The direct and indirect effects of new businesses on regional employment: an empirical analysis

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Abstract: We analyse the different types of effects that new businesses may have on regional employment. One of these effects is the direct contribution of employment in the new businesses to overall employment. We also estimate the indirect effect of new business formation on incumbent employment. We find pronounced differences between regions with regard to the two effects. Effects of new business formation on incumbent employment are considerably larger than the direct contribution of new businesses to employment.

Keywords: entrepreneurship; new business formation; regional development; direct and indirect effects.

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1   Introduction

New businesses can contribute to regional employment in different ways. One way is through the employment generated in new firms or establishments. The evolution of the newcomers, *e.g.*, given by the number of their employees, sales or market share, may be labelled the direct effect of new business formation. However, this is only a part of the contribution that new businesses make to economic development. Due to competition and market selection, only a fraction of start-ups survive for a longer period of time (Boeri and Cramer, 1992; Wagner, 1994) and those that succeed in the market may displace the incumbents. Given that market selection works according to a survival-of-the-fittest scenario, firms with relatively high productivity will remain in the market, while those characterised by a relatively low productivity level have to reduce their output or exit.[1] At a constant output level, this market selection process should lead to a decline (not increase) in employment because fewer resources are needed to produce a 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 does not necessarily need to be positive, but could just as well be negative (see Fritsch, 2008, for a review of the evidence).

As was argued by Fritsch and Mueller (2004), new business formation in a region may also have several indirect effects on incumbent businesses that evolve over a longer period of time. One type of such an indirect effect is the crowding out of incumbent businesses by newcomers. A second type of indirect effect is an improvement on the supply side due to the competition induced by new entrants that leads to a higher competitiveness of the regional economy and, thereby, to more employment. Analyses by Fritsch and Mueller (2004; 2008) suggest that the overall indirect effect of new business formation is positive in most regions. This implies that supply-side effects are considerably larger than crowding-out effects. Moreover, Fritsch and Mueller (2004; 2008) found an indication that the indirect effects of new business formation are considerably larger than the direct effect, *i.e.*, employment in new firms.

In this paper, we want to assess and compare the different effects of new business formation on regional employment. Section 2 introduces the data and spatial framework of the analysis. Section 3 investigates the employment share of new businesses, measured as the share of employees in businesses younger than ten years over all private sector employees in the respective region (*total direct level effect*). Other indicators focus on employment change rather than employment levels. We also decompose regional employment growth into the development of incumbent businesses and the employment growth of new businesses (Section 4). Based on these measures, we then try to find out whether the indirect effects of new businesses on employment (*i.e.*, employment change in incumbents) are more pronounced than the direct effects, as measured by employment change in new businesses (Section 5). Section 6 concludes.

2   Data and spatial framework of the analysis

Our data on start-ups and their employment are derived from the establishment file of the German Social Insurance Statistics. This database includes information on all establishments that have at least one employee subject to obligatory social insurance (Fritsch and Brixy, 2004). This implies that pure self-employment businesses without any employees are excluded from the analysis. We exclude the public sector because employment in this sector is governed by factors other than private sector employment. The analysis includes the start-ups in the 1984–2002 period.

The spatial framework of our analysis is based on the planning regions (*Raumordnungsregionen*) of West Germany. Planning regions consist of at least one core city and the surrounding areas. Therefore, the advantage of planning regions in comparison to districts (*Kreise*) is that they can be regarded as functional units in terms of travel to work areas, thereby accounting for economic interactions between districts. Planning regions are slightly larger than what is usually defined as a labour market area. In contrast, a district may be a single core city or a part of the surrounding suburban area (see Federal Office for Building and Regional Planning, 2003, for the definition of planning regions and districts). We restrict the analysis to the planning regions of West Germany for two reasons. First, while data on start-ups in West Germany are currently available for the time period between 1983 and 2002, the time series for East Germany, which begins in 1993, is much shorter. Second, many analyses show that the developments in East Germany in the 1990s were heavily shaped by the process of transformation to a market economy; therefore, it represents a rather special case that should be analysed separately (*e.g.*, Kronthaler, 2005). The Berlin region had to be excluded due to changes in the definition of that region after Germany's reunification in 1990. For historical reasons, the cities of Hamburg and Bremen are defined as planning regions, even though they are not functional economic units. To avoid possible distortions, we merged these cities with adjacent planning regions.[2] Therefore, we have 71 regions in our sample.

