of high-quality start-ups, which are known to induce larger employment effects than other types of new ventures. Moreover, compared to other regions, urban areas are characterized by relatively intense competition both on input and output markets due to a greater business density and a higher share of high-quality start-ups. Since intense competition spurs market selection and results in a higher competitiveness of the surviving firms, the supply-side effects and,

hence, the employment impact of new ventures is likely to be higher in agglomerations.

Finally, Chapter 5 elaborates on the influence of new firms' quality on the magnitude of their employment effects. To this end, the employment impact of different kinds of start-ups is estimated for West German regions for the period between 1988 and 2002. The quality of start-ups is indicated by their affiliation with broad economic sectors (manufacturing and services) as well as with industries. New firms in manufacturing and innovative industries, i.e. innovative manufacturing and knowledge-intensive service industries, are assumed to be of a higher quality than start-ups in services and non-innovative industries. Furthermore, the analysis differentiates between the direct employment effect of new firms, indicated by job development in entry cohorts, and their overall employment impact. The basic hypotheses are that (a) cohorts of high-quality start-ups have a relatively strong direct employment effect, i.e., they create comparatively more jobs than other new firms and that (b) high-quality start-ups present a stronger challenge to incumbents and, therefore, generate stronger overall effects on regional employment than their lower-quality counterparts. The empirical results clearly support hypothesis (a): new ventures in manufacturing and innovative industries contribute more to employment than new firms in services and non-innovative industries. Hypothesis (b), however, is confirmed only for new businesses in manufacturing and knowledge-intensive service industries, not for start-ups in innovative manufacturing. The insignificance of the effect of start-ups in innovative manufacturing on overall regional employment growth may be due to their relatively small number and to estimation problems with regard to their displacement and supply-side effects. However, the results plainly suggest that not all start-ups are equally important for

growth and that the quality of the new businesses, as indicated by their affiliation with sectors and innovative industries, plays an important role.

There are some important policy implications that can be drawn from these findings. First, it is the quality, not the quantity, of new firms that matters. Not all start-ups are equally important for economic growth, but the quality of new firms, i.e., the challenge they impose on incumbents, is decisive for their economic effects. As was shown for Germany, the marginal employment effect of start-ups declines and can even become negative for very high start-ups rates. Any yet, policymakers continue to believe that creating more start-ups will automatically generate more innovation, employment, and wealth. Hence, entrepreneurship policy in practice revolves about "encouraging *more* people in the population to consider entrepreneurship as an option, move into the nascent stage of taking actions to start a business and proceed into the entry and early stages of the business" (Lundström and Stevenson, 2005, p. 47). Investing huge amounts of money, public authorities in Western countries have developed a wide array of measures, e.g., transfer payments, loans, subsidies, tax benefits, and regulatory exceptions, at the national, regional, and local level to increase the mere number of new ventures (for an overview on such instruments, see Lundström and Stevenson, 2005). Moreover, policymakers argue and act in favor of lowering or even dismantling all kinds of entry barriers in order to make starting a business easier. In Germany, the promotion of new ventures became part of the active labor market policy at the federal level. The 'bridging allowance' (Überbrückungsgeld) was already implemented in the late 1980s and the 'start-up subsidy' (Existenzgründungszuschuss, ich-AG), introduced in 2003 as part of the Hartz reforms, sought to turn unemployed people

into entrepreneurs.[77] The Federal Employment Agency (FEA) invested about 2.05 billion Euro in 2004 and 1.58 billion Euro in 2009 in the promotion of start-ups out of unemployment (Baumgartner and Caliendo, 2008; FEA, 2009). However, the results of this thesis show this is likely to be the wrong strategy. In particular, it is only a small share of high-quality start-ups that creates innovation, employment, and prosperity. As a consequence, a policy that attempts to increase the sheer number of new venutures by lowering administrative barriers or subsidizing new businesses will predominantly stimulate low-quality start-ups that have only a small positive or even a negative marginal effect on economic growth. Such a strategy may lead to a revolving door regime characterized by "early failures, and precarious and temporary job creation" (Santarelli and Vivarelli, 2007, p. 464) instead of innovation and, thus, substantial and sustainable economic development. Therefore, since the effect of new business formation on regional development critically depends on the quality of start-ups, a growth-oriented policy should try to influence the quality of new firms, not just how many there are (Santarelli and Vivarelli, 2007; Piergiovanni and Santarelli, 2006; Shane, 2009). This requires, on the one hand, ceasing to offer incentives that encourage the 'marginal entrepreneur' to start a venture, i.e., cutting transfer payments, loans, subsidies, tax benefits, and the like. On the other hand, policy measures need to be (re)focused on high-quality innovative business concepts (see also

[77] The Federal Employment Agency (FEA) funded 22,000 business start-ups by formerly unemployed individuals in 1994; by 2004, this number was over 350,000, mainly due to the 'start-up-subsidy'. The two programs were different in their design, most importantly regarding the amount and duration of the subsidy. Whereas the 'bridging allowance' granted recipients the same amount that they would have received in unemployment benefits for a period of 6 months (plus a lump sum to cover social security contributions), the 'start-up subsidy' was paid for 3 years with lump sum of €600/month for the first year, €360/month for the second and €240/month for the third. Both programs were replaced in 2006 by the 'start-up subsidy program' (Gründerzuschuss). For detailed information on these programs, see Baumgartner and Caliendo, 2008.

Shane, 2009). Such a strategy may require particularly major investments in human capital – the essential precondition for high-quality entrepreneurship – by means of education, financial support, business support, and network creation (see section 6.2.2).

Second, the contribution of new businesses to economic development can be interpreted as a challenge-response interaction that results in a process of creative destruction in the Schumpeterian sense. However, in order to create employment and growth, the market process must be based on a 'survival-of-the-fittest' scenario. In particular, the emergence of supply-side effects, which are why new venture creation leads to a positive overall economic effect, require a properly functioning market mechanism. If the selection procedure is disturbed, i.e., relatively efficient firms are forced out of the market and inefficient firms are allowed to survive, it will result in a decrease in competitiveness and welfare (Fritsch, 2008). Therefore, policy is needed that will secure and enhance the market selection process. Any policy aimed at stimulating start-ups should ensure that there is a survival-of-the-fittest mechanism in place and be very cautious about interfering with this selection process. In particular, subsidizing new firms after entry might result in major distortions of the market process, which could include substitution and deadweight effects (Santarelli and Vivarelli, 2002; Vivarelli, 2004). Substitution effects emerge when financial incentives shift the cost functions of starting and operating new firms downward. This stimulates entry that otherwise would not occur and creates an artificial environment in which less efficient entrepreneurs survive as long as the subsidy continues. Deadweight effects are suffered in the situation where the subsidy recipient is likely to turn out to be efficient and does not need the support. Hence, such subsidization may be both useless – efficient firms do not need it and less efficient ventures close after the subsidy expires – and harmful –

less efficient entrepreneurs stay in the market while in the 'natural course' competition would have forced them to exit (Santarelli and Vivarelli, 2002). Therefore, any policy aimed at supporting new ventures after they have been set up may be of questionable utility. Policymakers should instead focus on instruments – so-called 'enabling policies' – that are more indirect and do not interfere with the market selection process. These include a variety of measures, such as basic education on economics and the market economy, more specialized entrepreneurial education and coaching programs as well as measures to improve the functioning of financial markets. More generally, the creation of an entrepreneurial climate and support of institutions conducive to innovation and entrepreneurship may very well be far more beneficial to economic growth than direct business subsidies.

