

# 5 DIRECT EMPLOYMENT EFFECTS OF NEW FIRMS\*

## Further Empirical Insights Concerning the Regional and Technological Dimension

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### 1. Introduction

Recent published studies suggest a positive relationship between new business formation and economic development (Audretsch and Fritsch, 2003; Audretsch and Keilbach, 2004; Fritsch and Mueller, 2004). Regions are, however, heterogeneous units and differ with respect to determinants of growth.<sup>1</sup> These determinants also affect firm formation and firm growth, and one may, therefore, expect remarkable regional differences in the employment contribution of new firms. For example, Brixy and Grotz (2004) show that the cohort employment of Eastern German start-ups increased more than that of Western German start-ups in mature stages. Related to this discussion, particularly firms occupying market niches and entering into formative stages of new industries are seen as driving forces for positive employment effects in the long run. New or better products, processes, and services increase the technological competitiveness of an economy and, hence, its economic growth. Technology orientation and knowledge intensity are major characteristics of firms occupying market niches forcing its performance and survival (see Almus et al., 1999; Almus, 2001; Agarwal and Audretsch, 2001).

Thus far, a descriptive analysis highlighting the regional differences in the employment contributions of new firms on a more disaggregated regional level as well as those in the employment contributions of high-technology

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<sup>1</sup> Fritsch (2004), for example, summarizes a number of reasons why growth may differ between regions. Regions may differ with respect to technology regime, industry structure, knowledge, and knowledge flows, ability to cluster industries and much more.

firms has not been performed.<sup>2</sup> In this paper, we address both questions and present new findings with respect to the direct gross employment effect of new firms. In doing so, we offer descriptive results concerning the employment figures of certain cohorts of newly founded firms and their evolution in mature stages. Since we do not account for indirect effects, namely crowding-out effects in incumbents and positive supply-side effects, we only address one major part of new firms' employment effects.

Besides the two unique features of this paper, our results also allow a comparison to the findings of Boeri and Cramer (1992); Brixy and Grotz (2004); Fritsch and Weyh (2004). In contrast to all these studies, we apply the ZEW Entrepreneurship Study as an alternative database to the IAB Establishment Register. The latter database suffers from the limitation that foundations of sole proprietorships, that is, firms without any employee subject to social security contributions, are not included.

The remainder of the paper is presented as follows. In the following section we provide some background information on the topic of employment effects of newly founded firms and derive our expectations regarding the evolution of cohort employment. A short description of the database and some information on data preparation are presented in Section 3. Section 4 contains the results of our empirical analysis. The study concludes with a summary in Section 5.

## **2. Background**

### **2.1 Employment Effects of New Firms**

We start with a systematic look at the employment effects of new firms (see also Fritsch, 1997; Fritsch and Mueller, 2004). The employment effects of a cohort of a newly established firm are aligned with the course of the firm's life cycle. New firms create an initial number of new jobs at their foundation. In the mature stage, the number of jobs generated by new firms depends on their success with respect to sufficient profitability. Insufficient success results in severe consequences, like capacity reduction or market exit – both lead to job losses. These losses might be compensated by the growth of surviving firms. The early-stage growth of new firms is mainly affected by their size at foundation. This stylized fact results from wide empirical evidence seeking to test Gibrat's Law. Gibrat's Law postulates that firm growth is independent of firm size (see Geroski, 1995, for details).

In the mature stage, the employment effect of new firms can be positive or negative. The ultimate sign, thereof, depends on the ability of surviving firms to cull more new employees than other firms release due to its market involvement. The business activities of new firms interfere with the market po-

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<sup>2</sup> Weyh (2006), also presents empirical evidence concerning the development of cohort employment on a more disaggregated level.

sitions and supply chains of incumbents. Thus, an indirect new-firm employment effect is apparent. On the one hand, new or better products, processes, and services increase the surplus for sub-purchasers heightening their competitiveness and, hence, the employment security and development of existing firms. On the other hand, increasing market pressure hinders the development of competitors, which might result in job losses. Table 5.1 summarizes the main effects of new firms with respect to employment.

Table 5.1: New firms' employment effects

Effect...	...in short term	...in medium term	
...in new firms (direct effect)	Jobs at foundation	Job gains for surviving firms, which then grow	Job losses for poorly performing firms
...on other firms (indirect effect)		Job gains for sub-purchasers and suppliers	Job losses for competitors
Bottom line	Is strictly positive	Possibly positive or negative	

## 2.2 Empirical Evidence for Germany

In this paper, we emphasize the direct employment effect of new firms in the medium term. We are particularly interested in the employment contributions of new businesses in light of general employment. Boeri and Cramer (1992) present initial results for West Germany for the period from 1977 to 1987. Their results clearly suggest an inverse U-shaped curve of cohort employment evolution over time: cohort employment rose in the first two years and declined thereafter. Their picture emphasizes that cohort employment in mature stages tends to be somewhat lower compared to the initial employment. Brixy and Grotz (2004) focused on employment figures in the 1990s and dealt with East/West-differences in particular. Their findings for Western Germany are mostly in accordance with results of Boeri and Cramer (1992). The recently published study by Fritsch and Weyh (2004) gives some initial insights into long-term cohort employment development. Most remarkably, the cohort employment continuously declines after a period of eight years. The number of individuals employed by a cohort of a new firm reaches about 80 percent of the initial level 18 years after foundation. In summary, the direct employment contribution of new firms is considerable in the long term as well.