3   The spatial and temporal dimensions of total direct level effects

One part of the impact that start-ups have on employment are the jobs created by new businesses. We measure this employment contribution of new businesses as the sum of employees in all start-up cohorts in the previous ten years in t=0 (*t=0 to t–9*) in relation to the total employment in the current year (*t=0*).[3] A period of ten years is taken because earlier studies have shown that the effect of new businesses on employment evolves over this time span (Fritsch, 2008). This measure, the total direct level effect, describes the newness of regional employment and can be regarded as an indicator for restructuring or creative destruction in the regional economy during recent years.

From 1992 to 2002, the mean share of employment in new businesses over all employees was 16.8% (Table 1). There was considerable variation between a maximum value of 27.1% and a minimum of 11.2%. The variation of the direct level effect across regions (between) was much larger than the variation over time (within).

Table 1   The descriptive statistics of the total direct level effects (all private industries)

	Mean	*Median*	*Minimum*	*Maximum*	*Standard deviation*
Overall	16.8	16.5	11.2	27.1	2.8
Between			12.5	25.4	2.7
Within			14.2	23.1	0.8

Note: Number of observations: 781.

The regional distribution of the total direct level effect in all private industries for 1993 to 2002 shows a rather mixed picture (Figure 1). Regions with relatively high direct level effects are concentrated in the northern part of West Germany, while this contribution of new businesses to employment is relatively low in the regions around Stuttgart and some of the regions north of Munich. These findings confirm the results of Audretsch and Fritsch (2002) and Fritsch and Mueller (2006) that regions of a certain type of growth regime tend to be clustered in space.

Figure 1   The total direct level effect in West German regions over 1993 to 2002
              (all private industries)
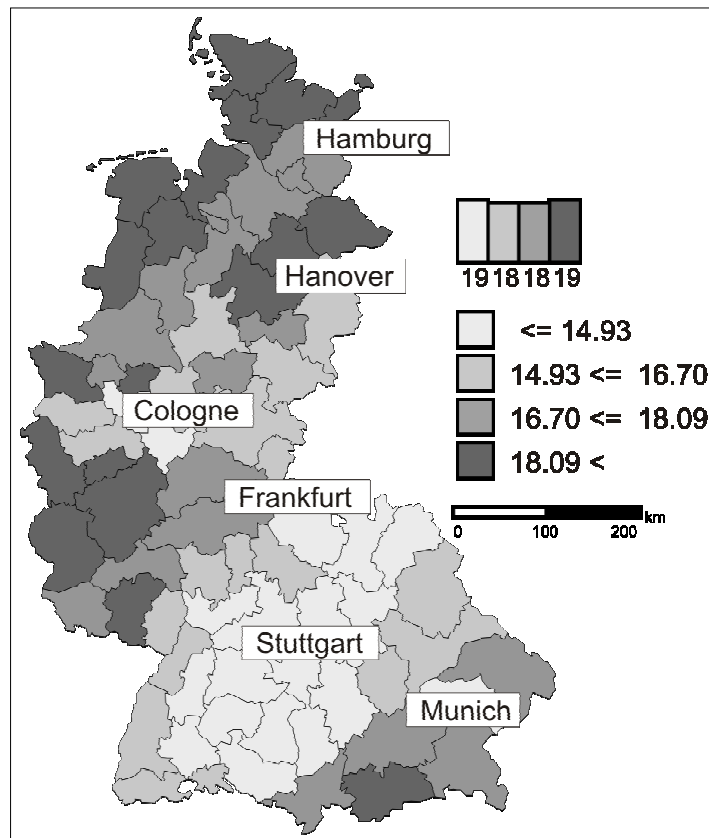
4   The spatial and temporal dimension of employment growth