Third, previous research and the results of this thesis strongly suggest that entrepreneurship does not take place in a wonderland of no spatial dimension, but is, instead, deeply connected to regional conditions. This is true not only for the level of new business formation, but also and most specifically to its effects on (employment) growth. As a consequence, strategies to promote venture creation need to account for the specific regional conditions. Given varying contextual conditions across regions (and, of course, nations) there are no 'one size fits all' or 'best practice' instruments of entrepreneurship policy that can be applied to all regions (or nations) (Sternberg, 2009; Tödtling and Trippl, 2005). Strategies that are successful in one context may not necessarily do well in another environment. For example, trying to reproduce the success of famous high-tech clusters such as Silicon Valley, Austin, Cambridge (UK), or Boston's Route 128 simply by copying what these places did (given that such knowledge is even available) is just not going to work. Instead, an effective and efficient policy strategy is contingent on a thorough analysis of contextual conditions as well as

measures specifically tailored to the local economic circumstances. This implies that regional key actors, like local public authorities, firms and industry associations, universities, research institutes, and business support providers, need to be involved in the design and implementation of a framework that will truly, not just theoretically, support regional growth.

6.2 Entrepreneurship Policy for High-Quality Start-Ups

Entrepreneurship and innovation are acknowledged to be the main drivers of economic development, and high-quality start-ups are a manifestation of both. Hence, public programs fostering this type of new firm might bring about economic growth. Nevertheless, such a possibility does not automatically justify policy intervention; public action must be justified by severe market distortions (Audretsch, 2003a). Specific rationales for supporting high-quality ventures are discussed in section 6.2.1, followed by suggestions for policy instruments intended to encourage the creation of such start-ups (section 6.2.2).

6.2.1 Rationales for the Promotion of High-Quality Start-Ups

In light of their economic effects, promoting high-quality new ventures seems desirable. However, in a market economy, there must be a very good reason behind any public interference in private venturing. In the case of high-quality entrepreneurship, there are mainly two arguments that can serve as rationale for such action.

First, high-quality start-ups can generate positive externalities as they are closely linked to innovations (Stam et al, 2009; Audretsch et al, 2006). This relates to the well-known argument for innovation policies, i.e., the gap between the social and private returns to R&D, due to incomplete appropriability, can lead to underinvestment in innovative

behavior from society's point of view (Nelson, 1959; Arrow, 1962). This is especially true for early-stage research, where results are not (yet) legally protected and, therefore, there is a greater divergence between social and private returns of R&D (e.g., Link and Scott, 1997; Martin and Scott, 2000). Moreover, this also holds for generic innovations that can be applied in many industries (Parker, 2009). As a result, one may assume that the existence of a positive externality that is not corrected for by the market leads to an under-provision of innovative activity in general and innovative entrepreneurial behavior in particular, which may justify governmental action.

Audretsch et al. (2006) introduce three other types of externalities that might justify public support of high-quality start-ups. They argue that network externalities result when the value of an individual's or firm's capabilities is conditional on the geographic proximity of complementary firms and individuals. The value of an innovative firm is thus higher in a cluster of other entrepreneurial ventures either because there exists a pool of specialized workers and suppliers or due to a higher potential for spillovers. Regions without a clustering of such firms will experience lower rates of high-quality start-ups as the expected value of any recognized opportunity will be correspondingly lower. Moreover, innovative new businesses provide valuable information to other actual and potential entrepreneurs even if they do not survive. Since other firms often benefit from, but do not pay for ideas and projects generated by failed firms (Audretsch, 2004), learning externalities arise. Finally, innovative entrepreneurship may create demonstration externalities, i.e., it may provide role models that will motivate other individuals to start a venture. From these arguments it follows that places with low levels of high-quality entrepreneurship will be more likely to also experience low rates of innovative new business

creation in the future. To change this path dependency, public policies may be justified.

Second, public support schemes might be justified due information imperfections. At its simplest, this concerns the inability of individuals to recognize self-employment as career option and realize the benefits of an innovative idea. Much more important, high-quality start-ups suffer from credit market constraints due to problems of asymmetric information and uncertainty (Stiglitz and Weiß, 1981; for an overview, see Parker, 2004). In general, potential investors face problems of adverse selection as they know much less about the prospects of a young firm than do the entrepreneurs themselves. The entrepreneurs have no track record, their market potential is unproven, they face a high risk of failure ('liability of newness'), and they often lack collateral as well as managerial and commercial experience. Moreover, debt financing bears the risk of ex-post changes in the borrower's behavior (moral hazard) due to monitoring problems. For high-quality start-ups, these problems are even larger and increase with the degree of novelty of the business concept. Asymmetric information may be particularly pronounced as high-quality founders are better informed about the potential and risks of the project, something that may be especially relevant for technical-based ideas as technical information is difficult to count and value (Arrow, 1962) and understanding it can require some absorptive capacity (Cohen and Levinthal, 1990) on the part of the potential investor. Moreover, entrepreneurs might be reluctant to disclose too many details of their concept as the idea is not legally protected and can – once revealed – be used for free by others (Shane and Cable, 2002; Auerswald, 2007).[78] In addition, starting an innovative venture is associated with high risks and uncertainty (Westhead and

[78] This is in fact a part of the appropriability problem stated earlier.

Storey, 1997; Lindström and Olofsson, 2001; Oakey, 2003; Tucker and Lean, 2003). Many innovations are based on some technological invention, which requires high R&D investment. However, the duration, cost, and success of these efforts are highly uncertain and investments are not yet covered by revenues.[79] Furthermore, the introduction of new products, services, and processes is accompanied by uncertainty as to market success and even successful technologies may require years or decades to become commercially viable and generate profits (Wessner, 2001). Finally, innovative start-ups generally involve intangible assets in terms of knowledge and ideas 'embedded' in the founder (Hsu, 2004) and/or firm-specific assets, which are of no or little collateral value (Revest and Sapio, 2010). Taken together, asymmetric information as well as the risk and uncertainty associated with high-quality firms make it almost impossible to assess the quality and prospects of the investment ex-ante. As a result, innovative new ventures are very unlikely to receive bank loans or other debt financing from traditional investors (Colombo and Grilli, 2007; Carpeter and Peterson, 2002; Revest and Sapio, 2010).