## 2.3 Regional Conditions and their Relevance to Direct Employment Effects

Regional conditions may affect the formation, survival and growth of new businesses. Brixy and Grotz (2004) show the most remarkable regional effect in terms of the comparison of Eastern and Western Germany. By applying an

alternative database, we test the validity of their results. The Eastern German economy was characterized by an (ongoing) transformation process, which has been initiated by “shock treatment” (Brezinski and Fritsch, 1995). The introduction of the Deutsche Mark on July 1, 1990 led to enormous economic pressure on the Eastern German economy. Competitiveness decreased remarkably and existing partners in the formerly communist Eastern Bloc were not willing to pay new prices in hard currency. Due to this, many firms collapsed and released huge portions of the Eastern German workforce. On the other hand, enormous transfers of resources from Western to Eastern Germany preserved a relatively substantial purchasing power. The combination of both instances defined a “start-up window” for entrants into the Eastern German market. The collapsing of firms led to low competition in local markets for non-tradable goods. The lack of infrastructure as well as a backlog in consumption in conjunction with the aforementioned preserved purchasing power offered an ideal opportunity to set up new businesses and realize fast growth. Based on these concepts, we expect that the *overall growth rate of cohort employment of newly founded Eastern German firms is higher than that of Western German firms.*

In addition, we point out regional differences within Eastern as well as Western Germany. In doing so, we expect that the evolution of cohort employment may differ between regions with high population density and those with lower density levels. High-density regions show some advantages with respect to the availability of highly qualified employees, R&D infrastructure, market size, and market heterogeneity. However, these regions are also confronted with some disadvantages; higher local taxes and rent payments as well as narrow physical spaces for firm expansion hamper firm growth in high-density regions. One may expect these regions to be mainly attractive to small-scale firms with low growth perspectives, e.g. R&D-intensive firms in early stages and service-oriented firms. As a result, growth oriented new firms may avoid settling in densely populated regions. Therefore, *regions with moderate or low population density may attract growth-oriented firms to a greater extent and, hence, perform better with respect to the evolution of new firm cohort employment than regions with high population density.*

## **2.4 Business Characteristics and their Relevance to Direct Employment Effects**

We also stress the role of firms occupying market niches and entering into formative stages of new industries. A formative industry life-cycle stage known as the ‘entrepreneurial regime’ (Winter, 1984) is favorable to the entry of new firms with knowledge-intensive or innovation activities. Trial-and-error processes and high uncertainty (e.g. regarding demand, market acceptance or technological risk) are characteristics which characterize this stage. Experienced value-added processes, minor (expected) profitability of new

business ideas and insufficient flexibility to implement radical changes in the specification of products or within the production process hinder incumbents in playing an active role in the formative stage of a new industry.

A mature industry life-cycle stage is characterized by incremental innovations, high importance of its accumulated stock of knowledge and a ‘routinized regime’ (Winter, 1984), all of which are necessary to complete the innovation process. It favors activities of incumbents if knowledge and experience are non-transferable. Some business ideas and market niches, however, are inaccessible to incumbents due to their disadvantages in implementing new specifications in their proven production processes. Hence, theories of strategic niches proposed by Porter (1979) and others suggest the simultaneous co-existence of small and large companies – if small firms identify and occupy niches. Along these lines one may expect that the *cohorts of new firms occupying market niches and entering into formative industry life-cycle stages perform better with respect to the evolution of cohort employment than the cohorts of other new firms.*

### 3. Database, Definitions, and Procedures

We use the ZEW Entrepreneurship Study to derive empirical evidence concerning the employment figures of cohorts of new firms. The database was constructed by the ZEW and the University of Mannheim via a telephone survey in 1999 (see Almus et al., 2001, for details).<sup>3</sup> The survey aimed to acquire information with regard to the annual employment as well as the survival status of firms founded between 1990 and 1993. The ZEW Foundation Panels East and West provided the parent population from which a random sample of 6,000 Eastern German and 6,000 Western German firms was drawn. These panels are based on data allocated by Creditreform, which, as the largest German credit rating agency, maintains a comprehensive database of German firms (Almus et al., 2000). With 3,702 complete interviews<sup>4</sup> out of 12,000 sample observations, the response rate (31 percent) surpasses many other German studies conducted by telephone.<sup>5</sup>

We apply the definition of the German Federal Office for Building and Regional Planning (BBR) to analyze regional differences in the evolution of employment contributions of new firms. In doing so, we differentiate between

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3 The questionnaire was part of a project co-funded by the Deutsche Forschungsgemeinschaft (DFG) under the grant LE1147/1-1. Matthias Almus and Susanne Prantl were mainly responsible for organizing the questionnaire, and both published a series of papers based on it.

4 The term “complete interview” refers to a final status of the CATI system. Nevertheless, the individual observations differ in their information content.

5 Several firms refused to answer all of the questions but at least gave information as to whether they had exited the market or not. For analyses dealing with the survival of firms, a statement regarding the survival status is possible for an additional 2,234 firms.

agglomeration regions, moderately congested regions, and rural areas. Firm affiliation is available at the zip code level, and, thus, supports the aggregation of cohorts of new firms according to these three types of regions. Due to our use of firm-level data, each firm's entire employee base is apportioned to the region in which its headquarters is located, regardless of where the employees actually work. Hence, regions that are home to firms with fewer non-resident establishments are represented more accurately.

Related to the second main contribution of the paper, we consider cohorts of knowledge-intensive and technology-intensive firms to approximate the group of firms occupying market niches. In addition, we take into account business formation activities in the information and communication technology (ICT) sector as an example of a new market. The expectations regarding the benefits of applying ICT innovations are still very high and partly confirmed in empirical studies (see, e.g., Bresnahan et al., 2002). Based on this high potential for new ICT applications, an increase in the number of ICT-related firms is evident.