For each region, we are able to follow employment in yearly cohorts of new businesses over time. The overall regional employment change (ΔEMP_{total}) results from employment in new businesses (ΔEMP_{new}) and from the employment change in the incumbents (ΔEMP_{inc}), *i.e.*:

$$\Delta EMP_{total} = \Delta EMP_{inc} + \Delta EMP_{new}. \tag{1}$$

Using the information on total regional employment change (ΔEMP_{total}) and employment in new businesses (ΔEMP_{new}), we can calculate the employment change in the incumbents as:

$$\Delta EMP_{inc} = \Delta EMP_{total} - \Delta EMP_{new}. \tag{2}$$

This employment change in the incumbent businesses encompasses the indirect effects of new businesses – displacement and supply-side effects – as well as other influences.

Since the effect of new businesses on employment evolves over a period of about ten years (Fritsch, 2008), we determine the employment that new businesses create by summing up the employment in start-ups that occurred within the previous decade. Hence, the employment in start-ups is defined as the number of employees in the start-up cohorts during the previous ten years. To assess employment in the incumbents in a certain year, we subtract this direct effect (the employment in start-ups during the previous ten years) from total employment. Therefore, 'incumbent employment' is the number of jobs in businesses that are at least ten years old. The annual change of total employment, employment in start-ups and incumbent employment is then calculated as the average change over a two-year period, *i.e.*, between the current period t=0 and t–2.[3] A two-year average is used to avoid disturbances by short-term fluctuations.

The employment change in businesses younger than ten years and the employment change in incumbent businesses are weighted with the share of total employment. This is necessary to avoid that the employment change in incumbents and the employment change in new businesses do not add up to the total employment change. Furthermore, this weighting procedure allows direct comparison with respect to descriptive results and regression results. A simple example may illustrate the three employment change measures. If the total employment change is 5%, the share of employees in businesses younger than ten years is 20% and the employment change in these young businesses is 9%, the respective employment change in businesses younger than ten years is weighted by 0.2, resulting in $9 \times 0.2 = 1.8\%$. In an analogue manner, the employment change in incumbents – 4% in our example – is also weighted by its share in total employment: 80% in our example. The weighted employment change in businesses older than ten years is then $4 \times 0.8 = 3.2\%$. Summing up the weighted employment change in incumbents and new businesses leads to $3.2 + 1.8 = 5\%$, which is the total employment change. Table 2 displays the definitions of the different variables for the employment effects of new businesses.

Table 2   The definition of variables for measuring employment change

Variable	Definition
Overall employment change	$\Delta EMP_{total} = ln\ EMP_{total\ t=0} - ln\ EMP_{total\ t-2}$
Employment in new businesses	$EMP_{new\ t=0}$ = Employment in start-up cohorts of the years $t-11$ to $t=0$ in year $t=0$
	$EMP_{new\ t-2}$ = Employment in start-up cohorts of the years $t-11$ to $t-2$ in year $t-2$
Weighted employment change in new businesses	$\Delta EMP_{new} = (\ln EMP_{new\ t=0} - \ln EMP_{new\ t-2}) \dfrac{(EMP_{new\ t=0} + EMP_{new\ t-2})\,/\,2}{(EMP_{total\ t=0} + EMP_{total\ t-2})\,/\,2}$
Employment in incumbents	$EMP_{inc\ t=0} = EMP_{total\ t=0} - ln\ EMP_{new\ t=0}$
	$EMP_{inc\ t-2} = EMP_{total\ t-2} - ln\ EMP_{new\ t-2}$
Weighted employment change in incumbent businesses	$\Delta EMP_{inc} = (\ln EMP_{inc\ t=0} - \ln EMP_{inc\ t-2}) \dfrac{(EMP_{inc\ t=0} + EMP_{inc\ t-2})\,/\,2}{(EMP_{total\ t=0} + EMP_{total\ t-2})\,/\,2}$

It should be noted that employment in the start-up cohorts during the previous ten years may also reflect the indirect effects of new business formation over this period. The reason is that the development of new businesses founded during the previous decade may well be affected by competitors that entered the market during this time span. Table 3 displays the descriptive statistics of the different employment change measures.