However, venture capitalists (VCs), i.e., venture capital funds, angel investors, or corporate investors, are skilled at dealing with these early-stage problems and are thus viable alternatives for financing unproven, entrepreneurial enterprises. Based on their specific knowledge, experience, and business networks, VCs can provide not only financing, but also offer mentoring and strategic advice, access to networks in which customers, suppliers, and potential alliance partners may be found (Colombo et al., 2006; Hsu, 2006), and help attract

[79] In fact, there are significant lead times in product development for innovative concepts, e.g., in biotechnology, up to 10 years of development prior to launch is common (Oakey, 2003).

further financing (Denis, 2004; Hellman and Puri, 2002; Mason and Harrison, 2004). As these investments are equity based, VCs share the risks, but they also profit directly from new firms' success.

Nevertheless, there is also evidence of market imperfections in early-stage venture capital (VC) funding (e.g., Harding, 2000; HM Treasury/Small Business Service, 2002, 2003; Auerswald, 2007; Wessner, 2007). Obviously, 'picking winners' seems not to be an easy task even for those who are skilled. For example, Lerner (2002) found evidence that most VC investments fail and only a small share of projects generates profit (see also Zacharakis and Meyer, 2000). In addition, VCs' main goal is to earn money and significant returns for their investors (Auerswald, 2007; Wessner, 2007). Accordingly, most VCs tend to invest close in time to market launch as the commercial prospects of innovative business concepts are well enough established to be predictable and scalable by that point. As a result, the seed phase of development often goes unfunded, i.e., promising technologies that are 'too new' to validate their commercial value face a valley of death with respect to the capital needed to convert ideas into innovations (Auerswald, 2007; Wessner, 2007; Oakey, 2003).

In addition, Mason and Harrison (2001, 2004) as well as Mason and Kwok (2010) claim that the demand side also contributes to the equity gap in early-stage financing. These authors present evidence that barriers to risk finance are created by a lack of high-quality investment cases. In particular, they claim that many entrepreneurs are not 'investment ready' due to information failures and competency gaps, i.e., they do not know different types of finance and the specific role and importance of equity finance, are not aware about the requirements of potential investors and how to fulfill them, and, in addition, do not have the skills necessary to convincingly present their investment proposal to potential investors. The second aspect concerns the 'investability' of

business ideas and involves a sufficient qualification of the entrepreneur in terms of knowledge and expertise to turn the idea into a viable business as well as the existence of a detailed and credible business plan.

Furthermore, there is evidence of an equity gap for certain investment sizes. The costs of searching, monitoring, and supervising investments are fairly independent of project size. These more or less fixed costs may make smaller projects unprofitable. Consequently, there can be a lack of funding available for relatively small business concepts (Harding, 2002; Martin et al., 2005; Mason and Harrison, 2004).

Finally, there may also be information asymmetries on the side of the potential entrepreneurs as they may have difficulty finding appropriate support services (e.g., advisory services concerning technical questions, general problems related to starting a venture, legal advice, tax issues, etc.) and financiers and in assessing the quality of these services.

As a consequence of information imperfections, there does appear to be a role for public intervention – on two fronts. First, there is a need of financial support for early stages of a firm's development and for small innovative business concepts that cannot attract VC. Second, information, advice, and mentoring services concerning business and management skills in general and firm- and technology-specific issues in particular seem to be necessary in order to enable potential innovative entrepreneurs to commercialize their ideas. A combination of both types of assistance may enable entrepreneurs to become 'investment ready', making it more likely that they will be able to attract private capital.

There are some convincing arguments to be made for government intervention with regard to the support of high-quality new businesses. However, it must be kept in mind that the presence of a market failure is only a *necessary*, not a *sufficient*, condition for policy intervention. The same factors that cause markets to fail can also impede the implementation of public intervention. To be fully justified, the policy intervention must result in an improvement of the market outcome (Fritsch, 1995) or, as some authors term it, in 'additionality' (Auerswald, 2007), i.e., the formation of high-quality start-ups that would not have occurred without public intervention. If so, a net increase in welfare, taking into consideration both the benefits and costs of the intervention, must be achieved such that the market outcome is "in total better … than the original one" (Coase, 1960, p. 22). Although the total benefits and costs of policy measures cannot be measured directly, it is at least possible to compare and evaluate different instruments as they will vary with regard to their information requirements, risks of government failures, and costs. This implies that it is the choice of measures that finally determines whether governmental intervention in the market can be justified.

6.2.2 Strategies Fostering the Emergence of High-Quality Start-Ups

Entrepreneurship is a broad and multidimensional phenomenon, not easily defined. Likewise, there is no comprehensive description and delineation of entrepreneurship as a policy domain; measures aimed at encouraging entrepreneurship cover a broad span of different policy areas – education, labor market regulation, taxes and social security, financial markets, competition, and intellectual property rights (e.g., Lundström and Stevenson, 2005; Stevenson and Lundström, 2007; Audretsch et al., 2007). I follow the view of Lundström and Stevenson (2005), who argue that the foundation of entrepreneurship policy in

general lies in the motivation, skills, and opportunities of individuals to start a business. Hence, the focus is on individuals rather than on firms. Possible actions range from heightening awareness of entrepreneurship as a viable career option and fostering its social legitimacy (motivation), to teaching the skills and sharing the know-how necessary to launching a venture (skills), to providing access to counseling, advisory services, and business networks, all in a hospitable regulatory and policy environment (opportunity). Appropriate measures can be targeted at the pre-start, start-up, or early post-start-up phase of a new business, but should mainly focus in the first two phases in order to avoid market disturbances.

An effective framework of instruments should include five distinct fields of action: entrepreneurship promotion; (entrepreneurship) education; the administrative, legislative, and regulatory environment; business support services and networks; and financing (see also Lundström and Stevenson, 2005).[80] Since the legal framework in terms of legal barriers to entry, taxes, and red tape has been extensively discussed elsewhere[81], the following sections focus on measures aimed at the other four dimensions in light of the market imperfections for high-quality start-ups discussed above. Note that this is not intended as an exhaustive list of instruments, but is instead representative of suggestions for major aspects of a policy aimed at fostering high-quality start-ups. In general, these measures are primarily enabling, i.e., they

[80] In fact, these authors also include a sixth category, namely, target group strategies, aimed at business formation by underrepresented groups in society and innovative start-ups. Since this section addresses the promotion of high-quality start-ups and the issue of minority entrepreneurship is outside the scope of this thesis, I do not discuss this category.