The identification of high-technology firms, knowledge-intensive firms, and firms in the ICT sector is based on the industry-level bearing on the classification of technology-intensive goods derived by the Organisation for Economic Co-operation and Development (OECD) (see Gehrke et al., 1997). Manufacturing industries are divided according to their R&D intensity into 'high-technology industries' and 'other manufacturing'. High-technology industries are considered as having an average R&D intensity of 3.5 percent or higher. Recent empirical studies (see, e.g., Engel and Fier, 2001) show that many firms in the service sector carry out considerable innovation activities as well. Analogously, these service industries are treated as part of the high-technology service sector (see Grupp and Legler, 2000). Finally, we stress the importance of non-technical consulting services (NTCS) characterized by high levels of knowledge intensity. High-technology industries and NTCS form the group of knowledge-intensive firms. Firms in other industries are low-tech as well as low-knowledge-intensive. The cross-section sector 'Information and Communication Technology' is defined according to the OECD (2000) list of applicable industries. Additionally, we include the retail sale of ICT-related products in the ICT sector (see Licht et al., 2002).

Alternatively, we use information about the entrepreneurs in regarding knowledge-intensive firms. In accordance with Landstroem's (1999) definition, we regard an entrepreneur as an individual who takes on full or partial responsibility for the risk of a firm's failure and who is involved in its management. Subsequently, we aggregate individual-level data about each entrepreneur's highest graduate degree at the firm level. We differentiate among firms with at least one academically distinguished founder, those with at least one master craftsman and those with lower 'human capital' inputs.

The parent population includes about 304,000 new Eastern German firms and 474,000 new Western German firms. Our final sample of 1,683 surveyed

firms is a 0.2 percent sample of the parent population. This paper provides representative analysis concerning the cohort development and the share of new firm employment in overall employment. Thus, we make a projection from the sample data to the parent population of newly founded firms. Thus, we weight each firm with the inverse of the firm's drawing probability and subsequently calculate the sum of cohort employment. Each firm's drawing probability is differentiated by firm size, industry, and survival state. These factors are the main determinants of the firm's employment level and, hence, may eliminate the bulk of the potential sample bias.

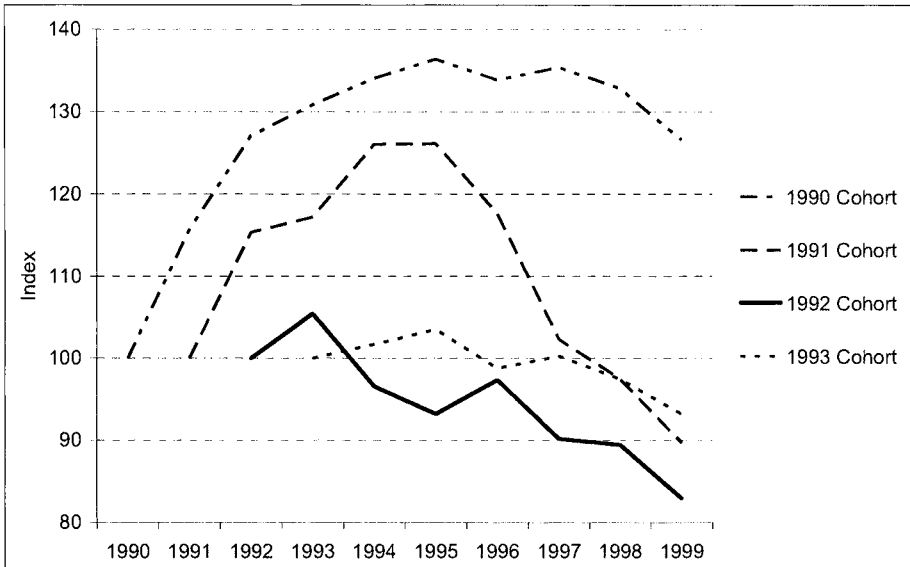
## **4. Empirical Results**

In essence, we focus on a description of cohort employment evolution and present possible explanations for observed figures. Our analyses take the employment contribution of surviving firms into account as well as that of business failures. Of course, our explanations are not sufficient to derive causal relationships. This is mainly due to the fact that we do not control for the impact of other factors – start-up size, for instance – explicitly.

### **4.1 Cohort Development Between 1990 and 1999**

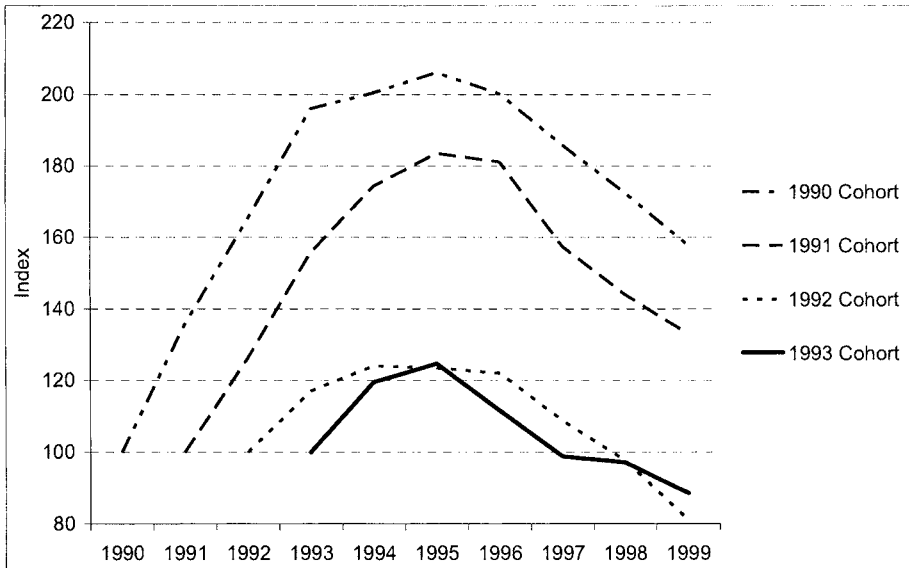
We start with an analysis resembling the study of Brixy and Grotz (2004). In contrast to these authors, we focus on firm-level cohort development, thereby taking sole proprietorships into account. Figure 5.1 shows the employment development of four Western German cohorts of new firms; figure 5.2 does the same for the four Eastern German firms. Since we are focusing on the comparison of developing patterns, we present indices. The number of employees in new firms at the foundation year is, thus, set to the initial index value of 100. The values for the subsequent years are calculated as follows: the employment statistic in year  $t$  is divided by that of the foundation year then multiplied by 100.