Table 3   The descriptive statistics for employment change

Variable	Mean	Median	Minimum	Maximum	Standard deviation[a]
Total employment change (ΔEMP_{total})	.117	−0.004	−7.632	8.872	2.918 (1.389/2.571)
Weighted employment change in new businesses (ΔEMP_{new})	2.963	2.842	0.723	5.935	0.826 (0.433/0.706)
Weighted employment change in incumbents (ΔEMP_{inc})	−2.839	−2.871	−9.456	6.003	2.445 (1.246/2.109)

Notes: The number of observations is 568 for each variable. The figures in parentheses display the 'between' (71 regions) and 'within' (8 time periods) standard deviations.

The mean value of the average total employment change over all regions is slightly positive (0.117%). Despite the positive average development, there are several regions that suffered a decline in overall employment during the period of analysis. The weighted average two-year employment change in incumbent businesses is strongly negative. The weighted changes of employment that can be directly attributed to new businesses are positive over all years and for all regions, resulting in a mean value of 2.963%.

The regional distribution of weighted employment change in incumbent businesses (Figure 4) is quite similar to the regional pattern of total employment change (Figure 2). This is also expressed by the high correlation coefficient of 0.97 between the two measures (see Table A1 in the Appendix). More pronounced differences in the regional patterns can be found when comparing the total employment change to weighted employment change in new businesses (correlation coefficient of 0.67). The correlation coefficient for the relationship between weighted regional employment change in incumbents and new businesses is 0.47. A spatial concentration of highly positive employment change in new businesses can be observed in the regions around Hamburg, Cologne, Frankfurt and Munich. The northern border area to the Netherlands and Denmark also shows a highly positive employment change in new businesses.

A comparison of the spatial dimension of the total direct level effect (Figure 1) with the total employment change (Figure 2) shows no obvious coherence. The correlation coefficient for the relationship between these two measures is 0.05 (Table A1 in the Appendix). The correlation between the direct level effect and the weighted employment change in incumbent businesses is also rather low (–0.08). The statistical relationship between the direct level effect and weighted employment change in new businesses is somewhat stronger (0.40), thus indicating that a relatively high employment growth in new businesses leads to a larger direct level effect.