[81] For high-quality start-ups, see., e.g., Henrekson and Stenkula, 2010; Henrekson, 2005; Henrekson et al., 2010; Bosma et al., 2009; Hessels et al., 2008; for new firms in general, see, e.g., Djankov et al., 2008; Hansson, 2008; Ardagna and Lusardi, 2009, Ciccone and Papaioannou, 2006; Gentry and Hubbard, 2005.

are intended to encourage the individual ability to create, perceive, and evaluate innovative business ideas and turn them into innovations by launching a new venture. This kind of policy largely avoids the ‘picking the winners-problem’, i.e. choosing the most promising projects and start-ups to receive public support. Selecting new ventures that are supposed to be economically successful is critical as it requires knowledge about their future success and, thus, entails the ‘pretence of knowledge’-problem for public authorities. Moreover, it discriminates against those who are not funded, which may interfere with competition and market selection. Hence, a policy strategy that is aimed at creating more ‘winners’ by enabling individuals to identify business opportunities and start a promising venture instead of picking them seems to be much more reasonable and effective.

6.2.2.1 Entrepreneurship Promotion

Empirical results suggest that an individual’s perception of entrepreneurship as a career option is strongly influenced by entrepreneurial culture and entrepreneurial ‘heroes’ (e.g., Wagner and Sternberg, 2004; Parker, 2004; Mueller, 2006b; LaFuente et al., 2007). Likewise, a lack of social legitimacy for entrepreneurship and the absence of role models can negatively impact an individual’s decision to launch a venture. The active promotion of entrepreneurship can play a critical role in changing individual mindsets toward new business formation and in fostering a culture conducive to start-ups. Such a policy should not be restricted to increasing awareness of entrepreneurship as a career option, but should also highlight the positive role entrepreneurs play in the economy and, thus, induce favorable attitudes toward and social legitimacy of entrepreneurship (Lundström and Stevenson, 2005).

Possible measures for accomplishing these goals include entrepreneurship awards, promotion of entrepreneurial role models and success stories through several (mass) media chains (television, newspapers, magazines, radio, and the Internet), sponsoring television programs and advertising campaigns to profile entrepreneurship issues, as well as hosting entrepreneurship-related events such as idea or business plan competitions (Lundström and Stevenson, 2005). This can be done at both the national and the regional level; however, promotion activities at the regional level may be especially important as it is the presence of regional role models that is found to exert a positive impact on start-up rates in general (e.g., Wagner and Sternberg, 2004; Parker, 2004; Mueller, 2006b) and on growth ambitions of new firms in particular (Bosma, 2009; Liao and Welsch, 2003).

6.2.2.2 (Entrepreneurship) Education

Education related to the promotion of high-quality entrepreneurship should include not only education in fields relevant to starting and operating a business, but also general qualifications. The aim here is not to motivate everyone to launch a venture, but to create a general awareness of entrepreneurship and impart knowledge and teach skills important to successful entrepreneurship.

Empirical results show that most founders of innovative and growth-ambitious firms have attained a university degree (Bosma et al., 2009; Bosma, 2009; Metzger et al., 2010; Cantner and Goethner, 2010). Therefore, improving the general knowledge and skills of the regional workforce should lie at the heart of every growth-oriented entrepreneurship policy (Piergiovanni and Santarelli, 2006). Since many innovative business concepts involve either the natural sciences or some type of engineering, promoting these fields early in the education process, perhaps even well before post-secondary study, as well as

ensuring the quality of their instruction would appear to be particularly important.

Assuming that entrepreneurship is first and foremost a certain attitude toward life, largely comprised of initiative, responsibility, ability to cope with risk, independence, and creativity, teaching and nurturing these qualities would appear to be of benefit (Kuratko, 2005; Fayolle, 2006; EC, 2004). Entrepreneurial knowledge, skills, and effective modes of action seem to flourish best in a stimulating environment, notably in the presence of entrepreneurial role models (e.g., Wagner and Sternberg, 2004; Parker, 2004; Mueller, 2006b; LaFuente et al., 2007). Even in the absence of such 'perfect' conditions, entrepreneurial education can stimulate interest in and development of the skills necessary to successful entrepreneurship. This does not mean, of course, that everyone will aspire to become an entrepreneur, nor that such an outcome should be really desired, but the possession of entrepreneurial skills and attitudes can be of benefit to society even without being applied to the creation of a new business. In fact, these skills and attitudes can be usefully applied in all working activities and to life in general (Schröder and Schmidt-Rothermund, 2007; EC, 2004).

Empirical research shows that individual attitudes toward entrepreneurship form in early childhood. Hence, entrepreneurship education can start as soon as elementary school and continue until the age at which career decisions are made (Schröder and Schmidt-Rothermund, 2007, Lundström and Stevenson, 2005; Knieschewsky and Zedler, 2004). At each developmental phase, entrepreneurship education needs to take an age-appropriate design to be most effective at discovering and nurturing entrepreneurial tendencies. For example, measures could include not only the straightforward teaching of knowledge about the requirements and day-to-day business of entrepreneurs, but also more active and self-organized engagement

with the subject, e.g., role playing, business plan competitions, business simulation games, and starting a real business. Also important would be to cooperate with real entrepreneurs so as to make practical experience available to students.[82]

Entrepreneurship education programs are becoming more common at universities and those existing, e.g., at MIT, the University of Cambridge, and the University of Austin, Texas, suggest that these programs can be very successful in stimulating high-quality start-ups and in contributing to the creation of regional high-tech clusters (Roberts and Easley, 2009; Easley et al., 2007; Garnsey and Heffernan, 2005; Library House, 2006, 2007; Smilor et al., 2007; for an overview, see Astebro and Bazzazian, 2010a). These programs may also perform the function of informing students about career options and creating learning opportunities for calibrating and refining their entrepreneurial aptitude (Weber et al., 2009).

Entrepreneurship education at universities can include a broad spectrum of measures and strategies, ranging from very general aspects of entrepreneurship promotion to very specific issues of venture creation. They can be organized as an integral part of the curricula

[82] Examples of programs that have been integrated in school curricula are "Young Enterprise" in the United Kingdom (www.young-enterprise.org) and "Junior Achievement," a world-wide initiative (www.ja.org). Both programs aim at increasing students' knowledge of planning and realizing a business start-up. In Germany, JUNIOR (www.juniorprojekt.de) provides students in middle school (from the age of 14) the opportunity to set up a student company for one year in school. The students receive 90 shares á 10.00 EUR from JUNIOR to sell in their own environment. With this share capital they can realize their own business idea. The student company mimics the organization of a joint-stock company (chairman, heads of departments, employees, shareholder meetings). More recently, the program "Who Wants to Become an Entrepreneur?" (Schmitt-Rodermund and Schröder, 2004) was developed to discover and encourage the personal requirements and skills (e.g., taking risk, leading others) related to entrepreneurship as early as in adolescence. The European Commission provides an overview of instruments designed for entrepreneurship education in primary and secondary education in the EU member states (EC, 2004).

and/or as extracurricular modules open to students in all fields of study. The latter creates the possibility of bringing together and matching people from very different, but complementary, disciplines. This is important as (potential) founders of innovative businesses normally possess technical qualifications, but tend to lack expertise in marketing and management. Conversely, many management students have the skills to start a firm, but do not have a business idea.