While, for example, the Eastern German 1990s cohort reaches an index level of 159 points, the Western German cohorts reaches only 133 points at the end of the investigation period in 1999. We observe lower index levels in the year 1999 for the 1991 cohorts. The difference between Eastern and Western German cohorts, however, is still obvious. The superiority of the Eastern German cohorts results from the so-called 'start-up window' that they were able to utilize after the German reunion: the very low firm density and firm productivity, lack of infrastructure, and backlog in consumption seen in the period offered an ideal opportunity for newly founded firms to grow.



Source: ZEW Entrepreneurship Study, authors' own computations.

Figure 5.1: Western German cohort-employment development



Source: ZEW Entrepreneurship Study, authors' own computations.

Figure 5.2: Eastern German cohort-employment development

However, the 'start-up window' closed very quickly. Subsequently worse economic conditions led to lower index levels for 1992 and 1993 cohorts of new firms in 1999. This observation is in accordance with the results of Geroski et al. (2002). They show for new Portuguese firms that founding conditions have long-term effects on survival and, as a consequence, on post-

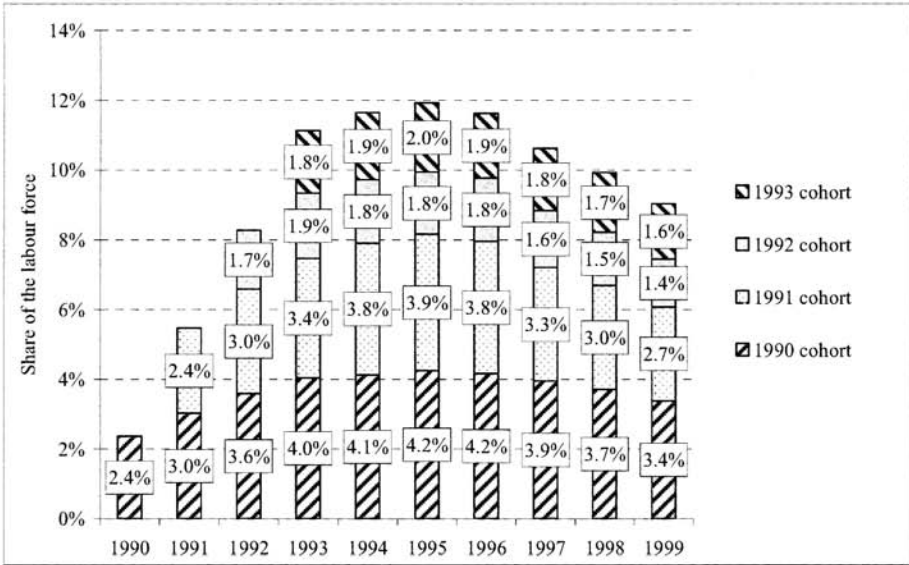


entry performance. Most of the cohort developments take the expected course, but the Western German 1992 and 1993 cohorts do not. Because initial conditions in 1993 were worse than in 1992, the 1993 cohort performed better than that of 1992. However, one might expect – regardless of the economic conditions – any cohort to definitely grow in the first year; for instance, founders tend to start very optimistically, blind to reality to a certain degree. This background facilitates the explanation of the evolvement of the two cohorts in question: after the first year of their existence, the firms of the 1992 cohort were confronted with a declining real GDP in 1993, thus having to draw on their resources to withstand the poor economic situation. The firms founded during 1993 were able to match their initial features with the prevalent conditions. After their first period, they were faced with better conditions and did not need to draw on their resources. As a consequence, they were more capable to exploit the increasing economic activity.

Figure 5.1 and figure 5.2 also show the typical inverted U-shaped, two-phase development of cohort employment. Firstly, employment losses in poorly performing firms (including market exits) are overcompensated for by firms which expand in their first years. This period is very short, and lower maximum index levels are reached if economic conditions are poor. The increase in cohort employment is then followed by a continuous decline in employment until the end of the investigation period. Employment gains if expanding firms cannot compensate for employment losses in poorly performing firms. Cohorts confronted with bad economic conditions fall short of the starting level at the end of the investigation period. This means that, in general, the direct initial employment contribution of new firms is reduced, and, hence, cannot be maintained in the long run. In summary, we observe a very similar development of cohort employment at the firm level, just as Brixy and Grotz (2004) did on the level of establishments with one or more employees making social security payments. The ‘start-up window’ for Eastern German firms closed very quickly, and the development of cohort employment follows an inverted U-shaped curve.

