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New Business Formation and Regional Development
A Survey and Assessment of the Evidence *

Michael Fritsch[a]

May 2011

Abstract

This paper reviews the current state of knowledge about the effect of new business formation on regional development. After a brief sketch of the origins of research on this issue, the main results of different lines of inquiry are discussed. Main issues are the development of start-up cohorts, the relative magnitude of direct and indirect effects, and results by type of entry and by industry, as well as differences in the effects that have been found for different types of regions. After interpreting the results based on a common framework, I put forward a number of important questions for further research and draw some conclusions for entrepreneurship policy.

JEL classification: L26, M13, O1, O18, R11

Keywords: Entrepreneurship, new business formation, employment regional development

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1. The link between new business formation and growth

There seems to be a widespread belief that new business formation leads to economic growth (Wennekers and Thurik, 1999). This belief has motivated politicians in many countries to promote entrepreneurship in order to stimulate growth (see for example the contributions in Audretsch, Grilo, and Thurik, 2007; and Leitao and Baptista, 2009). Remarkably, however, the theoretical as well as the empirical foundation for this belief is rather weak. Empirical research on the issue started late and only quite recently have researchers tried to assess the effects of new businesses on economic development in more detail.

This article provides an overview of the current state of knowledge about the effect of new business formation on regional development. It begins with a brief sketch of the extant research on this topic. I then report main results of studies that have analyzed the development of small and young firms and discuss their merits and shortcomings. One objection to this type of analysis is that it does not account for possible indirect effects of new business formation, which may be important and require a macro-level analysis of the relationships. Based on an exposition of such indirect effects of new business formation on development, I turn to the findings of analyses that investigate the relationship between new business formation and regional development. After describing the overall pattern that has been found, I deal with the relative magnitude of the direct and indirect effects, the results by type of entry and by industry, and with differences in the effects that have been found for different types of regions. Finally, I provide an interpretation of the results, draw some conclusions for policy, and define important questions for further research.

2. Emergence of the research field

In the 18th and 19th centuries, early writers on entrepreneurship, such as Richard Cantillon and Jean-Baptiste Say, described the role of the

entrepreneur as an organizer of often risky business endeavors, but it was Joseph A. Schumpeter who began to fully recognize the importance of entrepreneurship and new business formation for economic development. In his book *Theory of Economic Development*, published first in German in 1911, and again in his 1939 book *Business Cycles*, he analyzed the effect that some dynamic entrepreneurs had on growth and structural change, providing a number of empirical examples. Schumpeter was particularly interested in those entrepreneurs who made a strong impact on the economy by introducing radical innovation. According to Schumpeter, it was the dynamic entrepreneur who initiated radical structural change and growth, a process he described as “creative destruction.” Examples of this type of innovative entrepreneurship include the emergence of the cotton industry in England and the introduction of the mechanical loom and steam engine during the Industrial Revolution of the 18th century, as well as construction of the railway system that extended the geographic scope of markets, leading to the phenomenon of mass production and labor division in the 19th century. Schumpeter specifically described and highlighted the indirect growth-enhancing effects these cases of innovative entrepreneurship had in different parts of the economy.

Schumpeter recognized that dynamic entrepreneurs were rare, and that the absence of entrepreneurship could be regarded as an important barrier to economic development. However, in his focus on these rare cases of dynamic entrepreneurship, he did not say much about the ordinary, more commonplace business founder or about business owners in general.

One result of Schumpeter’s writings was the emergence of business history as an academic discipline dealing with the development of firms and, thereby, with entrepreneurship. However, in the first decades following Schumpeter’s contribution, entrepreneurship did not attract a great deal of attention. Although the occurrence of

larger groups of innovative new businesses, for example, in the Silicon Valley of California, attracted some interest in the issue, the main starting point of systematic empirical analyses of the effects of new business formation on economic development was a study conducted by David Birch (1979) entitled “The Job Generation Process,” which circulated as a mimeographed research report and was never formally published (see also, however, Birch 1981, 1987). Birch declared that according to his analysis, small and, particularly, new businesses were the main job generator in the U.S. economy. This statement received responses ranging from enthusiastic praise for a new solution to employment problems to pronounced skepticism (for a review of initial reaction to the Birch study, see, e.g., Storey 1994). Most importantly, however, the study stimulated numerous follow-up analyses for the United States as well as for many other countries.

One main innovation of the Birch study was that it analyzed longitudinal micro-level data that covered nearly the entire U.S. economy. In investigating the development of the U.S. economy, the study followed the development of business cohorts of a certain age or size over the years. Unfortunately, reliable information on new business formation and longitudinal micro-level data, which would have allowed employment in firms and establishments[1] to be tracked over the years, was rarely available at the time,[2] and considerable effort had to be expended on making existing data sources accessible for research and on the creation of new ones. In this respect, also, the Birch study had an enormous impact.

The bulk of the empirical research motivated by the work of David Birch was comprised of micro-level studies that focused on the

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[1] A start-up can be either a new firm or a new establishment of a multi-plant enterprise. The term “new business” is used here as an overall category that encompasses the set up of a new headquarters as well as the creation of a new subsidiary establishment.

[2] Birch (1979) used micro data from the Dun & Bradstreet credit rating agency for the United States in the 1969–1976 period.

development of young and small firms. It soon became clear that small firms do not generally grow faster than larger firms; some small firms do, but most continue with only a few employees and face a relatively high risk of exit. A number of studies found that the age of a firm is much more important in explaining its development than its size and that younger firms seem to have higher growth prospects than older ones.[3] This recognition finally directed attention to newly founded businesses and, consequently, to entrepreneurship. Compared to the micro-level studies of business development that have been initiated by the work of David Birch, analyses on a more macro level that related new business formation to the development of industries and regions as a whole are relatively few, many of them having been conducted only recently. The next section first reviews the studies that assess the development of start-up cohorts and discusses their merits and limitations. The following sections then provide an overview of the results of analyses that investigated the effect of new business formation on economic development based on a more macro-level approach.

3. The development of new businesses

David Birch's (1979) empirical approach was to follow the development of groups (cohorts) of businesses over time. His statements about the main drivers of development in the U.S. economy were based on comparisons of the performance of business cohorts. A crucial issue in this type of analysis is selection of the sample, which should be representative of the entire population of firms. This requires datasets containing information about the businesses at several points in time. Simple surveys that gather data on current and previous performance at only one point of time are not sufficient because even if the information is representative of all businesses during the period in which the survey

[3] Audretsch et al. (2004), Evans (1987), Davis, Haltiwanger and Schuh (1996), Sutton (1997), Haltiwanger, Jarmin and Miranda (2010), Stangler and Kedrosky (2010).

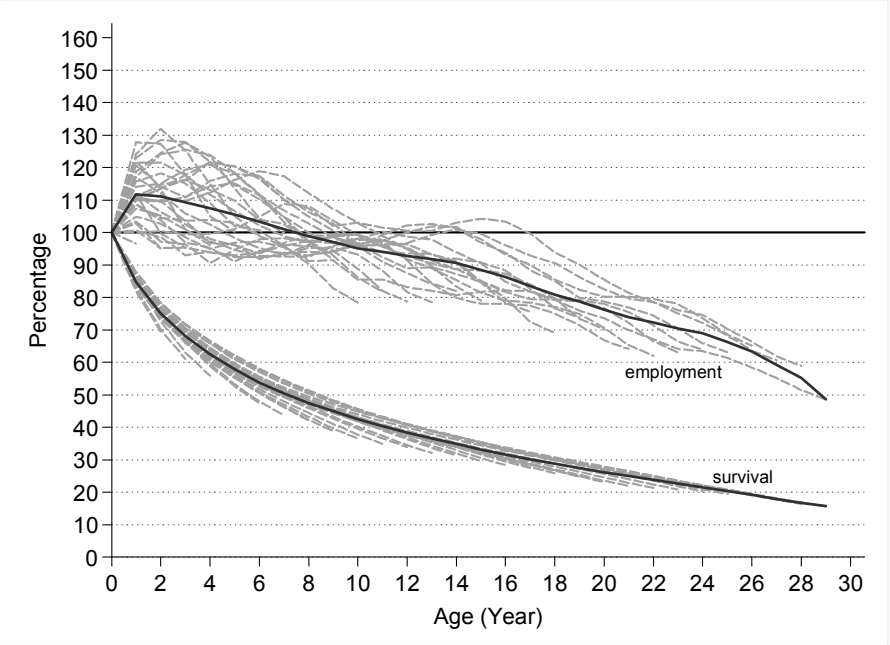
is conducted, information for those businesses that existed in an earlier period but are no longer in existence will nearly always be unavailable. Calculating average growth rates only for the firms that were active in both periods ignores those firms that exited the market and the rates thus suffer from a "survivor bias" that implies a too optimistic picture of development. Hence, cohort analyses of the development of new businesses require information about those businesses that exited the market after some time.

The German Employment Statistics, a comprehensive database that covers all businesses in the private sector (for details, see Spengler, 2008), provides information about representative cohorts of the vast majority of new businesses in Germany over periods of up to 29 years.[4] I illustrate the findings of analyses of start-up cohorts with results based on this database because of the exceptional long time period that is covered. Many results derived from these data are in line with work using other kinds of data and for other countries.[5] Analyzing the German Employment Statistics for West Germany, Fritsch and Weyh (2006) and Schindele and Weyh (2011) showed that overall employment in entry cohorts first rises but then declines from the second or third year on (Figure 1). After about eight years, it falls below the initial level and after 20 years the overall number of employees in a cohort is slightly less than 80 percent of that in the year the new businesses were set up. After 29 years, the maximum length of the currently available time series, the overall number of employees is about 50 percent of the initial number of employees. Since most of the start-up activity takes place in the service sector, employment development in services is quite similar to the pattern observed in the private sector as a whole. The results for manufacturing are somewhat different. The number of employees in the manufacturing start-up cohorts remains above the initial level for a longer period of time than it

[4] The statistic is limited to those businesses that have at least one employee, i.e. start-ups consisting only of owners are not included.

[5] See for example Horrell and Litan (2010) and Stangler and Kedrosky (2010) for the USA.

does in the services sector. From year 18 onward, employment declines until it reaches 55 percent of the initial level in year 29. During their first years, the manufacturing start-ups are also more successful than those in services, in that peak employment is about 160 percent of the initial level as compared to 130 percent for services.



Notes: Thin dotted lines: individual cohorts; dark thick line: average value over all cohorts for which information in the respective year is available.

Figure 1: Evolution of employment and survival rates in entry cohorts (Source: Schindele and Weyh, 2011)

In the service sector, the remaining 55 percent of initial employment after 29 years is in just 15 percent of the initial cohort plants, i.e., only 15 percent of all newly founded businesses survive the entire observation period. In manufacturing, nearly 20 percent of the start-ups endure for the entire 29 years. At the end of the period of analysis, in the year 2004, about 37 percent of all private-sector jobs are in the start-ups of the previous 29 years. This share is higher in services (47 percent) than in manufacturing (26 percent) (Schindele and Weyh, 2011).

It is a common observation of such cohort studies that only a small proportion of the new businesses create a considerable number of jobs; the vast majority remains rather small.[6] Accordingly, Schindele and Weyh (2011) find that after 10 years, about 23 percent of the jobs are concentrated in the largest 1 percent of the initial start-ups, 45 percent of employment is in the largest 5 percent, and more than 82 percent of the employees work for the largest 25 percent of the initial start-ups. Over time there is a continuously increasing employment concentration for the largest 25 percent of surviving businesses. The relatively few high-growth businesses, often termed "gazelles," have attracted considerable interest (for a review of respective studies, see Acs, 2011, and Henrekson and Johansson, 2010). One important result of these studies is that there is a slight tendency for gazelles to be relatively young, but that also quite a number of older firms can be found in this category. Moreover, gazelles are *not* concentrated in innovative manufacturing industries but can be found in all industries, particularly in the service sector (see also Acs, 2011).