Figure 2 The spatial distribution of total employment change (mean values from 1995–2002)
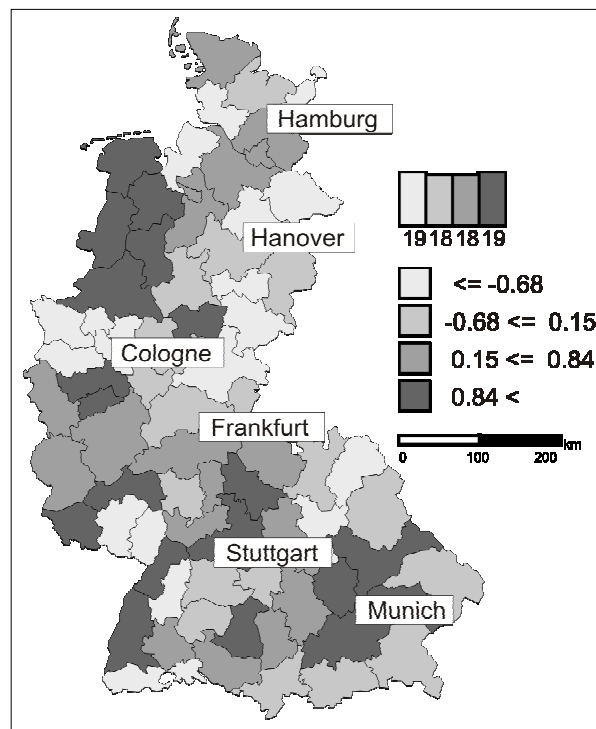
Figure 3   The spatial distribution of weighted employment change of new businesses
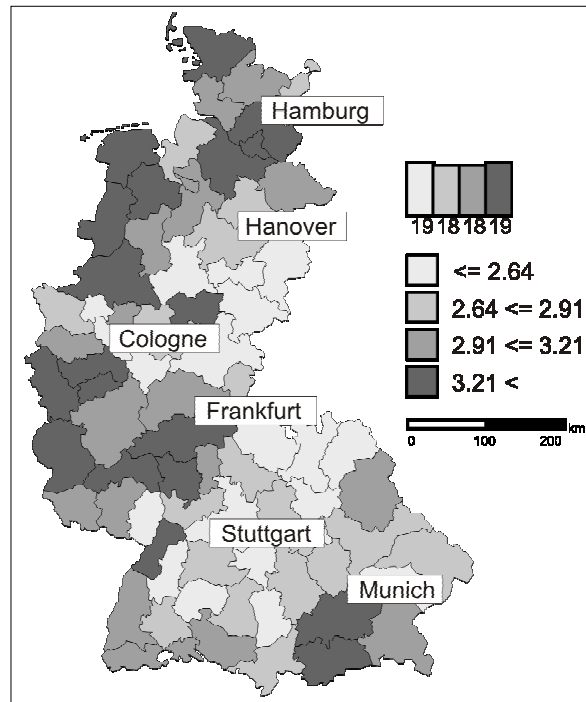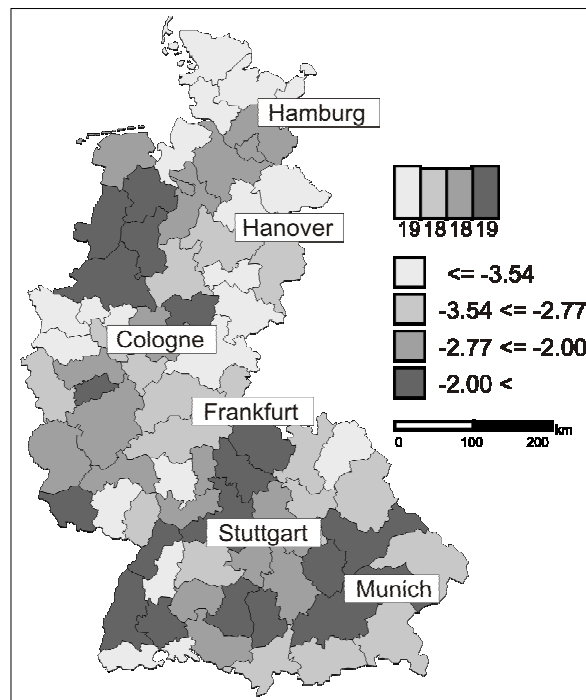(mean values from 1995–2002)

Figure 4   Spatial distribution of weighted employment change of incumbent businesses
(mean values from 1995–2002)

5 Employment in start-ups and the effect of start-ups on incumbents

In this section, we apply the different measures of regional employment growth presented in Section 3 to an analysis of regional employment growth. In particular, we want to find out whether the direct or indirect effects of new businesses have a larger impact on regional employment growth. We also investigate the impact of the direct level effect and a number of control variables.

5.1 Independent variables

The start-up rate is calculated according to the labour market approach: the number of start-ups per period is divided by the number of persons in the regional workforce (in thousands) at the beginning of the respective period. An important adjustment was made to control for the fact that not only the composition of industries differs considerably across regions, but that the relative importance of start-ups and incumbent enterprises also varies systematically across industries.[5] To correct for the confounding effect of the regional composition of industries on the number of start-ups, a shift-share procedure was employed to obtain a sector-adjusted measure of start-up activity (see the Appendix of Audretsch and Fritsch, 2002, for details). This sector-adjusted number of start-ups is defined as the number of new businesses in a region that could be expected if the composition of industries were identical across all regions. Thus, the measure adjusts the raw data by imposing the same composition of industries upon each region. Our analysis shows that this procedure leads to somewhat clearer results and higher levels of determination than estimates with the non-adjusted start-up rate. However, the basic relationships are left unchanged.