So far, the figures are merely displaying the development of the cohort employment of each founding cohort. However, relatively little is known about the absolute contribution that newly and recently founded firms make to economy employment. Figure 5.3 presents the shares in the whole labor force, incorporated by the founding cohorts between 1990 and 1999. Beneath the typical inverse U-shaped courses, which are mapped by the quotas of the single cohorts, one can see that more than a few people were wage-earners in young firms. The share of a cohort in the labor force at the year of foundation ranges between 1.7 and 2.4 percent. The share increases in the medium-term for the 1990 and 1991 cohorts, and decreases for the 1992 and 1993 cohorts. In 1993 about 11 percent of the labor force was employed in firms not older than four years. One in nine employees worked in a young firm. From our point of view, the direct employment effect of new firms is remarkable. The economic

conditions in the early 1990s were extraordinarily good and the transformation of the Eastern German economy to a market-oriented economic system was firing on all cylinders. These conditions indicate optimal possibilities for the entry and growth of new firms and hence, the cohort development is not representative of cohorts in the late 1990s.

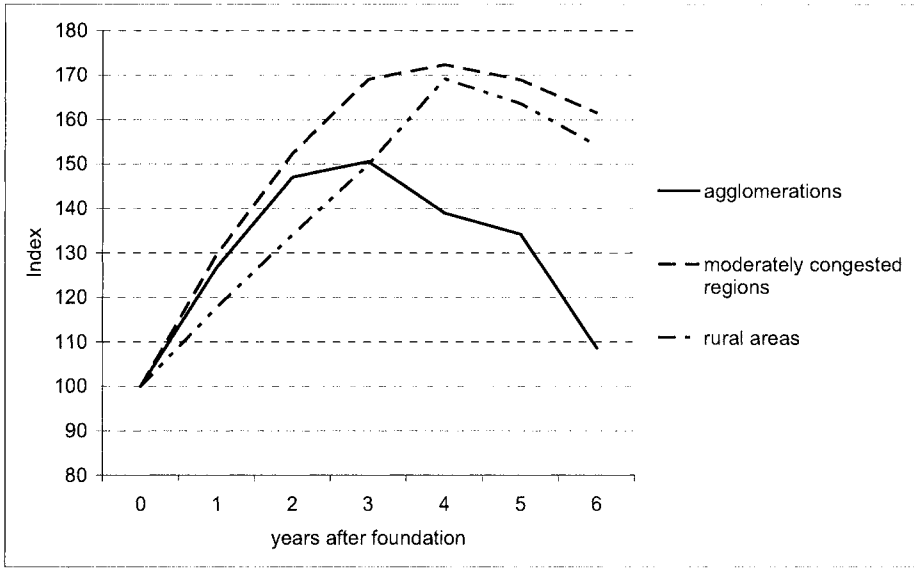


Source: ZEW Entrepreneurship Study, authors' own computations.  
 Figure 5.3: Cohorts' share-development in created jobs, scaled by labor force

### 4.2 Regional Pattern of Cohort Development

In the following, we distinguish regional differences in the evolution of cohort employment. Due to data restrictions, we are not able to stress regional differences for diverse groups of firms (e.g. by sectors) and are forced to pool the data. Therefore, we present employment figures for all new firms in agglomeration regions, moderately congested regions, and rural areas. In doing so, figure 5.4 shows the results for Eastern Germany and Western Germany. The figures suggest remarkable differences in the evolution of cohort employment between agglomeration regions on the one hand and moderately congested regions as well as rural areas on the other. The number of employees in cohorts of new firms which are located in moderately congested regions or rural areas reaches about 160 percent of initial employment in the sixth year. In contrast, cohort employment in agglomeration regions declines very quickly and ends at 109 percent of the figure at time of foundation. The differences may support the idea that regions with high population density may attract another type of new firm than regions with low density do and that growth-relevant conditions differ between the regions. The differences in employment figures for Western German regions are similar to Eastern Germany in the first four

years. Contrary to the Eastern German case, cohort employment in agglomeration regions does decline in the fifth and the sixth years. In the results, all regions show a similar change in cohort employment in the sixth year: The values range between 109 and 115. The employment figures are very similar to results of Weyh (2006) in this volume.



Source: ZEW Entrepreneurship Study, authors' own computations.

Figure 5.4: Eastern German cohort-employment development according to region



Source: ZEW Entrepreneurship Study, authors' own computations

Figure 5.5: Western German cohort-employment development according to region.

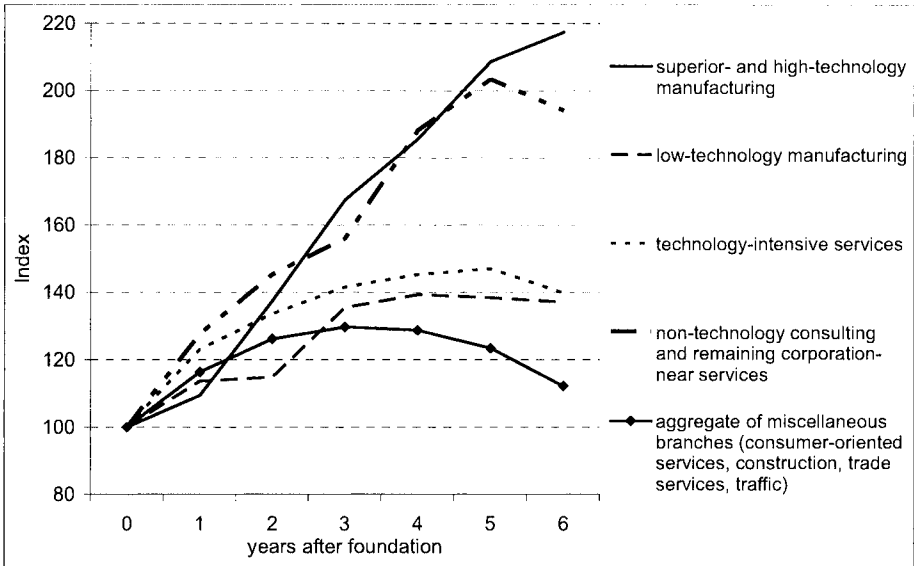
### 4.3 Technology and Human Capital Differentiation