The analyses of start-up cohorts clearly show that new businesses do create a considerable number of jobs, but that the share of employment in new businesses in overall employment is not overwhelming. Moreover, many new firms exit the market soon after entry; only a small fraction of start-ups exhibit considerable growth. Why these few gazelles succeed is still unclear and deserves further investigation. Having in mind Schumpeter's examples of innovative entrepreneurs that initiate radical changes with important indirect effects on other firms and other sectors of the economy (Schumpeter 1939), the development of start-ups tells only part of the story. Hence, even if the number of jobs provided by gazelles or the amount of value they add does make up a considerable part of a region or sector, attempts to assess the impact of new business formation on development should try to account for indirect effects also. It is a severe disadvantage of

[6] See, for example, Storey (1994, pp. 113–119) for a review of the cohort studies that were available until the early 1990s.

cohort analyses that they do not account for possible indirect effects of new business formation such as the displacement of incumbent businesses or the effect of the innovative products they introduce. Such possible indirect effects are reviewed in the next section.

4. Possible indirect effects of new business formation on economic development

New firms represent introduce new capacities into the market and therefore are an essential element of the market process. The evolution of the newcomers, e.g., as measured by how many employees they have or their market share, may be termed the direct effect of new capacities. Due to competition and market selection, only a fraction of start-ups survive for a longer period of time, and those that do succeed in establishing themselves in the market may displace incumbents. Two types of market exit may result from the entry of new businesses. First, a considerable number of new businesses fail to be sufficiently competitive and thus are forced to exit the market. Second, displacement of incumbents by new competitors leads to declining market shares or market exit. Such crowding-out effects may occur in the output market because the entrants gain market share, as well as in the input market due to the additional demand for resources made by new businesses that can lead to scarcity of inputs and increasing factor prices.

These crowding-out effects are somewhat indirect. Given that market selection works according to a survival of the fittest scenario, firms with relatively high productivity will remain in the market, whereas those with low productivity with either have to reduce their output or exit. At a constant output level, this market selection process should lead to a *decline* in employment, instead of the creation of jobs, because fewer resources are needed to produce the given amount of goods and services at a higher productivity 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 will not necessarily be positive but could just as well be negative.

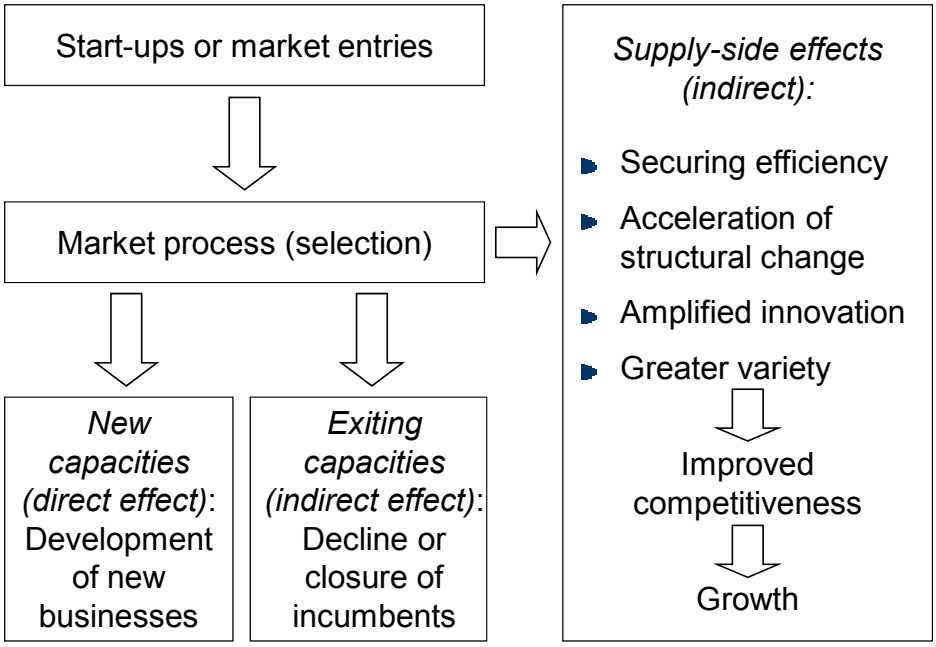


Figure 2: New business formation and the market process

However, a well-functioning market process is not a zero-sum game in which the gains of one actor are necessarily at the expense of the other actors. There are several ways competition by entry of new businesses can stimulate competitiveness on the supply side of the market and lead to employment growth. The main supply-side effects of entry could include (cf. Figure 2):

- *Securing efficiency and stimulating productivity by contesting established market positions.* Not only actual entry but also the very possibility of entry can force incumbents to perform more efficiently (Baumol et al. 1988).

- *Acceleration of structural change.* Quite frequently, structural change is mainly accomplished by a turnover of the respective economic units, i.e., by the entry of new firms and the simultaneous exit of established incumbents. In this case, the incumbents do not undergo

necessary internal changes, but are substituted for by newcomers.[7] This type of process has been emphasized by J. A. Schumpeter's (1911/1934, 1942) concept of creative destruction and by Alfred Marshall's (1920) analogy of a forest in which the old trees must fall to make way for new ones.

- *Amplified innovation*, particularly the creation of new markets. There are many examples of radical innovations introduced by new firms (Audretsch, 1995; Baumol, 2004). One major reason for this pronounced role of new firms in introducing radical innovation could be that incumbent suppliers are more interested in exploiting the profit possibilities of their given product program versus searching for new opportunities, particularly if the new products may compete with their established ones (Klepper and Sleeper, 2005; Klepper, 2009). Due to the reluctance that these types of incumbent firms show toward the adoption of new ideas, seting up one's own business may appear to be the only or the most promising possibility for inventors seeking to commercialize their knowledge (Audretsch, 1995; Klepper, 2009).

- *Greater variety of products and problem solutions.* If the product program of a newcomer differs from those of the incumbents, or if an entrant introduces significant process innovation, it will result in a greater variety of available goods and problem-solving methods. Such increased variety implies a higher probability of customers finding a better match for their preferences. Increased variety due to new supplies may intensify the division of labor as well as follow-up innovation and, therefore, can generate significant economic development (Boschma, 2004; Saviotti and Pyka, 2004).

[7] Such a process could, for example, be observed in the transformation of former socialist economies of Central and Eastern Europe, where new firms—the bottom-up component—had a considerably stronger impact on structural change (cf. Brezinski and Fritsch, 1996; Pfirrmann and Walter, 2002).

Like the crowding-out effects, the supply-side effects are somewhat indirect. They are not necessarily limited to the industry to which the start-up belongs, but may also occur in completely different industries that use the improved supply as an input. Neither are they restricted to the region in which entry occurs, but can emerge in other regions, e.g., those regions in which competitors are located. The indirect supply-side effects are the drivers of competitiveness in the respective industries, which may induce employment growth and increasing welfare. They are why one should expect positive employment effects of new business formation.

It is important to note that supply-side effects of new business formation do not necessarily require the newcomers to be successful and survive in order to occur. As long as entry induces improvements on the side of the incumbents, it will lead to enhanced competitiveness even if most of the new businesses fail and exit the market soon after entry. Indeed, even failed start-ups can make a significant contribution to growth.[8] A high degree of failure of new businesses, however, can also have a discouraging effect on market entry and this possibility should not be ignored.

This review of the different impacts of new business formation on market processes makes very clear that the evolution of new businesses is only a portion of their total effect on development. Many important influences that start-ups have on growth and employment are of an indirect nature and occur on the supply side of the market. If the market is indeed a survival of the fittest arena, the direct employment effects, i.e., the growth of new businesses, as well as the displacement of incumbents, should actually result in a decline in employment. Under a properly functioning market regime, growth from new business formation can only be expected from improvements on the supply side.

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[8] Thus, even in a “revolving door” market regime in which the vast majority of entries soon exit the market (Audretsch, 1995), start-ups may have an important effect to the extent that they pose a challenge to incumbents.

If, however, the process of market selection is not working as it should and allows the survival of relatively unproductive competitors, the economy's competitiveness will decline and, thus, cause the supply-side effects to become negative.

It is plausible to assume that the challenge to competitors made by a new business critically depends on its quality. Quality of a new business can be defined in many ways, of course, and may include aspects such as the entrepreneurial skills of the founder, the knowledge base and other resources of the new business, and its innovativeness. Therefore, the entry of innovative businesses led by well-prepared entrepreneurs who have the requisite knowledge and necessary resources can be expected to have a stronger effect and, particularly, lead to larger supply-side improvements than entry by non-innovative businesses run by persons lacking appropriate skills and unsuccessful at sufficiently accessing the relevant factors of production. High-quality start-ups that successfully challenge incumbents may then exhibit considerable growth and may become gazelles. It could also be expected that the supply-side effects will be relatively large in markets characterized by a high intensity of competition because of greater pressure for improvements. Moreover, supply-side effects may be larger in global product markets, compared to local markets, due to the greater number of direct competitors affected by the challenge of an entrant.

5. The effect of new business formation on regional development—Aggregate analyses

This section provides an overview of the results of analyses that investigated the effect of new business formation on an aggregate level, particularly regions and countries. I first highlight some methodological issues involved in such an approach and then review the main results of recent studies. A special emphasis is on the relative importance of direct and indirect effects of entries, on the characteristics of the new

businesses, on differences in the effects between regions as well as on differences between industries.

5.1 Methodological issues

As I mentioned above, micro-level analyses are not well suited for examining the indirect effects of new business formation. To account for such indirect effects, the relationship between level of new business formation activity and some aggregate performance measure, such as change in employment, change in gross domestic product, or change in productivity in the respective country, region, or industry, must be analyzed. To date, work on the effects of new business formation on economic development has mainly focused on employment creation, possibly due to the importance placed by policymakers on job generation and the prevention of unemployment. Another reason may be the better availability of information on employment as compared to other performance indicators.

For a meaningful comparison of regions or industries of different size or economic potential, the number of start-ups needs to be related to a measure of economic potential, i.e., a start-up rate should be used. Most commonly, the number of employees or the regional workforce (including the unemployed persons) is chosen as the denominator of start-up rates, what Audretsch and Fritsch (1994) term the “labor market” approach. This kind of start-up rate is based on the notion that each member of the workforce is faced with the decision to either work as a dependent employee in someone else’s business or start his or her own firm. According to the labor market approach, the entry rate may be viewed as the propensity of a member of the regional workforce to start an own business.[9] Many of the analyses of the effect of new business formation on regional development have used sector-adjusted start-up

[9] Because start-ups are usually located close to the residence of the founder (Stam 2007), the regional workforce can be regarded as an appropriate measure of the number of potential entrepreneurs.

rates that account for the fact that start-up rates differ systematically across industries.[10]

The results derived from an analysis of the relationship between start-up rates and the development of employment or turnover at the level of industries can be very difficult to interpret. The problem is that if industries follow a lifecycle, then the number of entries and the start-up rate will be relatively high in the early stages of the lifecycle when the industry is growing, and relatively low in later stages when the industry is in decline (Klepper, 1997). Can the resulting positive correlation between the start-up rate and development of the industry in subsequent periods be regarded as an *effect* of entry on growth? Probably not—and, indeed, entirely different results are found if, for example, the relationship between the level of startups and subsequent employment change is analyzed at the level of regions or at the level of industries (see Fritsch, 1996). This clearly demonstrates that geographical units of observation are much better suited for such an analysis than are industries.

Empirical studies that have analyzed the impact of new business formation on the development of regions or countries employ a start-up measure that is based on gross entry as indicator of the level of new business formation activity. Sometimes, net entry, calculated as the change in the number of business owners, is used, mainly for reasons

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[10] 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. If this fact is not appropriately taken into consideration, the result will be an overestimating of the level of entrepreneurship in regions that are home to a large number of industries for which start-ups play an important role, and an underestimation of 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 is 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. 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.

of data availability (e.g., Carree and Thurik, 2008; Dejardin, 2011). Another variant is to analyze the effect of turbulence, defined as the number of entries plus number of exits, on economic development (e.g., Bosma, Stam, and Schutjens, fortcoming), which can be regarded as an indicator of the level of creative destruction that takes place in the respective industry or region. Studies based on data from the Global Entrepreneurship Monitor (GEM) (e.g., Bosma, 2011) use “total entrepreneurial activity” (TEA), which 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/manager of a young business (for details, see Reynolds et al., 2005).