Basic entrepreneurship education programs should be aimed at a wide audience with the intent of creating awareness of and imparting basic knowledge about the firm formation process. They can be complemented by case study seminars, idea scouting, and business plan development workshops. For would-be entrepreneurs and people in the process of launching a venture, courses may cover very specific management and legal issues associated with the start-up, e.g., financing, marketing, human resources, protection of legal rights, choice of legal form, and development of soft skills. This usually requires the involvement of external experts such as experienced entrepreneurs, venture capitalists and business angels, and consultants (OECD, 2009; Kulicke, 2005, 2006).

An important part of entrepreneurship education (and promotion) is business plan competitions. They are targeted at identifying innovative business ideas, which are developed into viable business concepts over the course of the competition. To this end, the competition is usually organized in three phases. In the first stage, business ideas are evaluated. The second phase involves devising business and marketing strategies. In the third phase, complete business plans are presented and the best concept is awarded. Participants profit from free coaching, mentoring, and feedback by experts in the field of innovative entrepreneurship (e.g., successful entrepreneurs, accountants, patent attorneys, VCs, experts in different

technology domains) who also act as jurors.[83] In this way, they not only gain important knowledge about the entrepreneurial process, but also come in contact with potential financiers and business partners. The transition from entrepreneurship education to business support services is, thus, fluid.

6.2.2.3 Business Support Services and Networks

Almost everyone who intends to start a business lacks know-how regarding the administrative steps to take and the management skills necessary to launch and operate the venture (Lundström and Stevenson, 2005). The support needs of the (potential) founders of high-quality start-ups are even more extensive. For example, they may need support in areas ranging from expert counseling and mentoring with regard to technical assistance during the period of product development, to legal advice, notably about intellectual property rights, to financial issues, to the identification of specialized employees and suppliers. Innovative (would-be) entrepreneurs not only suffer from financial constraints in obtaining such support services, but also face severe problems in identifying appropriate providers of these services and in assessing their quality. It would, therefore, not be sufficient to only grant financial help for these services, but providing access to high-quality expert advice seems to be crucial. In this respect, the promotion, building, and maintenance of regional networks of professional business service providers, financiers, firms, industry associations, etc. is an important policy instrument. Obtaining information and resources can be much easier in a network than on a

[83] See e.g., the business plan competiton of the start-up support initiative futureSAX in Saxony (www.futuresax.de), of efo.-Business in Saxony-Anhalt (www.egobusiness.de) and the Munich Business Plan Competition (MBPW, www.mbpw.de).

spot-market due to established social relationships and trust between actors in a network (Putnam, 2000; Adler and Kwon, 2002). This is particularly important for innovative start-ups as they face severe problems of asymmetric information towards resource holders. Hence, having access to such networks helps (would-be) entrepreneurs to overcome these problems, discover important information about the potential of business ideas and related risks (Birley, 1985), and find potential support services, investors, employees, suppliers, collaborators, and customers (Stuart and Sorensen, 2003; Smallbone et al., 2002; Fischer and Reuber, 2003; Elfring and Hulsink, 2003).

The provision of infrastructure in terms of, for example, free use of office space or laboratories, is a popular measure to support start-ups in general. For potential founders of innovative new ventures this may be particularly important in the early stages of their endeavor in order to develop a viable business plan and start first product development, which is a precondition for convincing potential (VC) investors (e.g., Mason and Kwok, 2010; Mason and Harrison, 2004). This support can be granted either by offering access to the facilities of a university or research institution or in the framework of a technology-oriented business incubator. However, empirical evidence on the effectiveness of business incubators in supporting entrepreneurship, innovation, and regional development is at best mixed (Lindelöv and Löfsten, 2004; Siegel et al., 2003; Tamásy, 2007). The success of such centers seems to be strongly dependent on a close linkage to a university (or another research-oriented organization), the quality of the facility management, and external linkages to other regional and national key actors supporting entrepreneurship and innovation. An effective promotion of innovative business ideas and start-ups, therefore, needs to pay attention to these critical success factors.

6.2.2.4 Financing

Innovative entrepreneurs require external financial capital to refine their business idea, but the very nature of their business concepts, especially the uncertainty of success, can block access to debt financing. VCs, who are extremely specialized and, hence, more adroit at judging the quality of such investments than are traditional debt financiers, tend to invest at a later stage of business development so as to reduce their risk (cf. section 6.2.1). Hence, public provision of venture capital at the seed phase of an enterprise might be the only way (potential) founders can get across the 'valley of death', i.e., make a successful transition from idea to an actual business plan, which is a main precondition for most VCs (e.g., Mason and Kwok, 2010; Mason and Harrison, 2004). In addition, developing innovative business concepts takes time and may even be a full-time job. It might, thus, be necessary to provide a grant covering the living expenses of very promising (potential) entrepreneurs.

The greatest pitfall of providing public venture capital involves choosing which projects to finance. If even specialists like VCs avoid taking on the risk of early-stage new businesses, how can public officials make the right choice? The short answer is that they can't. However, they can circumvent the problem by imitating the market process, i.e., by holding competitions. It is therefore reasonable to link, for example, business plan competitions to the grant of public venture capital and subsidies for personal maintenance.

6.2.2.5 Implementing the Promotion of High-Quality Start-Ups

The preceding sections make it very clear that promoting innovative new businesses is an enormous task given the number and variety of dimensions that have to be taken into consideration. In particular, it is

very important to keep in mind that a rapid increase in the number of high-quality businesses cannot be expected as start-up rates in general tend to be persistent and path-dependent over time (Fritsch and Mueller, 2007). Therefore, policy strategies need to have a long-term orientation and politicians must be patient.

In addition, fostering innovative ventures should be viewed as a long and complex process, in which the main focus is on the pre-entry stage of firm development, when awareness, motivation, and ideas have to be created, after which, strategies need to be designed that will turn these ideas into innovations by starting a venture. It is important to provide support at every link of this chain, and yet it is equally important to keep in mind that it is not the number of support activities that matters, but the quality of the aid provided that counts. This applies to the education and promotion measures as much as to the counseling, mentoring, and financial services. The success of public support schemes, therefore, is strongly dependent on the qualifications of all those involved in the process.

In recognition of the regional dimension of entrepreneurship and innovation, an effective entrepreneurship policy framework will need to be adapted to and implemented at the regional level, taking into consideration specific local conditions and involving local key actors. Universities are assumed to be the main anchor of such a strategy as they are the chief sources of new knowledge and highly-qualified individuals, both of which are ‘main ingredients’ of high-quality, innovative start-ups. Therefore, tying entrepreneurship promotion programs to universities seems an obvious and cost-effective way to stimulate the emergence of innovative new ventures.

However, the number, variety, and complexity of challenges faced by innovative start-ups means that it is not feasible for universities to

take on the entire responsibility for the success of these programs. The creation, maintenance, and development of regional support networks, including, e.g., education and research institutes, firms, industry associations, high-quality business service experts, and public authorities, will be decisive to achieve success. Such networks may also function as first port of call for potential founders who are not associated with a university.