We use the average start-up rate over a ten-year period to account for the relevant time lag that was identified in previous analyses. In addition, we also include the direct level effect (the share of employees in new businesses younger than ten years over all employees). The direct level effect of start-ups, *i.e.*, their employment share, indicates the success of new businesses. Including this variable in the model gives us the opportunity to compare the effect of the level of start-up activity and the success of start-ups on the different measures of employment growth. This variable may represent several effects. First, it controls for the relative size of the new business sector. The larger the share of employees in new businesses, the larger their contribution to the total employment change. Second, the employment share of new businesses may indicate the 'strength' of new businesses in a region when competing with incumbents.[6]

In the models that explain total employment change and employment change in new businesses, we expect a positive coefficient for the start-up rate. In models with an employment change in incumbent businesses, the coefficient of the start-up rate indicates the direction and magnitude of indirect employment effects. If the indirect effects of new business formation is mainly a displacement of incumbents, the respective coefficient of the start-up rate should be negative (Table 4, Hypothesis 1a). A positive coefficient for the start-up rate indicates that the supply-side effects are considerably larger than the displacement of incumbents (Table 4, Hypothesis 1b). If the jobs in new businesses are the only contribution of start-ups to regional employment or if the positive and negative indirect effects are of the same magnitude, the coefficient for the start-up rate should be not significantly different from zero. By comparing the coefficients for the start-up rate in

the different models, we can assess the relative magnitude of the direct and indirect effects of new business formation on employment (Hypotheses 2a and 2b in Table 4). For the direct level effect of new businesses, *i.e.*, their employment share after ten years, we expect a positive impact on the total employment change and employment change in new businesses. However, the effect on employment change on incumbents is unclear. On the one hand, successful new businesses may stimulate the development of incumbent firms (Hypothesis 3a in Table 4). On the other hand, newcomers' success can also lead to larger displacement effects in incumbents, thereby constraining their employment growth (Hypothesis 3b in Table 4).

Table 4   Competing hypotheses of the indirect effects of new business formation on regional employment change

Variable	*Assumed impact on the regional employment change in incumbent businesses*	Expected sign
Start-up rate	*Entrants have positive and negative indirect effects on the employment change of incumbents:*	Coefficient for employment change of incumbents
	Hypothesis 1a: There is a negative impact of entrants on employment change in incumbents if positive supply-side effects are smaller than displacement effects.	–
	Hypothesis 1b: There is a positive impact of entrants on employment change in incumbents if positive supply-side effects are larger than displacement effects.	+
Start-up rate	*Hypothesis 2a*: The direct effects of new business formation on regional employment change are larger than the indirect effects.	Coefficient larger for new businesses
	Hypothesis 2b: The indirect effects of new business formation on regional employment change are larger than the direct effects.	Coefficient larger for incumbent businesses
Share of employees in new businesses	*A high share of employees in new businesses indicates a high quality of newcomers in terms of competitiveness. High-quality entrants lead to more pronounced supply-side effects, but also to larger displacement effects:*	Coefficient for employment change of incumbents
	Hypothesis 3a: Competitive entry induces supply-side effects that are larger than the displacement effects.	+
	Hypothesis 3b: Competitive entry induces supply-side effects that are smaller than the displacement effects.	–

To control for these influences, we tested a number of additional variables that may have an impact on regional employment. These variables are population density, the qualification of the regional workforce, regional labour productivity and the share of employment in the manufacturing sector. Because many regional characteristics (*e.g.*, land prices, availability of qualified labour and other inputs) tend to be correlated with population density, this variable can be considered a catch-all indicator for various aspects of local conditions. Since the development of employment in West German agglomerations has been below average in the period under analysis, we expect a negative sign for population density.

The qualification of the regional workforce is measured as the share of employees with a tertiary degree over all employees in private industries. We expect this variable to have a positive influence on all three types of employment growth measures. Regional labour productivity indicates the competitiveness of the regional economy and should have a positive impact on the overall employment change, as well as the employment change in incumbents.