Most studies simply regress the effect of the indicator of new business formation activity on a performance measure with some control variables; however, some studies have applied an explicit production function framework that also contains indicators for the contribution of other inputs to growth (Audretsch and Keilbach, 2004; Audretsch et al., 2006; Wong et al., 2005). In this type of approach, entrepreneurship is regarded as a production factor that introduces resources, such as initiative and opportunity recognition, as well as willingness and ability to take risk, into the model. The advantage of analyzing the contribution of entrepreneurship within the framework of a production function, as compared to a simple regression of indicators for entrepreneurship on measures of development, is that doing so more systematically accounts for other determinants of growth, and it has a foundation in production theory. However, entrepreneurs do not accomplish success and growth by spirit and initiative alone; they must hire labor and make capital investments. Hence, in a production function framework that includes the inputs of labor and capital, parts of the impact of entrepreneurship on development may be attributed to labor and capital and not to the entrepreneur who made the decisions regarding their use. Therefore, the effect of entrepreneurship may well be underestimated in this sort of analysis. However, those empirical studies that more or less solely relate the start-up rate to growth are in

danger of overestimating the effect of entrepreneurship due to the neglect of other factors.

A severe problem of applying the production function approach involves the data to be used. For example, data on the capital stock must generally be regarded as of questionable reliability and are, in many countries, rarely available at the regional level. Moreover, causal interpretation of these results can be problematic if the empirical analyses are related to the *level* of GDP or productivity, not to their development. To date, none of the available approaches using a production function framework has used longer time lags of the entrepreneurship indicators, which turns out to be of crucial importance, as will be shown in the next section.

Neglect of longer time lags is also a critical issue in nearly all of the available job-turnover analyses that try to assess the relative contribution that new, incumbent and exiting businesses make to the development of employment (e.g., Davis, Haltiwanger and Schuh, 1996; Spletzer, 2000; Neumark, Zhang and Wall, 2006). Without accounting for such time lags, these approaches have more the character of a descriptive job-growth accounting exercise than of a causal analysis of the effects of start-ups. The inclusion of longer time lags for new business formation particularly allows for the identification of indirect effects of entry on incumbent employment (see for such an approach Fritsch and Noseleit, 2009a and b).

5.2 Overview of the empirical evidence

5.2.1 The effect of new business formation on the performance of regions and industries

The first systematic analyses of the relationship between the level of new business formation and regional employment change were conducted by Reynolds (1994, 1999) for the United States. Reynolds found a pronounced positive effect. However, performing the analysis

for different time periods revealed considerable variation in the outcome. A positive relationship between the regional level of start-ups and subsequent growth was confirmed by Ashcroft and Love (1996) for the United Kingdom, by Acs and Armington (2002) for the United States, by Brixy (1999) for East Germany, and by Fölster (2000) and Braunerjhelm and Borgman (2004) for Sweden. But a number of other studies could not identify such a positive relationship between the level of start-ups and regional employment growth (Audretsch and Fritsch 1996; Fritsch 1996, 1997; EIM 1994). In an international cross-section analysis of 36 countries participating in the GEM project, van Stel et al. (2005) found some confirmation for a positive effect of "total entrepreneurial activity" (TEA) on GDP growth in highly developed countries, but not in the low-income countries of the sample. Audretsch, Keilbach, and Lehmann (2006) included the start-up rate into a Cobb-Douglas production function and identified a positive effect on the level of GDP and labor productivity, as well as on the growth of labor productivity, in West German regions. In a study based on GEM data for 37 countries, Wong, Ho, and Autio (2005) divided the indicator of total entrepreneurial activity into several groups. A significantly positive impact on GDP growth was found for "high growth potential" TEA[11] but not for overall TEA, necessity TEA, or opportunity TEA.[12] This result may be regarded as an indication of the important role quality plays in generating start-up effects.

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[11] A venture was classified as having a "high growth potential" if it fulfilled four 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 percent of the venture's customers normally live abroad; and (4) the technologies employed by the venture were not been widely available more than a year ago (Wong, Ho, and Autio, 2005, 345).

[12] Necessity entrepreneurship is understood as a start-up that is founded due to a lack of alternatives (e.g., the founder can't find any other kind of job). A new business that is set up to pursue an opportunity is classified as "opportunity" entrepreneurship. See Reynolds et al. (2005) for details.

Bosma, Stam, and Schutjens (2011) investigated the effect of entry and turbulence on total factor productivity for the 40 NUTS III regions of the Netherlands. Turbulence is defined as the number of entries plus the number of exits and is intended to measure the level of business dynamics understood as “creative destruction.” The number of entries was lagged by two years; the number of exits was taken from the current year. Bosma, Stam, and Schutjens (2011) found an effect of business dynamics in the service sector but not for start-ups and turbulence in manufacturing. According to their estimates, the effect of entry and turbulence in the service sector on the growth of total factor productivity decreases with a rising level of business dynamics. They identify an optimum rate of turbulence at which the effect on productivity growth reaches a maximum.

One reason for the somewhat mixed results of studies analyzing the impact of new business formation on employment change could be that the entry and turnover of establishments (firms) may lead to a productivity increase (see Baldwin 1995; Disney, Haskel, and Heden, 2003; Foster et al., 2001; OECD, 2003) that compensates for the employment effect. Another reason may be that not all the effects of new business formation on employment emerge immediately at the time the newcomers enter the market. Due to data restrictions, the analyses mentioned above did not include any or only rather short time-lags between the founding of the start-ups and the respective effect on output and therefore may have assessed the effects on regional development only incompletely. In an analysis for West German regions, Audretsch and Fritsch (2002) did, indeed, find evidence for positive long-term effects of new business formation. In this study, new business formation activity in the early 1980s could not explain regional employment change in the rest of the decade, but did provide an explanation of employment change in the 1990s. Van Stel and Storey (2004) analyzed the relevance of such time-lags more systematically and estimated a time-lag structure of the effects of new business formation on regional employment growth with data for Great Britain.

They confirmed that there are considerable time-lags between new business formation and its effect on regional development, which they found to be positive.

5.2.2 The “wave” pattern

A severe problem in analyzing the lag structure of the effect of new business formation on growth emerges from a high correlation between yearly start-up rates. Because of this high correlation, the original estimates may not reflect the “true” lag structure. In dealing with this problem, van Stel and Storey (2004) applied the Almon polynomial lag procedure. This procedure attempts to approximate the lag structure by a polynomial function (for a detailed description of this method, see Greene, 2008). In this type of analysis, an assumption must be made about the order of the polynomial to be used for estimating the lag structure. Fritsch and Mueller (2004) applied the Almon polynomial lag procedure in an analysis of the effect of new business formation on regional development in West Germany. They found that a statistically significant effect of new business formation on employment is restricted to a period of about 10 years. Van Stel and Storey (2004) assumed a second-order polynomial for estimating the lag structure of new business formation rates; however, Fritsch and Mueller (2004) also applied higher order polynomials. With a third- and higher order polynomial, they found a “wave” pattern of the effects (see Figure 3).

Figure 3 depicts the original regression coefficients that have been found without application of the Almon lag procedure as well as the coefficients that result from this procedure by assuming a third-order polynomial. The resulting smoothened lag structure suggests that new business formation during the current year has a positive impact on employment change. For years *t*-1 to *t*-5, the effect is negative, with a minimum in *t*-3. For entries in years *t*-6 to *t*-9, a positive relationship is found, with a maximum between years *t*-7 and *t*-8. The magnitude of the effect then decreases and becomes slightly negative in the last year

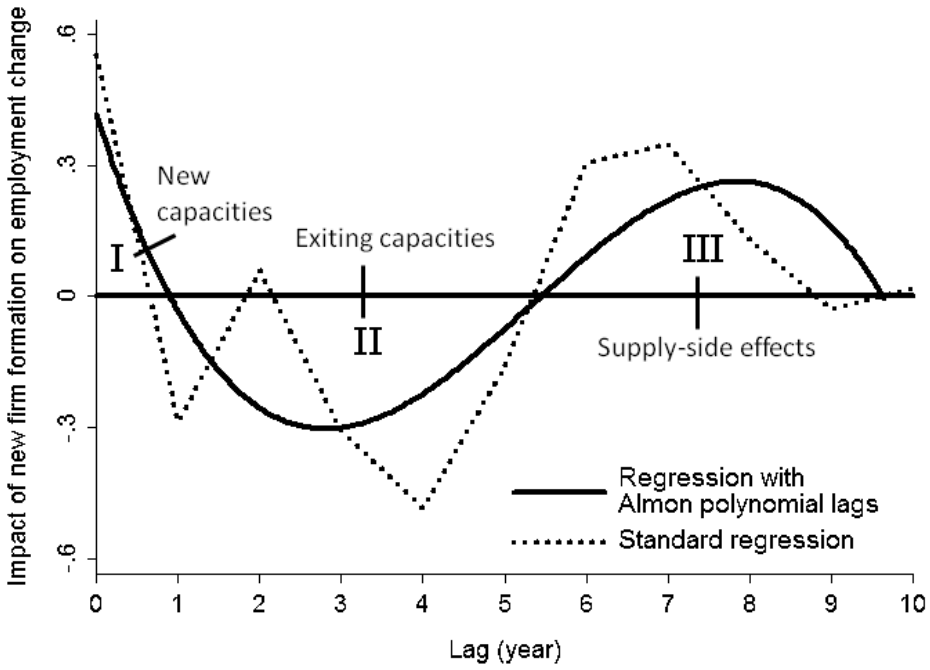

Figure 3 Effects of new business formation on employment change over time in West Germany—regression coefficients for start-up rates and the results of the Almon lag procedure assuming a third-order polynomial

of the sample (*t*-10).[13] This type of wave pattern of the lag structure has been confirmed for a number of countries, including Belgium (Dejardin, 2011), the Netherlands (van Stel and Suddle, 2008; Koster, 2011), Portugal (Baptista, Escária, and Madruga, 2008; Baptista and Preto, 2011), Spain (Arauzo-Carod, Liviano-Solis, and Martin-Bofarull, 2008), Sweden (Andersson and Noseleit, 2011), the United Kingdom (Mueller, van Stel, and Storey, 2008), and the United States (Acs and Mueller, 2008), as well as for a sample of 23 OECD countries (Carree and Thurik, 2008).

Fritsch and Mueller (2004) suggest an interpretation of this wave pattern that builds on the systematization of direct and indirect effects, as discussed in a previous section. According to this interpretation, the positive employment impact for start-ups in the current year can be

[13] The overall effect of new business formation on employment change can be measured by the sum of the regression coefficients for the start-up rates of the different years (Gujarati, 2009), which are depicted by the three areas in Figure 3.

understood as the additional jobs created by the newly founded businesses at the time of inception. This direct employment effect is indicated in Area I in Figure 3. It is well known from a number of analyses that employment in entry cohorts tends to be stagnant or even decline from the second or the third year onward (Boeri and Cramer 1992; Schindele and Weyh, 2011). Therefore, new firm formation activity in year *t*-3 and more distant time periods should not lead to any significant direct employment effect of the cohort as a whole. As soon as a new business is set up, it is subject to market selection and may gain market shares from incumbent suppliers. Thus, the negative impact of the start-ups in years *t*-1 to *t*-5 (Area II in Figure 3) is probably a result of market exit, i.e., new businesses that fail to be competitive and displacement of incumbents. The positive impact of new business formation on employment for years *t*-6 to *t*-10 (Area III in Figure 3) is probably due to a dominance of indirect supply-side effects, i.e., increased competitiveness of the regional suppliers resulting from market selection. After about nine or ten years, the impact of new business formation on regional employment fades away.