The German EXIST program is an example of an integrated strategy for the promotion of high-quality start-ups that acknowledges and implements the aspects and success factors presented above. Initiated in 1998 by the Federal Ministry of Economics and Technology (BMWi), it is aimed at improving the entrepreneurial environment at universities and research institutions and at increasing the number of technology and knowledge-based business start-ups. It is one of several examples of funding schemes financed by the federal government that are targeted toward regional cooperation and network creation between regional key actors from industry and science in order to stimulate knowledge spillovers. Started in 1998, it is now in its third funding phase and contains three project lines, namely EXIST Culture of Entrepreneurship, EXIST Business Start-Up Grant, and EXIST Transfer of Research.[84]

The first strand promotes projects at universities and non-university research institutions that focus on imparting entrepreneurial knowledge and skills as well as promoting technology and knowledge-based start-ups. Organized as a contest for designing an integrated concept of an 'entrepreneurial university', five regions were chosen in

[84] See www.exist.de and Kulicke (2005, 2006) for more detailed information on the EXIST program.

the first phase and 10 additional regions in the second phase. EXIST III, which is currently ongoing at universities all across Germany, is a project-based funding scheme under which universities and research institutions can apply for a non-repayable grant over a three-year period. The main aims of the EXIST program include: establishing a lasting 'culture of entrepreneurship' at universities and research institutions; supporting a consistent transfer of scientific knowledge to commercial output; exploiting the enormous potential of business ideas and entrepreneurial personalities at universities and research institutions in a targeted manner; and increasing the number and chances of success of innovative start-ups. To this end, a variety of support measures has been developed to address the fields of entrepreneurship promotion, entrepreneurial education, counseling, and mentoring, as well as the provision of support infrastructure. Hence, the EXIST program intends to generate an integrated concept for the promotion of high-quality start-ups (Figure 6-1).

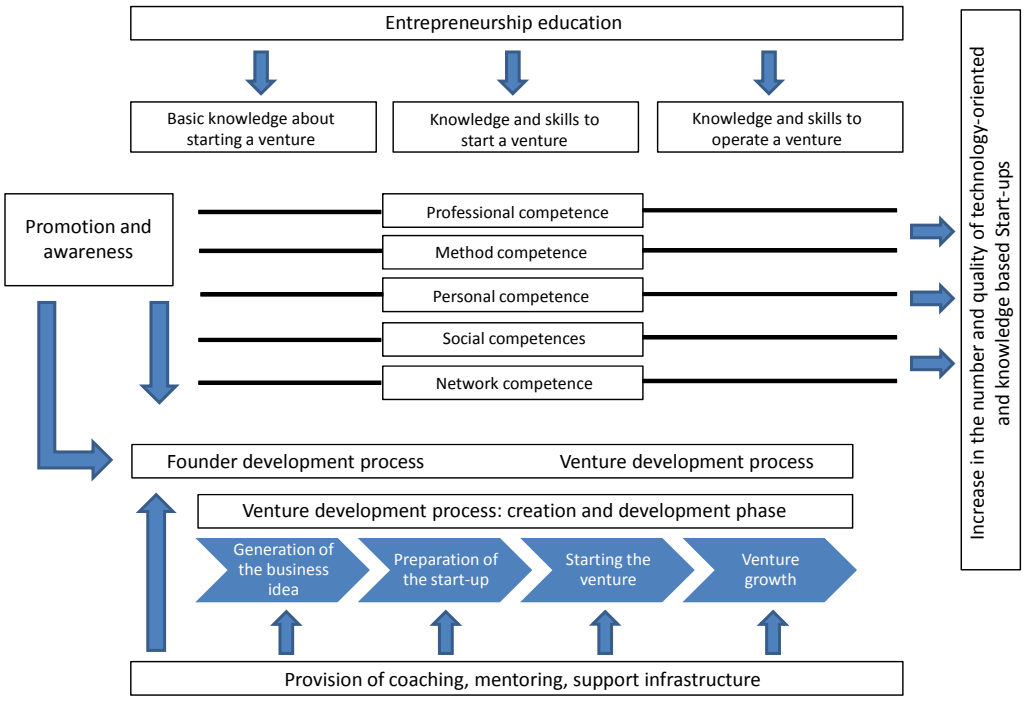


Figure 6-1 Promotion of start-ups out of universities and research institutions within the framework of the EXIST program

Successfully generating an ‘entrepreneurial culture’ at universities and research institutes also includes the creation and maintenance of a regional support network that will allow this culture to emerge and further evolve. The projects, therefore, try to build a regional support network comprising of firms, industry associations, financial institutions, business support services, education and research institutes, and public authorities and link it to other, extra-regional (EXIST) networks that allow for the exchange of knowledge and experience and, thus, learning.

The EXIST Culture of Entrepreneurship strand is complemented by the EXIST Business Start-Up Grant, which supports scientists, university graduates, and students in developing their business ideas into a business plan. Program participants receive a grant from 800 to 2,500 euro per month for a maximum of 12 months, a subsidy for materials and equipment (10,000 euro for solo start-ups and 17,000 euro for team start-ups), and 5,000 euro to cover coaching fees. In addition, they are given access to the infrastructure of the university or research institution and are eligible to take advantage of mentoring and counseling opportunities.

Finally, the EXIST Transfer of Research strand promotes technology-based start-up projects in their pre-start-up and start-up stages. In the first funding phase, research teams at universities or research institutes are supported for a maximum of 18 months to test the feasibility of their idea, develop a business plan and prototype, and launch the start-up. The funding includes enough to pay the salaries of up to three staff members and 50,000 euro for materials and equipment. After one year, funding is available to hire one more person with managerial skills as a member of the start-up team. During the second phase, the newly founded technology-oriented firms can receive

up to 150,000 euro to continue product design and pay for the expenses of finding external funding for their company.

The EXIST program shows that enormous progress has been made in the design of public support schemes to foster high-quality entrepreneurship. Although the program is too new for a full-scale evaluation of its long-term success, it appears to be quite promising (Kulicke, 2005, 2006; Kulicke and Krauss, 2005; Kulicke and Schleinkofer, 2008a, 2008b). The design and implementation of support schemes for high-quality entrepreneurship are, however, still in their early stages and it will take time before their full effects (and deficiencies) are known. Moreover, there are still a great many entrepreneurship promotion measures in effect in Germany (and surely in other countries as well), at both the national and regional level, that do not focus on high-quality start-ups and/ or are not in line with the aspects and success factors presented above[85]; these will need to be adjusted to this new policy strategy that concentrates on high-quality entrepreneurship.