Since diverse previous studies have found that new businesses start with a below-average productivity level (Bartelsman and Doms, 2000; Farinas and Ruano, 2005), successful entry in a high-productivity region may be relatively difficult, with a corresponding high danger of failure for entrants. Therefore, we expect that the effect of the level of regional labour productivity on employment change in new businesses is weaker for newcomers than for incumbents. The regional share of employees in manufacturing may indicate the regional position with regard to the secular shift from the manufacturing sector towards services. The regions with a high share of manufacturing employment may have less growth in incumbent businesses but more growth in new businesses because the majority (about 80%) of start-ups in Germany is founded in the service sector. Therefore, a positive impact of the share of manufacturing employees on employment change in new businesses could indicate a contribution of new businesses to structural change. Table 5 provides descriptive statistics for the variables used in the models.

Table 5 The descriptive statistics for dependent and independent variables

Variable	Mean	Median	Minimum	Maximum	Standard deviation
Total employment change (ΔEMP_{total}) (in %)	0.117	–0.004	–7.633	8.872	2.918
Weighted employment change in new businesses (ΔEMP_{new}) (in %)	2.963	2.842	0.723	5.935	0.826
Weighted employment change in incumbents (ΔEMP_{inc}) (in %)	–2.839	–2.871	–9.456	6.003	2.445
Average start-up rate of previous ten years (t=0 to t–9) (log)	2.198	2.211	1.857	2.556	0.129
Direct level effect (share of employees in new businesses younger than ten years over all employees) (log)	–1.815	–1.181	–2.152	–1.390	0.154
Population density, t–1 (log)	5.440	5.316	4.318	7.126	0.657
Regional labour productivity, t–1 (log)	11.297	11.291	11.065	11.608	0.091
Share of highly qualified employees, t–1 (log)	–3.199	–3.221	–4.269	–1.932	0.446
Share of manufacturing employees, t–1 (log)	–1.121	–1.089	–1.766	–0.651	0.253

Note: The number of observations is 568 for each variable. In the regression, the employment change is expressed in values between 0 and 1.

5.2   Estimation approach

The basic approach of our analysis is to regress the cumulative start-up rate for the previous ten years on the different employment change measures, thereby evaluating the size of the different effects. Since the logarithms of the independent-level variables are regressed on the log employment change, the coefficients can be interpreted as quasi-elasticities, *i.e.*, the average percentage change of employment due to a 1% change in the value of an independent variable. The model is specified as:

$$\Delta \ln Empl_{i,t} = \beta_0 + \beta_1 Start\text{-}up\ rate_{i,t} + Z_{i,t} + \upsilon_i + \varepsilon_{i,t}$$

where $\Delta \ln Empl_{i,t}$ is the respective employment change (total/incumbents/new businesses), $Startup\ rate_{i,t}$ is the logarithm of the average start-up rate of the previous ten years, $Z_{i,t}$ are other control variables, and υ_i are region specific fixed effects.

   Although regions can considered functional units, we correct for possible spatial interactions by applying a spatial lag maximum likelihood approach (see Anselin, 1988, for details). The respective neighbouring matrix is based on the assumption that regional interactions are allowed at any time lag since empirical results have shown an intraregion lag of up to ten years for the impact of new businesses on regional employment change. To account for region specific fixed effects, we include region dummies.

5.3   Results

We find that the start-up rate has a significantly positive effect on the overall employment change and employment change in new and incumbent businesses (Table 6). A comparison of the coefficients for the start-up rate between models clearly shows that the (indirect) effects of new businesses on employment in incumbents are always considerably larger than the (direct) effect of employment change in new businesses. This result is very robust for different versions of the model and strongly confirms Fritsch and Mueller's (2004; 2008) supposition. The direct level effect of new business formation has a positive impact on the total employment change and employment change in new and in incumbent businesses (Models 2 and 3). The relatively strong impact on employment change in incumbents is quite remarkable, given the low direct correlation between the two variables of only –0.08 (Table A1 in the Appendix). It may be regarded as an indication that newcomers induce higher supply-side effects in incumbents if they prove to be competitive and economically successful.