When they assumed a second-order polynomial for the Almon lag procedure, Fritsch and Mueller (2004) found the resulting lag structure to be “u”-shaped. The interpretation of the “u”-shaped lag structure is similar to that for the wave pattern that resulted from assuming a higher order polynomial. According to Fritsch and Mueller (2004), the initial increase in employment can be regarded as the direct employment effect of new business formation, which is followed by a period during which the crowding-out effects prevail, before the employment-increasing supply-side effects finally start to dominate. What is different between the two patterns is that these supply-side effects then become stronger and stronger without decreasing again in the more distant years. However, such an increase is highly implausible given the statistical insignificance of start-up rates during these periods. The increase in the curve for the latter periods is probably caused by the very nature of a second-order polynomial, which by definition

possesses only one inflection point. If the interpretation of the lag structure proposed by Fritsch and Mueller (2004) is correct, both patterns imply that the indirect employment effects as indicated in Areas I and II of Figure 3 are more important than the direct effect, i.e., the initial employment created in the newly founded businesses (Area I).

5.2.3 Identifying and comparing direct and indirect effects of new business formation

Fritsch and Noseleit (2009a) tried to identify the indirect effects of new business formation on employment and compare the magnitude of the two types of effects—direct and indirect. Using the information on total employment change (ΔEMP_{total}) and on employment in new businesses (ΔEMP_{new}), they calculate the employment change of incumbents as

$$\Delta EMP_{inc} = \Delta EMP_{total} - \Delta EMP_{new}\,.$$

This employment change in incumbent businesses encompasses the indirect effects of the new businesses—displacement and supply-side effects—as well as other influences that are not caused by the start-ups. They then estimated the indirect effect of new business formation by regressing the start-up rate of the preceding 10 years on the change in incumbent employment.

Fritsch and Noseleit (2009a) calculated the direct contribution of new businesses to overall employment as

$$\Delta Emp_{direct\ t=n} = \frac{Emp_{cohort\ t=n} \quad Emp_{cohort\ t=n\ 1}}{Emp_{total\ t=n-1}} * 100$$

with $\Delta Emp_{cohort\ t}$, giving the number of employees in a certain cohort in year *t* and where $\Delta Emp_{total\ t}$ is the overall regional employment in year *t*.[14] The pattern of the direct employment effect identified this way is

[14] Thus, start-ups of the 1984 cohort, for example, which entered the market with 230,138 employees, accounted for an employment change of 1.47 percent in the initial

surprisingly similar for the different start-up cohorts in the sample. In the year the start-ups enter the market, they account for an employment increase of about 1.5 to 1.8 percent. In the first year after entry, this effect is also positive but much smaller. Because the start-up cohorts tend to experience an employment decline in later years, their direct contribution to employment change becomes slightly negative. Hence, the largest direct contribution of start-ups to employment change occurs in the year they are set up (see Figure 4).

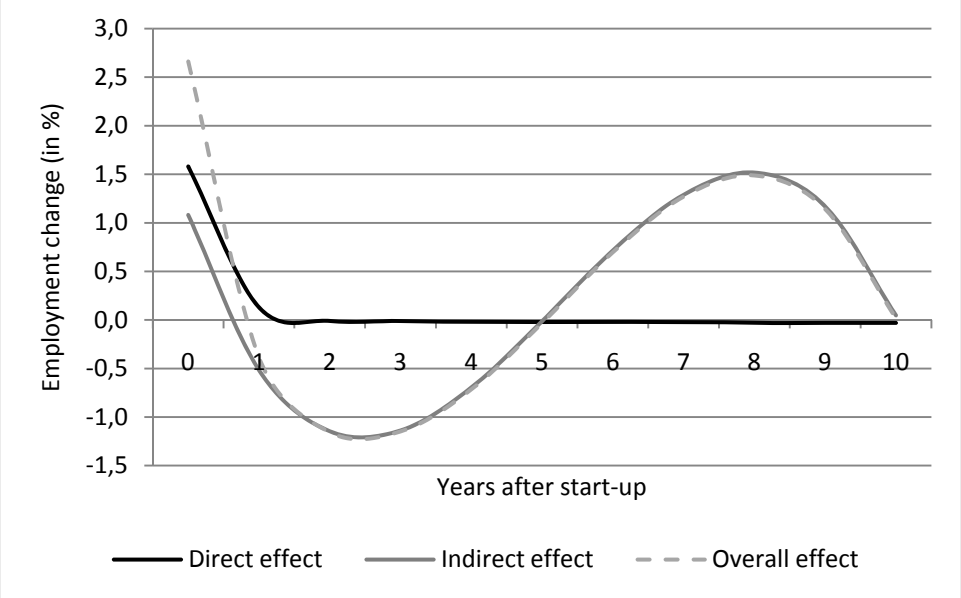

Figure 4: Impact of start-ups on regional employment change—direct and indirect effects

Estimating the indirect effect of new business formation by regressing the start-up rates of the preceding 10 years on the change in incumbent employment, Fritsch and Noseleit (2009a) found a wave

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year because $\Delta Emp_{direct1984} = \frac{230,138 \quad 0}{15,677,496} * 100 = 1.47$. Since these businesses did not exist in the prior period, the share of employees in the cohort over all employees in *t*-1 gives the percentage change of employment that the 1984 start-up cohort contributed in that year. In 1985, employment in this cohort grew from 230,138 to 236,236. Thus, the contribution of the 1984 start-up cohort to overall employment change in the year 1985 is calculated as

$\Delta Emp_{direct1985} = \frac{236,236 \quad 230,138}{15,522,385} * 100 = 0.039$ percent.

pattern (see Figure 4). After applying a weighing procedure that allowed them to express employment change in incumbents as a share of overall employment change, they compared the magnitude of the direct effect and the indirect effects. The resulting curve for the overall effect (Figure 4) corresponds well to the findings of earlier studies for Germany (Fritsch and Mueller, 2004, 2008). As Figure 4 clearly shows, the largest part of the overall employment induced by new businesses is due to indirect effects on incumbents. The main deviation between the two curves is that the aggregate indirect effect is considerably lower than the overall effect in the first two years, which is due to the direct effect of new business formation on regional employment in this early period.

Based on their analysis for West Germany, Fritsch and Noseleit (2009a) estimate that the overall effect of start-ups on regional employment over the period of analysis is an increase of about 3.8 percent. This means that in the average West German region, start-ups of a certain vintage have led to a nearly 4 percent increase in employment over a period of 11 years.[15] About 40 percent of this increase is attributable to employment in new businesses; the other 60 percent is due to the indirect effects. Hence, nearly two-thirds of the employment change generated by new business formation arises from the interaction between newcomers and incumbents in the region. Employment in the start-ups is clearly the smaller part of the overall effect. This result was confirmed by using another way of identifying direct and indirect effects of new business formation (Fritsch and Noseleit, 2009b). A simple explanation for the larger indirect employment effects may be seen in the greater number of incumbents compared to entries. If many more incumbents react to the challenge

[15] This result corresponds quite well to the estimates of Fritsch and Mueller (2008). According to Fritsch and Mueller (2008), one additional start-up per 1,000 employees leads to an overall employment increase of about 0.46 percent in the average region. Given an average start-up rate of about nine new businesses per 1,000 employees, an employment increase of 4.14 percent can be attributed to new business formation.

posed by a much fewer number of newcomers, it could produce more employment.

In order to identify indirect effects of new business formation on regional growth, Koster, van Stel and Folkeringa (2010) used a market mobility measure that reflects the change in the ranking of establishments with five or more employees in terms of employment size. They found a pronounced correlation between this market mobility measure and the start-up rate indicating significant effects of entry on the regional market structure. Including the start-up rate and the market mobility measure into a model for explaining regional employment growth shows a statistically significant effect of both indicators. This result seems to be driven by the development of the service sector. When running the analysis for manufacturing only the start-up rate as well as the market mobility measure have no statistically significant effect on regional employment growth.

5.2.4 Characteristics of new businesses: The quality of entry

The currently available datasets that allow assessing the regional level of new business formation provide only modest information about the characteristics of start-ups that may be indicative of quality. One piece of information about new businesses that is available in some data is their size at the time of entry or their organizational status, e.g., whether a start-up is part of a larger firm or whether it can be viewed as independent. Other characteristics that can be found in the GEM data are based on a self-estimation by founders concerning their growth prospects and the innovativeness of their venture. Another method of identifying start-ups of a certain quality uses information on their industry affiliation. For example, start-ups in industries classified as “high tech” or “low tech” may be regarded, respectively, as highly innovative or non-innovative. Results of such analyses are reported below in the section about differences between industries.

Koster (2011) investigated whether independent new firms, as compared to establishments started by existing firms (organizational foundings), in the Netherlands have different effects on regional employment change. Such different effects might very well be expected since new establishments set up by existing firms can rely on the resource base of their parent firm, which makes them less vulnerable and can result in relatively high survival and growth rates (Tübke, 2004; Brüderl et al. 1992).[16] Koster finds that the lag structure for the effects of organizational foundings on regional employment indicates a positive direct effect on regional employment, but that this positive impact rapidly tapers off until it is close to zero and non-significant; specifically, he does not find the positive third part of the typical wave pattern that Fritsch and Mueller (2004; 2008) viewed as an indication of supply-side effects. However, a statistically significant third part of the wave was found for independent start-ups. This supports the idea that the organizational status of entries makes a difference to their potential effect on regional development.

In an analysis employing data on Portugal, Baptista and Preto (2010) studied the time-lag structure of different types of new businesses. They found that start-ups with foreign capital involved, which are a very small share of the total number new businesses, have a strong displacement effect on employment as well as pronounced supply-side effects, whereas the impact of start-ups without foreign capital is very weak, resulting in only a low amplitude of the wave. According to the results of Baptista and Preto (2010) the overall employment effect of start-ups with foreign capital is clearly positive. Distinguishing between new businesses that enter with an above-average size and the smaller start-ups leads to similar results: the larger entries have a pronounced effect and show the usual wave pattern of the time-lag structure with a rather high amplitude, while the impact of smaller start-ups is minor. It remains, however, rather unclear

[16] The number of organizational foundings in Koster's data is about half the number of independent start-ups (Koster, 2011).

if the larger start-ups lead to an increase or a decrease of regional employment over the observation period.

In comparable research, Acs and Mueller (2008) investigated the effect of different kinds of start-ups on employment in U.S. Metropolitan Statistical Areas. According to their estimates, the start up of firms having less than 20 employees, of which the vast majority can be assumed to be independent new businesses, has a positive initial, but quickly disappearing, effect on regional employment; no positive third part of the wave pattern indicating dominant supply-side effects could be found for these small start-ups. However, Acs and Mueller (2008) did find a pronounced third part of the wave for entry firms having between 20 and 499 employees. New businesses set up with 500 and more employees, the majority of which are plausibly assumed to be subsidiary establishments, have a rather pronounced negative employment effect that probably indicates considerable displacement of incumbents. This negative effect is largest about three years after start up and then becomes weaker. Unfortunately, the time series available to Acs and Mueller (2008) allowed them to estimate a lag structure of the effects of new business formation on regional employment for a period of only six years, so they cannot say if the effect of the start up of large firms becomes positive in later years. The authors speculate that the entry of larger firms induces massive restructuring of the regional economy, leading to a pronounced reduction of labor inputs during the first years after start-up.[17]

Using GEM data for 127 Nuts 3 regions of 17 European countries, Bosma (2011) draws distinctions between start-ups based on the ambitions and expectations of entrepreneurs, that is, between those with low growth ambitions (expect to have none or at most one employee in the next five years), those with modest growth ambitions

[17] More than 10 percent of the entries were firms with less than 20 employees, about 8 percent were firms with between 20 and 499 employees, and the larger firms made up a little more than 10 percent of all new establishments.