Now we focus on the second main contribution of our paper: the role of new firms occupying market niches and/or entering into formative industry life-cycle stages. Firstly, we look at the cohort-employment development of different groups of firms according to their industry. Secondly, we discuss the implications regarding sharing between knowledge-intensive firms as well as of firms in high-tech and ICT-related industries in the cumulative number of employees of all newly founded firms. We are unfortunately obliged to pool the data and to depict a period of just six years. This is due to the small number of newly founded firms in our dataset attributable to the group of high-tech-oriented firms. Thus, an analysis differentiated according to year of foundation makes no sense and, consequently, we have to ignore founding information and pool the data in order to achieve a sufficient number of observations for our analysis. The loss of pooling is given by the reduction of the investigation period, which is limited by the information on employees for the youngest cohort (= cohort of new firms founded in 1993). In this case, we have information for six years.

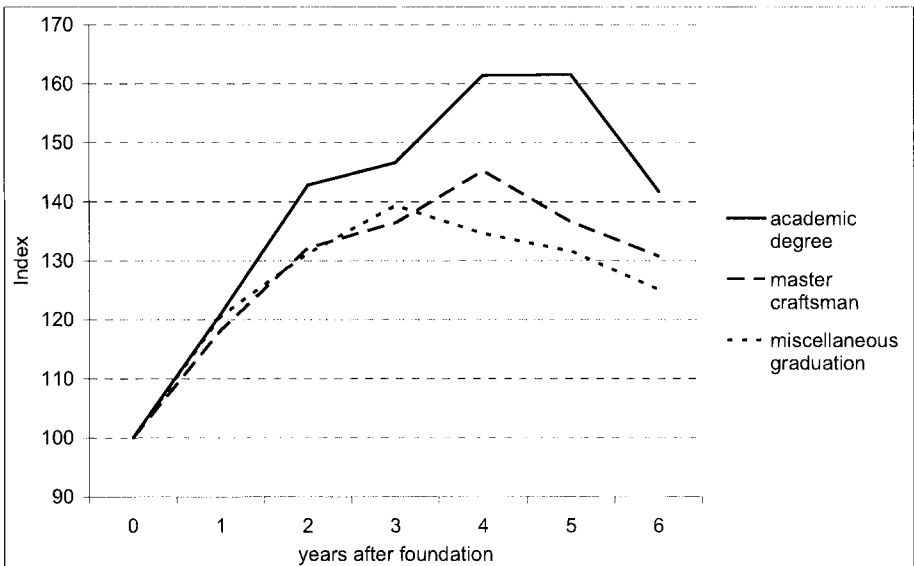
Figure 5.6 screens the cohort-employment development for five sub-groups of the private economy. It can be observed that the curve representing the cohort employment of superior-tech and high-tech firms steadily increases and reaches an index value of nearly 220 points after six years. The growth of the cohort employment of firms offering technology-intensive services or non-technical consulting services is smoother, with the curves reaching their top levels (140 and 150) in the fourth and fifth years. The cohort employment of the remaining firms in low-tech industries already reaches its top level in the third year and declines afterwards to an index level of 110 until the sixth year after foundation.

Figure 5.7 shows the cohort-employment development according to the founders' 'human capital', which is measured at the firm level by the highest academic achievement of the involved entrepreneurs. We differentiate among firms founded by academics, master craftsmen, and founders with lower qualifications. The curve representing the employment development of start-ups founded by academics outpaces the two other groups, reaching a top level of about 160 index points and falling back to 140 points in the sixth year. The end levels of each of the other two groups are about 130 points. It is amazing that the curves of these two aggregates end in close contact despite the fact that – besides the observations which were not able to be assigned – several founders lacking an apprenticeship or any other education are included in the residual group. Craft firms, however, are usually small and remain so because they are, due to regulation, confronted less with the 'pressure to grow' in order to remain in the market. It could be argued that the predominance of new 'academic' firms results from the fact that these firms operate mostly in the high-tech industries of manufacturing. However, in our sample, the smallest

share of academics founded new firms in these industries. Most academics – neglecting the aggregate of the miscellaneous industries – settled in the technology-oriented services sector. From the opposite point of view, the highest share of academic entrepreneurs can also be found in the tech services industry. The second-largest share is associated with non-technical consultants.

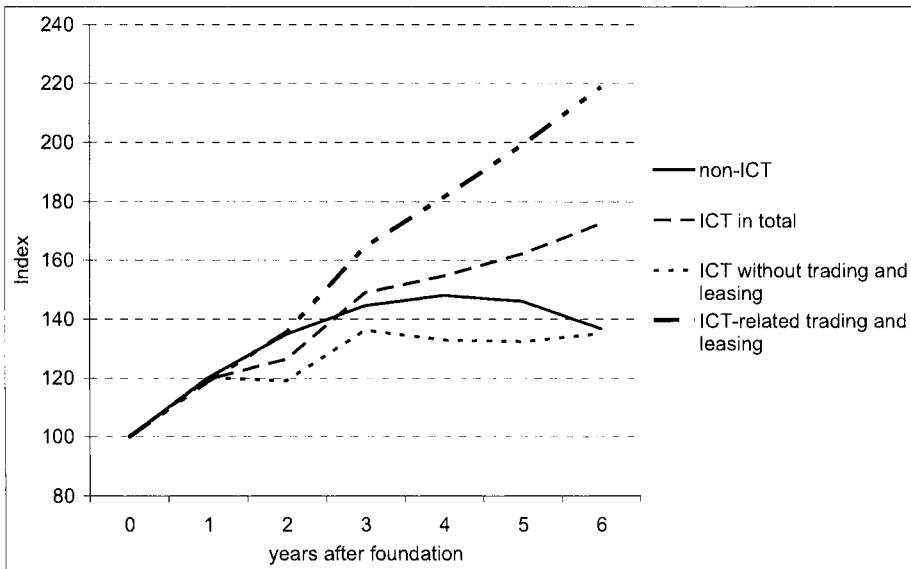


Source: ZEW Entrepreneurship Study, authors' own computations.  
Figure 5.6: Industry-specific cohort-employment development