6.3 Limitations and Implications for Future Research

This thesis deepens our understanding of the relationship between entrepreneurship and regional development, but it is not, of course, the last word on the subject. There are still a number of research gaps that need to be filled. First, even though some of the key variables that govern the employment effects of new venture creation at the regional level were identified, more research is necessary to discover which regional attributes moderate the employment impact of new business

[85] See e.g., Baumgartner and Caliendo (2008), Parker (2009), Gu et al. (2008) and for examples of public founding for new business formation out of unemployment in Germany, Great Britain, and the US.

formation. In particular, the dominant role of population density, implicating the existence of a variety of agglomeration economies, should be further disentangled. In this respect, case studies might be an appropriate way of complementing the extant quantitative studies. Based on this, future research should try to investigate into the characteristics and evolution of different regional growth regimes that affect the employment contribution of start-ups.

Second, the relationship between new firms' quality and the size of the employment effects created by start-ups is a largely unexplored field. Existing research strongly suggests that high-quality start-ups have a much larger growth impact than there lower-quality counterparts. However, such research is hampered by problems in defining quality. Industry and sector affiliation, which were also used in this thesis, are rather coarse indicators. Especially with regard to the innovativeness of new firms, which is usually measured by industry affiliation, more fine-grained indicators need to be developed. In addition, other aspects and even types of quality need investigation, for example, the (formal and informal) qualifications of the entrepreneur, the quality of the business concept, and the knowledge base of the new firm (indicated by, e.g., intellectual property rights), as well as the amount and quality of resources that are employed in the new business. The enhancement of existing, and the development of new data sets would be very useful and necessary in this respect.

Finally, policy recommendations and guidelines need to be more firmly based on the empirically-derived insights into the relationship between new business formation and regional economic development set out in this thesis and in other scholarly work. Especially in light of the fact that the concept of entrepreneurship has been taken up across such a vast array of policy areas, care needs to be taken so that entrepreneurship does not become just another political 'trend'.

Although past experience shows that governments do not necessarily pay attention to economic expertise, it cannot hurt to at least try to provide a few guidelines on the issue of entrepreneurship policy. Even more important is a proper evaluation of public support schemes for entrepreneurship. Huge amounts of money are spent on these programs, but only very few of them undergo an assessment of their effectiveness and efficiency (OECD, 2004c). The evaluation of new strategies such as entrepreneurship promotion, entrepreneurship education, as well as network creation and maintenance may be a particular challenge as these programs affect the number of innovative start-ups only in the long run and new approaches and methods of evaluation may need to be developed.

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Appendix A

Table A-1: Descriptive statistics

	Mean	Median	Minimum	Maximum	Standard Deviation
Employment change (%)	-0.002	-0.005	-0.15	0.24	0.048
Start-up rate (SR) (sector adjusted)	8.74	8.26	5.61	17.91	1.95
Start-up rate (sector-adjusted) squared	80.24	68.30	31.52	320.61	38.25
Population density (log) (POP)	5.40	5.27	4.24	7.13	0.66
POP * SR	47.93	44.80	28.07	91.43	11.51
High education level (HEL)	0.04	0.03	0.01	0.17	0.02
HEL * SR	0.38	0.28	0.09	1.95	0.21
Medium education level (MEL)	0.51	0.52	0.37	0.63	0.04
MEL * SR	4.58	4.37	2.68	9.27	1.04
R&D employees (R&D)	0.02	0.02	0	0.08	0.02
R&D * SR	0.25	0.22	0.07	1.15	0.13
Unemployment rate (U)	0.12	0.12	0.04	0.27	0.04
U * SR	1.16	1.06	0.40	3.39	0.46
Short-term unemployment rate (STU)	0.08	0.08	0.03	0.14	0.02
STU * SR	0.64	0.61	0.16	1.25	0.21
Long-term unemployment rate (LTU)	0.04	0.03	0.01	0.11	0.02
LTU * SR	0.30	0.27	0.04	0.86	0.15
Labor productivity (LP)	0.08	0.08	0.05	0.12	0.01
LP * SR	0.75	0.68	0.35	1.81	0.24
Small business presence (SBP)	0.45	0.44	0.29	0.69	0.07
SBP * SR	4.12	3.84	1.68	11.13	1.46
Entrepreneurial regime (ER)	0.56	0.55	0.14	0.99	0.13
ER * SR	4.86	4.59	1.24	12.80	1.68

Table A-2: Correlations between variables (Pearson correlation coefficients)

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Employment change	1																
2	Start-up rate	0.126	1															
3	Start-up rate squared	0.129	0.990	1														
4	Population density (POP)	-0.064	-0.238	-0.217	1													
5	POP * start-up rate	-0.027	0.824	0.817	0.255	1												
6	High education level (HEL)	0.041	0.095	0.102	0.497	0.351	1											
7	HEL * start-up rate	-0.036	0.406	0.407	0.374	0.664	0.892	1										
8	Medium education level (MEL)	0.127	-0.199	-0.193	-0.454	-0.555	-0.099	-0.403	1									
9	MEL * start-up rate	0.033	0.885	0.870	-0.446	0.688	-0.068	0.306	0.089	1								
10	R&D employees (R&D)	0.101	-0.002	0.007	0.346	0.278	0.761	0.773	-0.026	-0.135	1							
11	R&D * start-up rate	-0.072	0.423	0.422	0.337	0.657	0.807	0.923	-0.439	0.309	0.859	1						
12	Unemployment (U)	-0.207	0.114	0.108	0.112	0.125	-0.117	-0.259	-0.293	-0.065	0.110	-0.124	1					

Table A-2: Correlations between variables (continued)

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
13	U * start-up rate	-0.185	0.615	0.599	-0.078	0.602	-0.207	0.063	-0.448	0.495	-0.132	0.178	0.786	1				
14	Short-term unemployment (LTU)	-0.349	0.175	0.150	-0.026	0.177	-0.287	-0.268	-0.322	0.056	-0.079	-0.129	0.863	0.830	1			
15	STU * start-up rate	-0.280	0.593	0.568	-0.226	0.407	-0.360	-0.200	-0.312	0.407	-0.260	-0.069	0.729	0.904	0.902	1		
16	Long-term unemployment (LTU)	0.468	-0.029	-0.041	0.259	0.224	-0.071	-0.060	-0.356	-0.161	0.065	0.060	0.848	0.701	0.862	0.670	1	
17	LTU * start-up rate	-0.494	0.249	0.230	0.118	0.369	-0.123	-0.046	-0.372	0.070	-0.010	0.083	0.823	0.827	0.868	0.822	0.955	1
18	Labor productivity (LP)	0.016	0.591	0.577	0.132	0.642	0.622	0.683	0.016	0.476	0.676	0.654	0.290	0.342	0.224	0.287	0.269	0.352
19	LP * start-up rate	-0.071	0.922	0.913	-0.132	0.885	0.236	0.593	-0.340	0.859	0.163	0.593	0.054	0.609	0.217	0.555	0.131	0.362
20	Small business presence (SBP)	-0.070	0.523	0.496	-0.480	0.299	-0.370	-0.250	-0.114	0.485	-0.198	-0.181	0.335	0.561	0.409	0.688	0.176	0.387
21	SBP * start-up rate	-0.047	0.900	0.889	-0.356	0.719	-0.194	0.180	-0.290	0.840	-0.215	0.224	0.198	0.693	0.312	0.660	0.088	0.333
22	Entrepreneurial regime (ER)	-0.111	0.244	0.229	-0.032	0.231	-0.257	-0.187	-0.147	0.196	-0.272	-0.174	0.403	0.431	0.421	0.457	0.394	0.442
23	ER * start-up rate	-0.013	0.722	0.708	-0.204	0.633	-0.220	0.072	-0.252	0.664	-0.243	0.093	0.268	0.642	0.404	0.632	0.280	0.458
24	Market potential	0.020	-0.358	-0.337	0.813	0.052	0.440	0.295	-0.256	-0.480	0.305	0.241	-0.062	-0.275	-0.173	-0.383	0.078	-0.091