(expect to have between two and nine employees in the next five years), those with high growth ambitions (expect to have 10 or more employees in the next five years), and those with innovative ambitions (assume that at least some customers will consider their product or service new and that not many other businesses offer the same product or service). He finds that the regional rate (TEA) of young entrepreneurs with high growth ambitions has a much closer relationship with the regional level of labor productivity than does the regional rate of less ambitious start-ups or the TEA for innovative entrepreneurship.

Another indication that not all entries are equally important to economic development but that the quality of the newcomers may play a decisive role is provided by empirical work that distinguishes between new businesses according to how long they remain in the market. In an empirical analysis at the level of German industries, Falck (2007) found that new businesses that survived for at least five years (“long-distance runners”) had a significantly positive impact on GDP growth, whereas the effect of entries that stayed in the market for only one year (“mayflies”) was statistically insignificant or significantly negative. Fritsch and Noseleit (2009b) arrived at a similar result in an analysis at the level of West German regions. They found that the positive effect of new business formation on incumbent employment is nearly entirely caused by start-ups that are able to survive for at least four years. The employment effect of new businesses that exit the market within the first four years is much weaker or statistically insignificant.

The available evidence on the effect of entries with different characteristics clearly suggests that not all start-ups are of equal importance for economic development but that the quality of the newcomers plays a decisive role. However, the results are by no means completely uniform. For example, while Acs and Mueller (2008) as well as Baptista and Preto (2010) found relatively pronounced effects on regional employment from larger start-ups, many of which are probably subsidiaries of larger companies, Koster (2011) identified a slightly

lower impact from organizational foundings, i.e., new subsidiaries of already existing firms. According to Acs and Mueller (2008) as well as Baptista and Preto (2010) large start-ups induce strong displacement effects but it is unclear if they lead to an increase or a decrease of overall employment in the long run. Moreover, it is not entirely clear what the set up of subsidiary establishments of large firms means in terms of challenge to incumbent establishments in the region. On the one hand, it could lead to increased competition for scarce resources on the local input market; on the other hand, it could be an important source of regional growth (Baptista and Preto, 2010). Presumably, much depends on the type of activity conducted by the new establishment and on the regional economic environment (e.g., the intensity of competition for local inputs). However, despite some ambiguity in interpreting results, it is fairly clear from the available evidence that small and short-lived new businesses have very little effect on regional development, probably because they do not constitute a strong enough challenge to incumbents. The intensity of the challenge may also explain why entry by ambitious entrepreneurs who expect to grow has a stronger impact than that of start-ups with low growth expectations.

Clearly, it would be helpful to have data that allow for a much more differentiated characterization of entry in attempting to discover more about how the quality of a new business affects the direct and indirect contribution it will make to economic development.

5.3 Regional differences

5.3.1 Empirical findings

Regions may differ considerably with regard to the characteristics of their new and incumbent businesses, as well as with regard to their ability to absorb the positive effects of new business formation. Fritsch and Mueller (2004, 2008) analyzed three types of German planning

regions: the highly agglomerated areas, the moderately congested regions, and the rural regions. The analysis showed that new business formation in agglomerations not only creates relatively pronounced positive short-term (direct) effects, but also leads to comparatively high, positive long-term (supply-side) effects (Figure 5). Also, the negative medium-term (displacement) effects are slightly stronger in agglomerations. Generally, the effects of new business formation on employment change are much more pronounced in agglomerations than in the other two types of regions.[18] A similar result was found by van Stel and Suddle (2008) for urban and rural regions of the Netherlands, and by Baptista and Preto (2011) for highly and modestly agglomerated regions of Portugal. Mueller, van Stel, and Storey (2008) showed that the effects of new business formation on regional employment are much more pronounced in England compared to either Wales or, particularly, Scotland.

Fritsch and Noseleit (2009a) investigated the direct and indirect effects of new business formation in agglomerations, moderately congested areas, and rural regions in West Germany, applying the decomposition procedure described above. They found only minor differences in direct effects between the three types of regions, but differences in the indirect effects were found to be considerable and well suited for explaining the patterns detected by Fritsch and Mueller (2008). Figure 6 displays the results of their analysis. The basic shape of the curve for the aggregate indirect effect in agglomerations is quite similar to the shape of the curve for moderately congested regions, the main difference being that the amplitude of the wave is more pronounced in agglomerations, indicating a higher intensity of indirect effects. This higher intensity of indirect effects of new business formation on incumbents in agglomerations suggests a higher level of economic interaction in these regions, which may directly result from

[18] The results for the rural regions, however, should be viewed with caution because only two of the 11 coefficients for start-up rates in the unrestricted model proved to be statistically significant and the coefficients for the Almon lags remained insignificant.

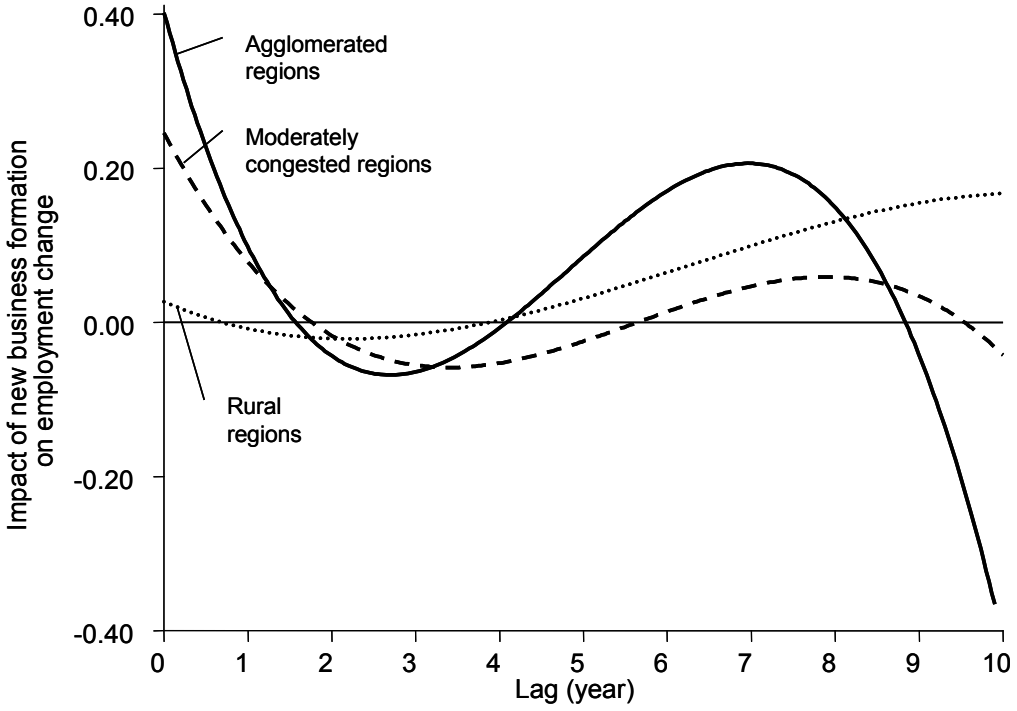

Figure 5 Impact of new business formation on regional employment change in agglomerations, moderately congested regions, and rural regions (Fritsch and Mueller, 2008)

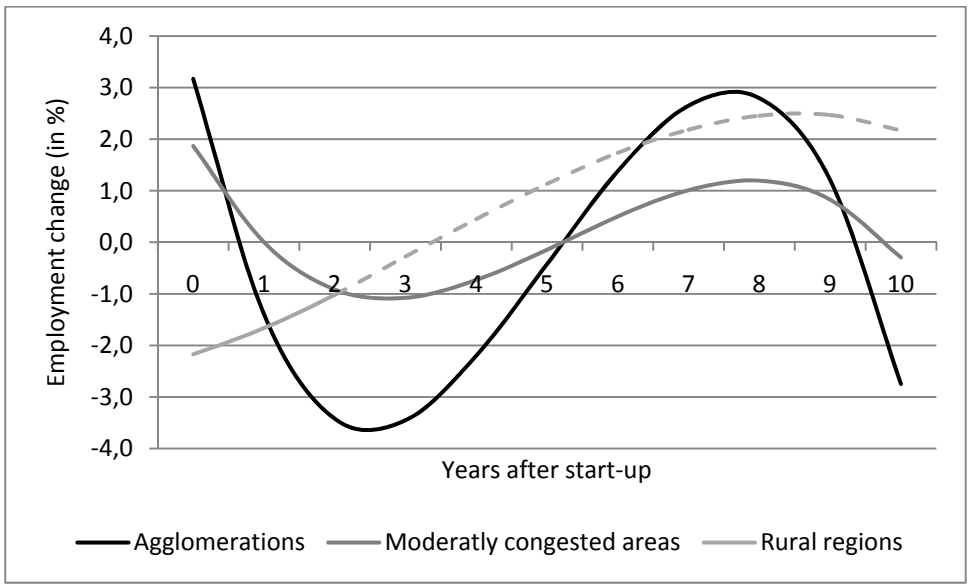

Figure 6 Average effects of new business formation on incumbent employment in different types of regions (Fritsch and Noseleit, 2009a)

higher density, particularly the spatial proximity of relatively many actors. The pronounced negative indirect effect in agglomerations between year 1 and year 6 after start up suggests higher displacement effects, which may be due to more intense competition in these regions. In turn, this relatively intense competition and selection in agglomerations may explain the more pronounced supply-side effects that dominate the third phase of the wave.

Another main difference between agglomerations and moderately congested areas, on the one hand, and rural regions on the other, is the direction of the aggregate indirect effects in the first years. In agglomerations and moderately congested areas, the early indirect effect is positive, suggesting that demand-side effects of the resources purchased by the newly founded businesses are much stronger than the displacement effects. In rural regions, the early indirect effects are significantly negative, a possible explanation for which could be that because of poor local supply, an increased demand for resources the rural start-ups need is chiefly met by suppliers in other areas. That the values for the coefficients of the aggregate indirect effect in rural areas do not decrease in the last periods as is the case for agglomerations and moderately congested areas should be interpreted with great caution because the unrestricted regressions coefficients for the start-up rate in later periods almost never prove to be statistically significant if included in the model.

Fritsch and Schindele (2011) investigated in more detail the regional differences in direct employment effects of new business formation in West Germany. They used two indicators to measure the contribution new businesses made to employment growth. The first is the *short-term employment contribution* of the start-up cohorts after a period of two years to total employment in the year prior to start-up. The second indicator is the *long-term employment contribution* of a start-up cohort after 10 years that is also related to overall employment in the year before the new businesses were set up. Fritsch and Schindele

(2011) found that, on average, an entry cohort of a particular year adds 1.8 percent to overall employment after two years (short-term employment contribution) and 1.56 percent after 10 years. The difference between the long-term and the short-term employment contribution reflect the development of start-up cohorts over these years. There is noteworthy variation in the employment contribution of new businesses across regions. The minimum value for the long-term employment contribution for all private industries is 0.84 percent; the maximum value is about eight times as high (6.56 percent). For short-term employment contribution of new businesses, the maximum value (4.71 percent) is more than four times larger than the minimum value of 0.95 percent.

Regression analyses by Fritsch and Schindele (2011) explaining the impact of regional characteristics on the direct employment contribution of new businesses showed that the start-up rate, the survival rate, the employment growth of new businesses, a large share of small businesses engaged in regional innovation activity, a highly educated regional workforce, and good availability of moderately priced labor have a significantly positive impact. Population density also has a positive effect, which can be partly explained by the fact that agglomerations are home to a relatively well educated workforce. Remarkably, Fritsch and Schindele (2011) did not find any indication that growth of new businesses is at the expense of incumbents: in fact, the development of both new businesses and incumbent firms appears to be positively interlinked. All in all, their analysis suggests that the *quality* of young firms, in terms of survival and success, has more influence on regional employment than does the *quantity* of start-ups. This indicates that simply trying to increase the number of regional start-ups will not suffice to create employment growth.