Source: ZEW Entrepreneurship Study, authors' own computations.  
Figure 5.7: Cohort-employment development categorized by founders' human capital

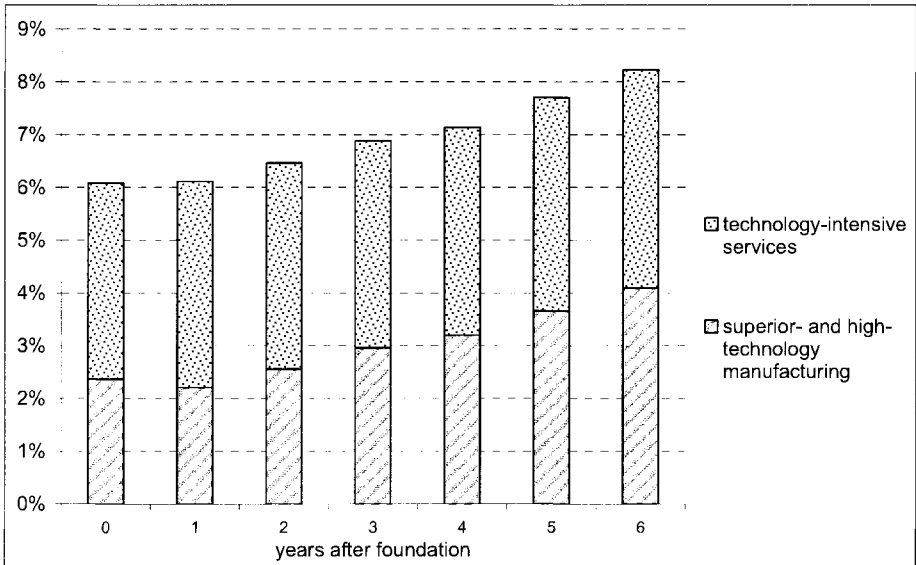
Figure 5.8 presents the compendious employment development of new firms pertaining to the ICT sector. The analysis of the ICT sector follows the idea of separating a group of firms, which entered markets in formative stages. The four sub-groups regarded are: the ICT sector as a whole, the ICT sector without trading and leasing, ICT-related trading and leasing, and non-ICT industries. Firms with ICT-related trading and leasing activities reach an index level of about 220 at their peak and outperform the group of remaining ICT firms as well as remaining firms outside the ICT sector. It is remarkable that the cohort of software developers does not achieve a higher employment growth compared to the firms outside the ICT sector. In contrast to the results for high-tech industries, high-tech orientation does not necessarily achieve a high employment growth. In the early 1990s, computers started their diffusion into private households. Thus, the ICT-consumer market consisted mainly of retailers, which were beginning to prosper and build up employment. The boom of software developers and service suppliers started a few years later and led to flourishing founding conditions for mid-1990s ICT-cohorts.



Source: ZEW Entrepreneurship Study, authors' own computations.

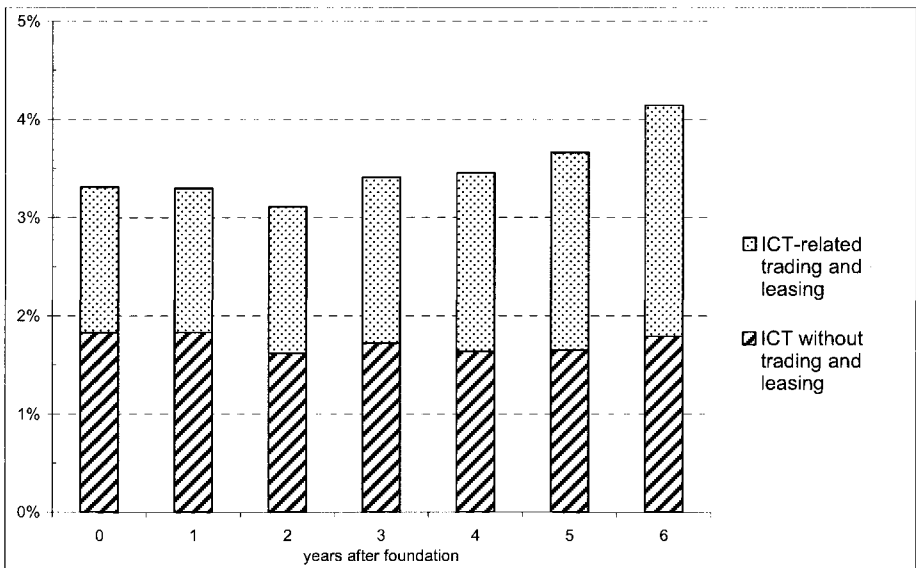
Figure 5.8: ICT-specific cohort-employment development

Almost all of the presented results suggest that cohorts of firms occupying market niches or entering new markets achieve higher employment growth compared to the others.



Source: ZEW Entrepreneurship Study, authors' own computations.