Table A-2: Correlations between variables (continued)

	Variable	18	19	20	21	24	25	26
18	Labor productivity (LP)	1						
19	LP * start-up rate	0.780	1					
20	Small business presence	0.198	0.443	1				
21	SBP * start-up rate	0.450	0.847	0.813	1			
22	Entrepreneurial regime (ER)	0.210	0.234	0.477	0.381	1		
23	ER * start-up rate	0.374	0.707	0.679	0.798	0.810	1	
24	Market potential	0.065	-0.245	-0.531	-0.465	-0.048	-0.277	1

Appendix B

B1 Classification of innovative manufacturing industries and knowledge-intensive service industries

Innovative manufacturing industries

Manufacture of chemicals and chemical products
- Manufacture of basic chemicals
- Manufacture of other chemical products
- Manufacture of man-made fiber

Manufacture of machinery and equipment n.e.c.
- Manufacture of general purpose machinery
- Manufacture of special purpose machinery
- Manufacture of domestic appliances n.e.c.

Manufacture of office, accounting and computing machinery

Manufacture of electrical machinery and apparatus n.e.c.
- Manufacture of electric motors, generators and transformers
- Manufacture of electricity distribution and control apparatus
- Manufacture of insulated wire and cable
- Manufacture of accumulators, primary cells and primary batteries
- Manufacture of electric lamps and lighting equipment
- Manufacture of other electrical equipment n.e.c.

Manufacture of radio, television and communication equipment and apparatus
- Manufacture of electronic valves and tubes and other electronic components
- Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy
- Manufacture of television and radio receivers, sound or video recording or reproducing apparatus, and associated goods

Manufacture of medical, precision and optical instruments, watches and clocks
- Manufacture of medical appliances and instruments and appliances for measuring, checking, testing, navigating and other purposes, except optical instruments
- Manufacture of optical instruments and photographic equipment

Manufacture of motor vehicles, trailers and semi-trailers

- Manufacture of motor vehicles
- Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers
- Manufacture of parts and accessories for motor vehicles and their engines

Manufacture of other transport equipment

- Manufacture of railway and tramway locomotives and rolling stock
- Manufacture of aircraft and spacecraft

Knowledge-intensive services

Financial intermediation, except insurance and pension funding

Activities auxiliary to financial intermediation

Research and development activities

Real estate activities

Legal, accounting, book-keeping and auditing activities; tax consultancy; market research and public opinion polling; business and management consultancy

Architectural, engineering and other technical activities

Advertising

Source: Own classification according to Grupp and Legler (2000)

Table B-1: Descriptive statistics

	Mean	Median	Minimum	Maximum	Standard Deviation
Start-up rate (log)	2.261	2.271	1.627	2.937	0.243
Start-up rate in manufacturing (log)	0.748	0.756	0.111	1.246	0.219
Start-up rate in services (log)	1.993	1.996	1.290	2.724	0.262
Start-up rate in innovative manufacturing industries (log)	-1.393	-1.384	-2.062	-0.747	0.233
Start-up rate in knowledge-intensive service industries (log)	0.014	0.007	-0.700	0.874	0.307
Share of highly-skilled employees	0.050	0.043	0.014	0.183	0.026
Population density (log)	5.442	5.288	0.659	4.253	7.126
Market potential (log)	-3.452	-3.435	-4.122	-2.871	0.261
Employment change	-0.001	-0.011	-0.150	0.240	0.048

Table B-2: Correlations between variables (*Pearson* correlation coefficients)

		1	2	3	4	5	6	7	8	9
1	Start-up rate all sectors (log)	1								
2	Start-up rate in manufacturing (log)	0.848	1							
3	Start-up rate in services (log)	0.934	0.776	1						
4	Start-up rate in innovative manufacturing industries (log)	0.441	0.641	0.375	1					
5	Start-up rate in knowledge-intensive services (log)	0.719	0.434	0.754	0.337	1				
6	Share of highly-skilled employees	0.198	0.058	0.045	0.147	0.56	1			
7	Population density (log)	-0.031	-0.190	0.006	-0.024	0.401	0.603	1		
8	Market potential (log)	-0.393	-0.534	-0.349	0.161	0.401	0.577	0.508	1	
9	Employment change	0.187	0.075	0.105	0.169	0.325	0.233	0.076	0.253	1

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Publikationen

Why Does the Effect of New Business Formation Differ across Regions? *Small Business Economics, 2010,* DOI 10.1007/s11187-009-9256-9 (mit Michael Fritsch*).*

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Arbeitspapiere

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Are More Start-Ups Really Better? Quantity and Quality of New Businesses and Their Effect on Regional Development. *Jena Economic Research Papers 070–2009* (mit Michael Fritsch).

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Konferenzen und Workshops

ERSA 2007, 47. Kongress der European Regional Science Association, 29. August - 2. September 2007, Paris. Präsentation: Why Does the Effect of New Business Formation Differ across Regions?

G-Forum, 11. Interdisziplinäre Jahreskonferenz zur Gründungs-forschung, Förderkreis Gründungs-Forschung e.V. (FGF), 8. - 9. November 2007, Aachen. Präsentation: Why Does the Effect of New Business Formation Differ across Regions?

Max-Planck-Institut für Ökonomie, Workshop: "Institutional Reform to Support the Entrepreneurial Economy", 14. - 18. Januar 2008, Jena, Germany. Präsentation: Interdependencies between Entrepreneurship Policy Measures. An Avenue for Future Research?

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GfR (Gesellschaft für Regionalforschung): International Summer-Conference in Regional Science: "Asymmetric shocks and the region“, 19. - 20. Juni 2009, Lübeck. Präsentation: The Effect of New Business Formation on Employment - The Dominance of Density.

G-Forum, 13. Interdisziplinäre Jahreskonferenz zur Gründungs-forschung, Förderkreis Gründungs-Forschung e.V. (FGF), 28. - 30. Oktober 2009, Leipzig. Präsentation: Does Quality make a Difference? Employment Effects of High- and Low-Quality Start-ups.

Hiermit erkläre ich,

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