Fritsch and Schroeter (2011a) analyzed the influence of region-specific factors on the overall effect of start-up activity on employment change using the regression:

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

where *r* indicates the regions and *t* time. The *average start-up rate* is calculated as the mean over a 10-year period, i.e., from *t-10* to *t-1*. A period of 10 years was used to account for the relevant long-term effects found in a number of other analyses. The squared value of the start-up rate was included to account for a nonlinear relationship with employment change. Fritsch and Schroeter (2011a) found a positive coefficient for the average start-up rate, but a significantly negative coefficient for its squared value, indicating that the marginal effect of new business formation on regional employment declines with the number of start-ups. This suggests that regions with a relatively low level of start-ups may benefit more from an increase in the start-up rate than will regions in which the start-up rate is already high.

The estimated coefficients of the start-up rates and 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 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. For example, because employment in West German agglomerations grew less than it did in other types of regions during the period of analysis, Fritsch and Schroeter (2011a) found a negative coefficient for the effect of population density on employment change. However, interaction of the start-up rate with population density showed a strongly positive relationship, indicating that new business formation has a much larger effect in high-density areas than in rural regions. According to Fritsch and Schroeter (2011a), this population density effect is rather dominant.

Other region-specific factors that lead to a relatively pronounced effect of new business formation on employment growth are a large share of medium-skilled workers and a high level of innovative activity. Although the total unemployment rate appears to be unimportant, a high share of short-time unemployed had 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, and the entrepreneurial character of the technological regime were insignificant factors in the employment growth effects of new business formation.

In their analysis of the effect of entry and turbulence on the total factor productivity in a region, Bosma, Stam, and Schutjens (2011) identified a significantly higher effect in regions with high population density, particularly those regions in which the industry structure is characterized by a high level of *related variety* (for this concept see Frenken, van Oort, and Verburg, 2007). “Related variety” of regional industry structure means that the region’s industries are diverse but technologically related so that they share at least some portion of the same knowledge base. For example, technological relatedness of industries can be assumed if one firm produces goods normally produced by several different industries (Neffke and Svensson, 2008). Such technological relatedness may be conducive to the emergence of new combinations of ideas among different industries, which could be viewed as a special case of Jacobs externalities (Jacobs 1969).

5.3.2 What explains the dominance of density?

Many empirical analyses have found that the effect of new business formation on growth is considerably more pronounced in high density areas as compared to rural regions. When investigating the reasons for regional differences of the effects for West German regions, Fritsch and Schroeter (2011a) found that population density played an important

role. There are at least two strands of argument that may explain why density is so important in regard to the effect of new business formation:

- *First*, high-density areas tend to be a breeding ground for relatively high-quality start-ups, such as innovative new businesses. A main reason for this is the pronounced knowledge base of larger cities, manifested by the presence of universities and other research institutes. This explanation is supported by empirical evidence showing that innovative new businesses are particularly likely to be set up close to such research institutions (Bade and Nerlinger, 2000; Baptista and Mendonca, 2010). Moreover, many agglomerations have an abundant high-skilled workforce, which that can be viewed as a reservoir of high-quality entrepreneurs, not to mention an important input for innovative new firms. Other factors that may stimulate the emergence and success of high-quality start-ups in high-density areas include spatial proximity to other actors and the resulting knowledge spillovers, as well as diversity of activity (Jacobs externalities).
- *Second,* the high intensity of local competition, particularly on the input markets, may lead to relatively strong selection effects that spur regional productivity. The argument for a higher intensity of selection in agglomerations is in line with the observation that survival rates of new businesses are significantly lower in these regions compared to other areas (Fritsch, Noseleit, and Schindele, 2011; Renski, 2009). The argument is also consistent with the results of Fritsch and Mueller (2004, 2008) as well as those of Fritsch and Noseleit (2009a), who showed that displacement effects tend to be more severe in agglomerations, but that positive supply-side effects are also considerably more pronounced (see Figures 5 and 6).

Thus, there are some plausible explanations for the relatively pronounced effect of new business formation on regional development in high-density areas, but the reasons behind this phenomenon are not yet well understood. In particular, we do not know whether these

differences are due to different quality of the regional entries or what role local competition plays. If the intensity of local competition contributes to explaining the regional effects, this could be a clue as to which is more important—competition on the output market or competition for local inputs. Moreover, the dominant effect of density is a phenomenon that holds for a sample of regions *on average*; there are also empirical examples of high-density areas where new business formation has no such strong effect.[19]

5.3.3 Regional growth regimes

Audretsch and Fritsch (2002) suggested that there may be considerable differences between regions with regard to the role that new firms and entrepreneurship play in development. In introducing the concept of regional growth regimes, they extended the idea of the technological regime (Audretsch 1995, 39–64; Marsili, 2002; Winter 1984) from the unit of observation being the industry to a geographic unit of observation (see also Fritsch, 2004). By analogy to the common concept of a technological regime, the growth regime in a region is called *entrepreneurial* if growth results from a high level of new firm start-ups and a turbulent enterprise structure. In contrast, regions where above-average growth is accompanied by relatively stable large incumbent enterprises are regarded as having a *routinized* growth regime (Figure 7). In the routinized regime, new businesses do not play an important role, and their chances for survival and growth are much lower than in an entrepreneurial regime.

[19] This holds, for example, for large sections of the old-industrialized Ruhr area in Germany.

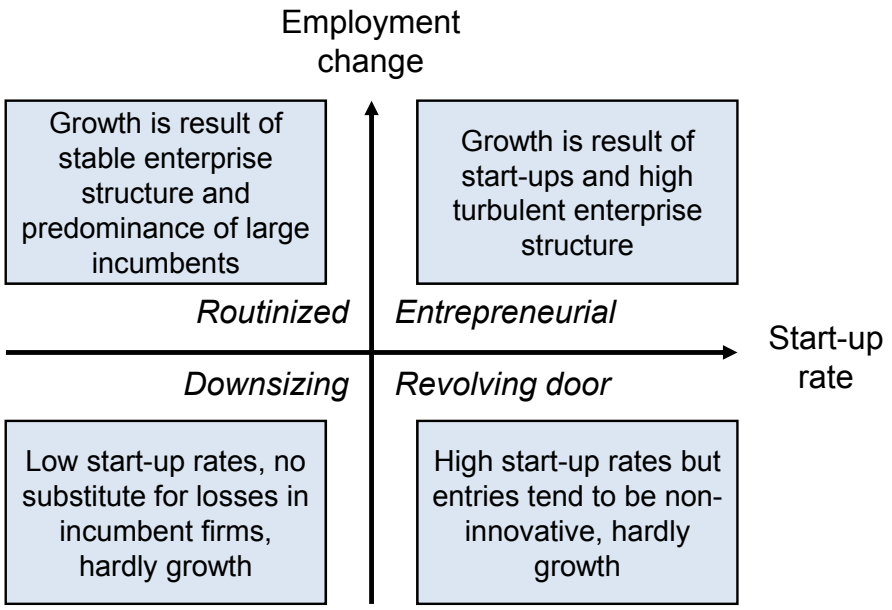

Figure 7: Regional growth regime types and their characteristics

Audretsch and Fritsch (2002) characterized regions with relatively low growth rates but above-average start-up rates as *revolving-door* growth regimes (see also Fritsch and Mueller, 2006). They conjectured that under such a regime, entries will tend to be non-innovative, supplying basically the same products and using nearly the same technology as the incumbent firms. Finally, relatively low-growth regions, which are characterized by a below-average level of start-up activity, are classified as *downsizing* growth regimes. In such regions, the number and quality of start-ups is not sufficient to provide enough new jobs or income to substitute for the losses in incumbent firms.

In analyzing transitions between the different growth regimes, Fritsch and Mueller (2006) identified some patterns. They found that while downsizing as well as entrepreneurial growth regimes tend to be rather stable over time, the other two types of regime appear to be more temporary. Moreover, if a region with a downsizing regime experiences an increase in new business formation, it will most probably become a revolving-door regime before it eventually reaches the stage of being an entrepreneurial growth regime. Correspondingly, if regions with an

entrepreneurial growth regime experience a decline in start-ups, they will first assume the character of a routinized growth regime before they eventually turn into a downsizing regime. These findings suggest that the effect of new business formation on growth occurs with a time lag that may be considerably longer than the lag suggested by the wave pattern. It may take a long time before the growth effects of an increased level of entrepreneurship become evident and even if the start-up rate begins to decrease, the growth benefits of higher start-up rates in a region will continue to prevail for some time.

In comparing entrepreneurship and growth in former socialist East Germany to the long-established market economy of West Germany, Fritsch (2004) concluded that the two parts of the country experienced different growth regimes during the period under inspection, the 1990s and the early 2000s. Despite quite similar formal institutions in both parts of the country, differences with regard to entrepreneurship culture, level of economic development, and policy, to name just a few, seem to have had a relatively strong effect on how the two regionsdeveloped.

5.4 Differences between industries

5.4.1 Why should there be differences in the effect of new business formation on regional growth between industries?

Differences in the effects of start-ups in different industries on regional growth are interesting for two reasons. First, industry affiliation may be regarded an indicator for certain characteristics of new businesses so that the results of the respective analyses may help us assess the importance of the quality of start-ups on their effects on growth. Second, market conditions, particularly the intensity of competition and the importance of particular parameters in the competitive process such as price and quality, may vary considerably between industries, resulting in differences in the direct and indirect effects of entry.

Acemoglu, Aghion, and Zilibotti (2006) and Aghion et al. (2009) argued that the distance of an industry or firm from the technological frontier may be decisive with regard to how incumbents will react to the challenge of new competition. According to this view, firms or industries that are relatively advanced and can be regarded as close to the technological frontier tend to react to entry with innovation (escape-entry effect), whereas the entry of new competition discourages more backward firms or industries from innovation activity. Aghion et al. (2009) presented empirical evidence as to the effects of entry by foreign competitors on a sample of U.K. firms that is in line with this hypothesis.

Another set of predictions about the divergent effects of entry in different industries is based on the notion of an equilibrium rate of business ownership (Audretsch et al., 2002; Carree and Thurik, 1999; Hartog et al., 2010), a concept sometimes referred to as a market's "carrying capacity" in the organization ecology literature (Hannan and Freeman, 1977). If there is such a thing as an equilibrium rate of business ownership, then "excessive entry" may lead to "market overcrowding."[20] Hence, business ownership rates that exceed the equilibrium rate will be unstable and tend to develop toward the equilibrium rate. This implies that the effect of new business formation on growth depends on the actual number of competitors, not the equilibrium number. If the actual number of firms in a market is equal or greater than the equilibrium number, positive net entry will not increase long-term overall employment in the firms operating in this market. However, entry may lead to growth if the actual business ownership rate is below the equilibrium rate (Hartog et al., 2010).

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[20] The common explanation for why entrepreneurs enter markets that are already crowded is that they are overconfident with regard to their chances and risks (Arabsheibani 2000; Koellinger, Minniti, and Schade 2007). Such overconfidence does indeed seem to be common among firm founders, and one may even argue that it is a necessary ingredient of new ventures, given the high risk of failure that would otherwise deter 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. Individuals particularly prone to founding such types of business may be those individuals who face relatively low opportunity costs, e.g., due to being unemployed.

Despite some empirical evidence (most of which is on the whole-nation level rather than covering a particular industry[21]) in support of this market "overcrowding" idea (Audretsch et al., 2002; Carree et al., 2007; Hartog et al., 2010), the concept suffers a number of drawbacks. First, many markets are geographically much larger than a region or a country and it thus may be rather questionable as to whether one can determine an optimal number of firms for a certain region or country. Second, the assumption that a market has a given carrying capacity is a static one in that it implies given levels of product, costs of production, and demand. These assumptions ignore possible supply-side effects of new businesses and may be appropriate chiefly in the case of non-innovative entry. If entry is innovative, that is the new firm introduces new products or better methods of production or distribution that stimulate innovation by incumbent firms, it may induce considerable change in the equilibrium number of firms. Clearly, for the case of innovative entry, the notion of excessive entry and overcrowding is of limited value, and even in the case of non-innovative entry, the argument is weak, especially in the event that incumbents respond to the newcomers' challenge by engaging in innovation.