Figure 5.9: Job-share development of cohorts attributable to technology-intensive industries



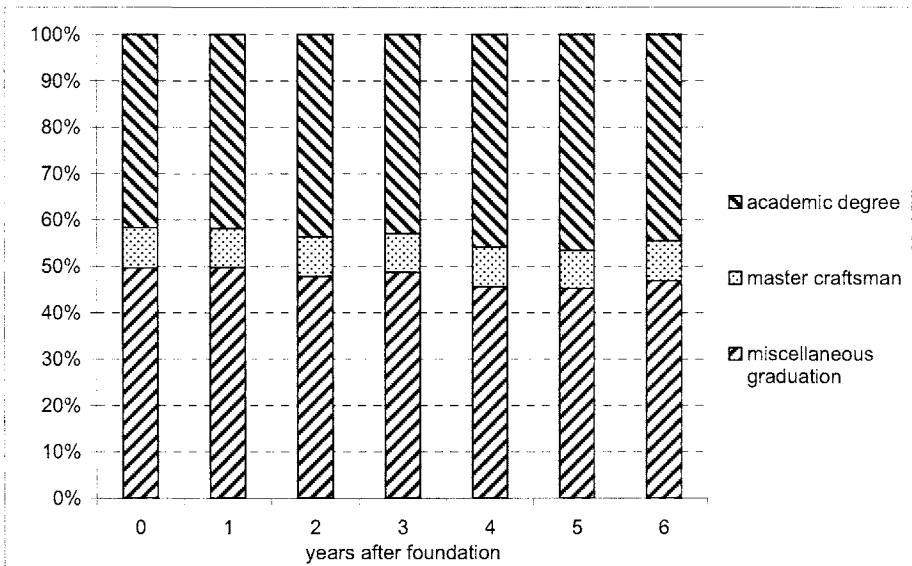
Source: ZEW Entrepreneurship Study, authors' own computations.

Figure 5.10: Cohorts' share-development in created jobs assignable to the ICT sector

One impact of the higher-than-average employment growth of new high-technology firms, knowledge-intensive firms and firms in the ICT sector is its increasing share in the overall number of jobs created by a cohort of new firms. This increase is shown by the next three figures. Six percent of the created jobs in the founding year can be attributed to firms in high-tech indus-

tries (figure 5.9). This share rises steadily to above eight percent after six years of existence. With regard to many exaggerated statements about the importance of newly founded high-technology firms for the labor market, this result falls short of expectations. The ICT sector starts as a whole with a share of just 3.2 percent. While the share of the ICT trading and leasing sector rises continuously from 1.5 to 2.4 percent, the share reflecting the second ICT group hovers around 1.7 percent, hampering the general increase (figure 5.10). Figure 5.11 screens the shares according to founders' human capital. In the founding year, 42 percent of the new jobs traceable to firms founded by academics and 8.5 percent result from foundations made by master craftsmen. In the observation period, the latter wavers around the aforementioned 8.5 percent with only moderate fluctuation. The superiority of the cohort of academic founders leads to a distinct rise in its share of jobs created to a level of 44.5 percent.

The advantage of technology-oriented and knowledge-intensive firms may be influenced by technology orientation as well as knowledge intensity. Once again, our analysis is not appropriate for deriving a causal relationship. The descriptive results tell us something about variances among different cohorts of new firms. For example, the employment figures might also result from differences in governmental support activities (see table 5.2). The table suggests remarkable differences in the share of firms funded by cheaper loans from public banks.



Source: ZEW Entrepreneurship Study, authors' own computations.

Figure 5.11: Cohorts' share-development in created jobs, categorized by founders' human capital



Table 5.2: Industry-specific supporting quotes

Industry	Support		
	Yes	No	n/a
Superior- and high-technological manufacturing	50 %	46 %	4 %
Non-technological manufacturing	41 %	56 %	3 %
Technology-intensive services	22 %	75 %	3 %
Non-technological consulting and remaining firm-related services	18 %	81 %	1 %
Miscellaneous industries (consumer-oriented services, construction, trade services, transportation)	32 %	66 %	2 %

Source: Almus et al. (2001).

## 5. Conclusions

The paper provides additional empirical evidence of the evolution of cohort employment of new firms and the level of their direct gross employment effect. We confirmed the inverted U-shaped curve of cohort employment at the level of firms. Newly founded Eastern German firms had a growth advantage in terms of better economic conditions – known as the ‘start-up window’ – inducing an advantage over their Western German counterparts. To summarize, our firm-level analysis showed similar results compared to studies based on establishment data. Our analysis provides insight at a disaggregated level of regions as well. The results for Eastern Germany suggested that agglomeration regions perform worse with respect to the evolution of cohort employment of new firms in mature stages. In contrast, differences among agglomeration regions, moderately congested regions, and rural areas are evident in the first years but declined to zero in mature stages in Western Germany.

The direct employment effect can be remarkable. Each cohort of new firms provides between 1.7 percent and 2.4 percent of all jobs in Germany at the time of foundation. The economic conditions in the early 1990s were quite extraordinary and are not representative of the present. Therefore, we expect a lower employment contribution of new firms founded at present. The employment contribution of one single cohort appears to be small; however, taking into account the high turbulence rate in the economy, numerous jobs are created and destroyed within a few years’ time.

Finally, we illustrated that cohorts of firms founded in high-technology industries as well as in ICT-related trading and leasing generally perform better than other newly founded firms. This dominance was also evident in academic foundations. The employment figures implicated an increase in the share of all jobs provided by new high-tech firms in the medium-term. High-tech firms reached a share of about eight percent in the sixth year after foundation. This result emphasizes that the direct employment effects of high-tech firms are very small. Indirect employment effects may be more important due to the supply of new or better products.

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