A number of ad-hoc hypotheses about divergent effects of entry into different industries may apply. For example, it is plausible to assume that the effect of entry is relatively strong in industries that are knowledge-intensive and require relatively high qualification (e.g., high-tech manufacturing, knowledge-intensive business services) because the entries into such industries are generally of high quality. One may particularly assume a relatively positive employment development for new ventures, i.e., a pronounced direct effect, in innovative industries as they benefit from a new and growing demand for their products or services. Nevertheless, innovations are always subject to uncertainty as to market success and, if they involve R&D, also with respect to the success, cost, and duration of the R&D. If innovative new firms do

[21] An exception is the analysis by Carree and Thurik (1999) of the Dutch retailing sector.

survive, however, it is plausible to expect them to grow rapidly and to generate a relatively strong direct employment effect in the respective region. The regional incidence of the indirect effect does, however, depend on the spatial distribution of competitors. It can be relatively pronounced within regional clusters of the respective industry but it may be rather weak if the number of local competitors is small.

How certain barriers, such as minimum efficient size and capital requirements, affect entry is a priori unclear. On the one hand, one may assume that a certain minimum efficient size leads to larger-size entries, which will tend to have a more pronounced effect than smaller entries (Acs and Mueller, 2008). Hence, start-ups in the manufacturing sector, which is characterized by a relatively large minimum efficient size, have a stronger effect on growth than new businesses in small-scale industries such as many types of consumer-oriented services. On the other hand, entry rates tend to be higher in industries with a low minimum efficient size (Fritsch and Falck, 2007), which should lead to higher intensity of competition and, hence, more pronounced supply-side effects.

5.4.2 Empirical evidence of industry differences

There are only a few empirical studies investigating the employment effect of start-ups differentiated by their sector affiliation. Concerning the direct employment effect of new businesses, empirical analyses for Germany provide evidence that there is a great deal of variation between manufacturing and the service sector. For example, while the number of employees in start-up cohorts of service firms falls below the initial level after a period of eight years, in the case of new manufacturing businesses, the number of employees stays above the initial number for 18 years (Fritsch and Weyh, 2006; Schindele and Weyh, 2011).

Empirical results on the survival of innovative firms are mixed. Studies by Audretsch (1995) for the United States and by Audretsch,

Houweling, and Thurik (2000) for the Netherlands indicated a relatively greater risk of failure for start-ups in industries with high R&D levels. In contrast, Cefis and Marsili (2005) for the Netherlands, Metzger and Rammer (2009) as well as Fritsch, Noseleit and Schindele (2011) for Germany presented evidence for higher survival rates for new ventures in innovative industries as compared to other industries in Germany. Metzger and Rammer (2009) also showed that new businesses in innovative manufacturing industries and knowledge-intensive services created, on average, more jobs per start-up than entries in non-innovative and non-knowledge-intensive industries, at least in the case of Germany.

Applying a regional production function approach, Audretsch, Keilbach, and Lehmann (2006) included the start-up rate as an input together with capital, labor, and R&D investment. In their analysis for West Germany, they found that new business formation in high-tech manufacturing industries and in information and communication industries had a considerably stronger impact on the regional growth of labor productivity than did the overall start-up rate or the level of start-ups in low-tech industries.

Analyses of the overall effect of new business formation on regional employment growth have found much stronger effects for start-ups in manufacturing than for start-ups in the service sector (Andersson and Noseleit, 2011; Fritsch and Mueller, 2004; Fritsch and Schroeter, 2011b; van Stel and Suddle, 2008). Distinguishing between several parts of the service sector, van Stel and Suddle (2008) identified the lowest effect for new business formation in trades. According to Fritsch and Schroeter (2011b), start-ups in knowledge-intensive business services had the strongest impact on overall employment growth in West Germany, while the effect of new businesses in innovative manufacturing remained statistically insignificant. However, studies using performance indicators based on GDP figures have found contradictory results. Dejardin (2011), in a study of Belgium, identified a

positive effect of net entry on GDP growth only for services, while the effect of net entry into manufacturing industries was non-significant. Bosma, Stam, and Schutjens (2011), in their analysis for regions of the Netherlands, found a positive effect of entry and turbulence on the growth of total factor productivity only for services, not for manufacturing.

Analyzing the effect of new business formation on regional employment in Portugal, Baptista and Preto (2011) found that the overall effect on regional employment was substantially larger for new businesses in knowledge-based industries than for start-ups in other sectors. In their study, “knowledge-based” industries include innovative manufacturing and knowledge-intensive services (e.g., communications, finance, insurance, real estate, and business services) (OECD, 2002). Specifically, the displacement effects as well as the supply-side effects of new businesses in knowledge-based industries were much more pronounced than in non-knowledge-intensive industries.

The wave pattern observed for the effects of new businesses on employment implies that start-ups may induce a considerable reallocation of resources in the respective regional economy. Andersson and Noseleit (2011), in an analysis for Sweden, focused on such intersectoral effects. In a first step, they confirmed the well-known wave pattern for the Swedish economy as a whole. In a second step, the model was run for three sectors: manufacturing, low-end services, and high-end services. Andersson and Noseleit found that in all three sectors new business formation resulted in an employment increase. Analyzing the effect on overall employment change, start-ups in manufacturing had the strongest impact, followed by new business formation in low-end services. The effect of start-ups in high-end services, defined to include knowledge-intensive services, on overall employment change, however, was hardly statistically significant. Andersson and Noseleit clearly showed the presence of indirect effects

by regressing new business formation in a certain sector on employment change in other sectors of the economy. These indirect effects were strongest for start-ups in manufacturing, again followed by start-ups in low-end services, with high-end service industries again bringing up the rear.

In short, the results of empirical studies on how new business formation in different industries affects growth are far from being monolithic. The only point of agreement among these studies is that start-ups in manufacturing tend to have a stronger impact on employment than do new businesses in the service sector, which may be explained by the larger average size of manufacturing start-ups. However, in analyses with GDP or productivity as the dependent variable, only entry into the service sector had a statistically significant effect. With regard to entries in innovative industries, some analyses found lower probabilities of survival, whereas studies for other countries showed relatively high survival rates in these industries. The results on the overall impact on regional employment of start-ups in innovative or knowledge-intensive industries are also inconclusive. In some studies, start-ups in these industries had a pronounced impact, while in others, this effect was statistically insignificant.

There are a number of explanations for these diverse empirical results. One reason may be that industry classifications are not well suited for distinguishing between entries that have different impact on regional development. A second reason could be that there are considerable differences between certain industries in specific countries or types of regions that have implications for the effects of entry on development. Differences in the results between countries or regions may have to do with how close the firms under study are to their technological frontiers (Aghion et al., 2009). Also unclear is how the method of analysis and the choice of the dependent variable shape the results. For example, that Audretsch, Keilbach, and Lehmann (2006), applying a production function approach, identified a strong positive

effect of new business formation in the German high-tech manufacturing industries on the development of labor productivity, while, for the same country and sector, Fritsch and Schroeter (2011b) found no significant effect on employment needs explanation. More research is also needed into the effect on employment and total factor productivity of start-ups in the manufacturing and the service sector in the Netherlands (van Stel and Suddle, 2008; Bosma, Stam, and Schutjens, 2011). Obviously, considerable further research is needed before we will completely understand how economic development is affected by start-ups in different industries.

6. Is new business formation a cause or a symptom of regional development?

The review of research on the effect of entry on regional development has shown that there is compelling empirical evidence in favor of a positive relationship. However, given that economic growth creates entrepreneurial opportunities, which, in turn, in accompanied by an increasing number of firms, entry may also be viewed as a symptom of development. If growth stimulates the emergence of new businesses, ignoring this relationship may lead to overestimating the effect that start-ups have on economic development.[22] In an extreme case, new business formation would simply be a by-product of growth processes that take place independently of new business formation.

However, viewing new business formation as only a by-product of economic development is rather implausible. Such a stance would have to ignore numerous examples of the pioneering role some exceptional entrepreneurial personalities have played in economic development. Even if one made the rather strong assumption that historical developments obviously largely initiated by new ventures—for example,

[22] Economic growth can stimulate new business formation at least in three ways. First, prievious growth may generate a relatively large number of new entrepreneurial opportunities. Second, positive expectations about future growth can encourage individuals to start an own business. Third, overall growth makes it easier for start-ups to survive their first critical years and to establish on the market.

the Industrial Revolution of the 18th century or development of the micro computer and emergence of the Internet economy—would have occurred anyway, such a stance cannot explain the geography of these developments. On the other hand, however, without an adequate empirical analysis of the relationships, the possibility of such an effect of economic development on new business formation cannot be ignored. The question, therefore, is: Does economic growth truly have such a significant impact on new business formation and, if so, does this situation lead to overestimating the effect of entry on development in subsequent periods?

A first indication of the extent to which the emergence of new business is a result of growth processes can be drawn from studies that have analyzed the determinants of entry. Many of these studies have found such a positive effect of growth, particularly population growth, on entry, but in most cases the relationship was not very strong.[23] Audretsch, Keilbach, and Lehmann (2006) simultaneously estimated the effect of regional performance on the level of new business formation, as well as the effect of new business formation on the growth of regional labor productivity, using a production function framework. While they found that the growth of GDP per head had a statistically significant positive impact on new business formation in subsequent periods, the effect of start-ups on the increase in labor productivity remained statistically significant. This clearly suggests that new business formation has a distinct positive effect on development that is independent of an overall growth trend.

In a recent paper, Anyadike-Danes, Hart, and Lenihan (2011) analyzed this relationship for Irish regions between 1988 and 2004, a time span that includes the period of rapid economic growth Ireland enjoyed between 1994 and 2000. The authors found that during the period of analysis, the number of businesses in Ireland almost tripled.

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[23] See, for example, Audretsch and Keilbach (2007), Fritsch and Falck (2007), Reynolds, Storey, and Westhead (1994), and Sutaria and Hicks (2004).

However, the number of start-ups in relation to the number of incumbent businesses remained fairly constant in the longer run. The same holds for the number of new businesses in relation to the number of employees. Relating the time series of new business formation and employment showed no statistically significant effect of employment growth on the level of start-ups, but did show a weak effect of gross entry on employment. These statistical tests were, however, restricted by the limited length of the two time series. Anyadike-Danes, Hart, and Lenihan (2011) found that the stock of businesses per regional population is fairly constant across regions, supporting the idea of an equilibrium number of businesses per population at a certain point in time. The authors suggested that relatively high start-up rates in a region might be regarded as a process of catching-up to this equilibrium rate.

Hartog et al. (2010) investigated the possible two-way relationship between changes in the business ownership rate (= net entry) and growth for 21 OECD countries for the period 1981–2006, employing a simultaneous empirical approach. They identified a link between the national welfare level and the business ownership rate, but found that development during the previous periods had no statistically significant effect. Analyzing the effect of changes in the business ownership rate on GDP growth, Hartog et al. (2010) concluded that there are decreasing marginal returns in terms of growth effects to entrepreneurship, which confirms results of Fritsch and Schroeter (2011a) for German regions. Hartog et al. (2010) explained this result with the notion of an equilibrium business ownership rate: an increasing level of entrepreneurship will have relatively pronounced effects on growth if the initial business ownership rate is below the equilibrium rate; the effects will be considerably smaller if the initial rate is above the equilibrium rate. A main limitation of Hartog et al.’s (2010) study is that it contains no information on gross entry and thus nothing can be learned about the effects of the number of entries on turbulence in the stock of businesses and its effects on economic development.

In summary, work to date has not identified any, or only a relatively weak, effect of growth in previous periods on the level of new business formation; the effect of new business formation on economic development, however, is found to be considerably pronounced. Based on this evidence, we can conclude that start-ups do have a distinct impact on growth independent of any long-term growth trajectory that might exist. New business formation is more a cause than a symptom of growth. However, assessing the effect of new business formation on economic development without simultaneously accounting for a possible effect of growth on the level of start-ups may lead to some overestimation of the effects of start-ups.

7. Entry, market selection, and regional performance: Interpretation and speculation

Empirical evidence as to the effects of new business formation on economic development clearly indicates that start-ups need to be understood as an integral part of the market process. According to this view, new businesses are a challenge to incumbents and may induce improvement of overall economic performance, given that market selection is working on a survival of the fittest basis. This implies that the consequences of new business start-ups for growth depend on a number of factors, including:

- quality of the newcomers in terms of the competitive pressure that they exert on incumbents,
- the way incumbent firms react (e.g., by product innovation, process innovation, outsourcing to low-wage regions), as well as
- the functioning of the market selection process, which, in turn, depends on several other factors, such as the number of competitors, demand conditions, technological developments, barriers to entry and exit, etc.

Market selection processes are at work in both output and input markets. Given the interregional or even global scope of many output markets, improvements on the part of incumbents that were originally motivated by pressure from local start-ups may not occur in the same region where the local start-up is but elsewhere. Since many input markets, such as markets for low-end services, floor space, and labor, are much more local in character than output markets, one may expect that the competition effects induced by start-ups on input markets will more often occur in the same region as the start-up compared to the consequences of competition on output markets. For example, intense competition for inputs could explain why survival rates of start-ups in regions with high population density are lower and that displacement effects are more pronounced. This would point to a relatively high importance of regional input market conditions to the effect of new business formation on regional development as compared to the regional market for the respective products and services.

The above-discussed factors make it uncertain that new business formation will necessarily lead to additional employment in the same region where the start-up takes place. Indeed, there are several examples of regions in which the effect of new business formation on employment is insignificant or even negative. However, on average and in most regions, start-ups *do* create more employment in their region, particularly in the longer run. Why there is such variation between regions in this regard, however, is still rather unclear.

8. Implications for entrepreneurship policy

Although our understanding of the effects of new business formation on regional development is still incomplete, the current state of knowledge suggests a number of important implications for an entrepreneurship policy aimed at stimulating regional growth.

It has been shown that new business formation may produce a number of important indirect effects that have a strong impact on

regional competitiveness and growth. These competitiveness-enhancing supply-side effects of new business formation rely on markets operating according to survival of the fittest principles. If the market does not operate according to these principles, which when functioning properly force less productive firms to exit, entry may not stimulate growth. Therefore, any growth-oriented entrepreneurship policy should ensure that the market truly is determined by survival of the fittest. Policymakers should take particular care to avoid any action that will interfere with this selection process, such as direct support of new businesses by means of special subsidies that are not available to incumbents.

A number of analyses clearly suggest that it is not the mere number of start-ups, but their ability to compete successfully with incumbents and to survive, that is important for their effect on regional development. Hence, increasing the number of start-ups may not be an appropriate strategy for an entrepreneurship policy aimed at stimulating growth; rather, such a policy should focus on improving the quality of start-ups and on increasing the number of high-quality new businesses. Hence, to be truly effective, the policy must concern itself with the quality of the start-ups it encourages. This implies that start-up rates or business ownership rates that include all types of businesses are of only limited relevance for assessing the level of growth-relevant entrepreneurship in a region.

Policy intended to stimulate high-quality start-ups should be firmly based on the preconditions necessary to successful entrepreneurship, such as general as well as entrepreneurship education, and provide qualified advice to potential founders. Entrepreneurship education, in particular, could be very useful in helping people make a more realistic assessment of their ability to run a business and, in the best case, convince those ill suited to such a venture from embarking on it (von Graevenitz, Harhoff, and Weber, 2010). The empirical results particularly indicate that a highly educated regional workforce and good

availability of moderately priced labor is generally conducive to the employment contribution of new businesses. Moreover, policy should be especially designed to include measures aimed at the regional knowledge base, which is an important source of spatially bounded knowledge externalities that may enhance the recognition of promising entrepreneurial opportunities and the emergence of high-quality start-ups. Trying to increase the number of high-quality start-ups means actively creating an entrepreneurial culture. For innovative start-ups, this includes building a high-quality university system that provides cutting-edge scientific knowledge and technology, facilitates access to higher education by talented people, and effective technology transfer.

The results of recent research clearly show that region-specific factors play an important role in the development of new businesses and their contribution to employment. Growth conditions for new businesses and their role in regional development will vary according to the characteristics of the regional environment, and thus different regions may well have quite different types of growth regimes (Audretsch and Fritsch, 2002; Fritsch, 2004; Fritsch and Mueller, 2006). This suggests that policy measures aimed at creating an environment for successful entrepreneurship should be region-specific and take into consideration both the advantages and disadvantages of a region's economic structure.

9. Avenues for further research

Recent empirical analyses of the effects of new businesses on economic development have produced a number of interesting results. This work has substantially improved our understanding of the underlying forces, but there is considerable room for further investigation. In what follows, I sketch some important avenues for further research in the field.

- *Alternative performance measures.* Most analyses of the effect of new business formation on regional development have used

employment change as a measure for performance for reasons of data availability. Only very few studies used GDP-based indicators such as GDP growth or productivity, quite often with considerably different results than analyses using employment growth figures. Such divergent results deserve further investigation. Since productivity can be regarded a catch-all variable that should particularly reflect improvements of performance that do not result in more employment (e.g., labor-saving process innovations), the effect of new business formation on productivity should be more pronounced than the effect on employment. Moreover, since the wave pattern that has been found for the effect of new business formation on employment change suggests that market selection begins to work rather soon after entry, the positive effect of entry on GDP and productivity should occur considerably earlier than the effect on employment.

- *Quality of entry*. 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, her or his motivations (e.g., opportunity vs. necessity start-ups) and growth ambitions, the marketing strategy pursued, the amount and quality of resources mobilized for the new business, its productivity, survival over a certain period of time, etc. Since high-quality start-ups put greater competitive pressure on incumbents, the market-process-oriented view expressed above implies that they should have a stronger effect on overall development than start-ups of a lower quality. However, nearly nothing is known about those characteristics of new businesses that make them particularly challenging to incumbents. Only few studies have analyzed the factors that are conducive to the emergence of high-quality entry such as innovative start-ups or new businesses with high growth expectations. To derive policy recommendations for increasing the number of high-quality start-ups, much more needs to be known about the determinants of this type of entry.

- *Gazelles.* Fast-growing new businesses (gazelles) are a special case of high-quality start-ups. Although these firms have attracted a fair amount of attention and research in recent years (Acs, 2011; Henrekson and Johansson, 2010), not much is known about them. This holds particularly in regard to their effect on the respective industry and region. What regional conditions are conducive to the emergence of gazelles? What impact do these fast-growing new businesses have on overall regional development? Does the emergence of gazelles lead to a particularly pronounced response by incumbents?

- *Indicators for growth-relevant new businesses*. All the studies on how new business formation affects regional development are based on start-up rates for the entire regional economy or for different sectors. If it is correct that only a small portion of new businesses has a significant effect on regional development, then start-up rates that include all new businesses produce a rather diffuse picture and are not well suited to assess the level of growth-relevant entrepreneurship in a region. More informative indicators for this type of entrepreneurship should be developed.

- *Effects of entry on competition in input markets and output markets.* The available evidence as to the competitive processes induced by the newcomers is still incomplete and somewhat speculative. For example, it is still a largely open question as to why we can observe such pronounced supply-side effects of new business formation in many regions when output markets are interregional or even global. Is the effect of start-ups on such interregional markets concentrated in the respective region? Moreover, what is the relative importance of competition on output markets compared to competition for local inputs such as floor space and labor? To what degree do the indirect effects of new business formation that occur in the region rely on input market competition? If input markets play a considerable role in

this respect, what can policy do to stimulate positive effects of new business formation on regional development?

- *Characteristics of output markets*. Entry conditions and the competitive process vary considerably with the characteristics of the industry such as the stage of the industry life cycle (Audretsch, 1995; Klepper, 1997). Such characteristics of output markets should have consequences for the performance of newcomers as well as for the effect of new business formation on overall development. They may also have some influence on the quality of entry. Empirical evidence as to the impact of start-ups in different industries on overall economic performance, however, is not very clear and partly contradictory. And nothing is known about the influence that the intensity of competition and the importance of particular parameters in the competitive process of a certain market, such as price and quality, have on the direct and the indirect effects of entry.

- *Institutional environment*. Generally, the role the institutional environment plays in entrepreneurship is a research “blind spot.” This is particularly true for the effects of new business formation on development. Formal as well as informal institutions may be important at all stages of the entrepreneurial process and can affect the number and quality of start-ups as well as their impact on input and output markets (for a more detailed treatment of this topic, see Feldman, Lanahan, and Miller, 2011, and Henrekson and Johansson, 2011).

- *Regional characteristics*. A number of studies have clearly shown that regional characteristics can play a considerable role in the employment effects of new business formation. Particularly, population density seems to have a dominant effect in this respect. These regional differences are not yet well understood and should be further investigated. Among the factors that might explain such regional differences are

- the regional economic and political history, wealth level, and development in previous years;
- the characteristics of the regional knowledge base;
- the scale and type of entrepreneurship culture prevalent in the region;
- the quality of the regional start-ups;
- the qualification of the workforce, the availability of labor, and the regional wage level;
- the local availability and price of other inputs, such as finance and business-oriented services;
- the regional industry composition;
- the size structure of the regional economy;
- regional policy measures such as subsidies for start-ups and incumbent businesses;
- the presence of supportive networks;
- the intensity of regional competition on input and output markets.

Combinations of such region-specific factors may lead to particular regional growth regimes.

- *Entry as a cause or as a symptom of growth*? Research in this important field is particularly hampered by the lack of appropriate data. Time series are often too short for adequately investigating this important issue. Although the few available studies clearly indicate that start-ups can have an effect on subsequent growth that is independent from long-term development trajectories, more such studies for countries of different wealth levels would be desirable. It would be particularly interesting to know whether it is possible to identify types of new businesses that are mainly induced by

increasing domestic demand and have no significant effect on future development (start-ups as a symptom of growth). Accordingly, it would be desirable to know what types of new ventures are growth initiators and to what extent their emergence is a result of development processes.

- *Universities and other research institutions as incubators.* Although our knowledge about the characteristics of those new businesses that are of particular importance for regional growth processes is incomplete, there are sufficient indications that the regional knowledge base, particularly universities and other research institutions, play an important role in this respect. Hence the role of these knowledge sources as incubators of new businesses should be further investigated (for a review of this field, see the contribution of Astebro and Bazzazian, 2011). A more comprehensive understanding of the role played by these institutions could be particularly helpful in deriving appropriate policy recommendations.

- *Entrepreneurship policy*. Finally, all the research directions proposed above should lead to the design of an appropriate growth-oriented entrepreneurship policy. A large part of the entrepreneurship policy currently observed in many countries and regions is motivated by stimulating regional growth. However, these policy instruments have been designed more or less ad-hoc, without a sufficient understanding of the underlying processes. The effects of the current strategies should be analyzed and considerable effort should be devoted to carefully transform the research results into appropriate and effective policy strategies.

10. Final remarks

How new business formation affects regional development is still a largely underresearched field. This is remarkable given the importance of the issue, particularly since regional development is often given as a justification for policy measures intended to promote the emergence of

new ventures. Recent research has shown that new business formation can indeed further regional development, but it would be naïve to expect that all or even most of these new businesses create a substantial number of jobs. Many and probably the most important effects of new business formation on growth are indirect in nature and much depends on factors such as the quality of the start-ups and the regional environment. Our knowledge about these influences has increased considerably in recent years, but a great deal of research is necessary before we will arrive at an understanding of the effects that is sufficiently comprehensive to be useful.

This survey of research in the field has highlighted a number of open questions that are ripe for further research. I very much hope that further research will lead to answers (and, of course, more questions) that will be particularly helpful in designing appropriate and effective policies in this field.

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