   The effect of population density on employment change tends to be negative, obviously reflecting the below-average employment growth in agglomerations during the period under inspection. Regional labour productivity has a positive impact on the total employment change and employment change in incumbents. According to our expectations, the effect is considerably weaker for employment change in the new businesses. The regional share of highly qualified employees also has a positive effect on the total employment change and employment change in incumbents, but not on employment in new businesses. The share of employees in manufacturing has the expected positive effect on the employment change of new businesses in all models except Model 1. While Models 1 and 2 identify the expected negative effect of the share of employees in manufacturing on employment change in incumbents, the respective coefficient shows no clear effect in Model 3. The coefficient for the employment share in manufacturing in the model for total employment change is not statistically significant, probably because the positive effects on new businesses are compensated by the negative effect on incumbents.

Table 6   The regression results

| | Employment change | | | | | | | | |
| | Model 1 | | | Model 2 | | | Model 3 | | |
	Overall	In incumbents	In new businesses	Overall	In incumbents	In new businesses	Overall	In incumbents	In new businesses
Average start-up rate of previous ten years (log)	0.237** (0.023)	0.167** (0.018)	0.0750** (0.009)	–	–	–	0.219** (0.024)	0.157** (0.019)	0.067** (0.009)
Direct level effect, t–1 (log)	–	–	–	0.173** (0.034)	0.105** (0.027)	0.068** (0.011)	0.124** (0.034)	0.070** (0.027)	0.053** (0.011)
Population density, t–1 (log)	−0.323** (0.12)	−0.231* (0.094)	−0.091* (0.038)	−0.332** (0.11)	−0.247** (0.090)	−0.089* (0.037)	−0.275* (0.12)	−0.204** (0.093)	−0.071 (0.037)
Regional labour productivity, t–1 (log)	0.107* (0.046)	0.082* (0.035)	0.029* (0.014)	0.167** (0.046)	0.125** (0.036)	0.046** (0.014)	0.104* (0.044)	0.080* (0.034)	0.027* (0.013)
Share of highly qualified employees, t–1 (log)	0.060* (0.024)	0.064** (0.019)	−0.005 (0.007)	0.091** (0.025)	0.087** (0.020)	0.004 (0.007)	0.059* (0.024)	0.063** (0.019)	−0.006 (0.007)
Share of manufacturing employment, t–1 (log)	−0.047 (0.037)	−0.066* (0.028)	0.019 (0.012)	−0.025 (0.041)	−0.057+ (0.032)	0.032* (0.013)	0.001 (0.040)	−0.039 (0.031)	0.039** (0.012)
Constant	−0.670 (0.90)	−0.537 (0.71)	−0.201 (0.26)	0.209 (0.93)	0.084 (0.73)	0.094 (0.26)	−0.523 (0.90)	−0.452 (0.71)	−0.138 (0.24)
rho (spatial lag)	0.038* (0.015)	0.037** (0.011)	−0.005 (0.006)	0.041** (0.015)	0.034** (0.011)	−0.001 (0.006)	0.037* (0.015)	0.036** (0.011)	−0.004 (0.006)
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	568	568	568	568	568	568	568	568	568
Variance ratio	0.57	0.63	0.40	0.53	0.60	0.36	0.58	0.64	0.42
Wald-test	6.15*	10.90**	0.72	7.26**	9.1**	0.05	6.18*	10.57**	0.56
LM-test	3.96*	9.06**	0.68	4.09*	6.97**	0.03	3.90*	8.72**	0.51
Log-likelihood	1443.31	1586.59	2063.16	1418.47	1563.24	2047.22	1450.34	1590.26	2074.36

Notes: Robust standard errors in parentheses; + statistically significant at the 10% level; * statistically significant at the 5% percent level; ** statistically significant at the 1% level.

6   Conclusions

In this paper, we analysed the importance of the direct and indirect contributions of new businesses to employment change. Particularly, we decomposed total employment change into employment change in incumbent businesses and employment change that can be attributed to the new businesses entering the market. We find that employment in new businesses contributes an important share to total employment change.

Separating the employment change in incumbent businesses (older than ten years) from the employment change in new businesses (younger than ten years) allowed us to identify the direct and indirect effects of new business formation. We found that the effect of start-ups on incumbent employment is always positive and considerably more pronounced than the employment contribution that can be directly attributed to new businesses. This clearly indicates that the indirect effects of new business formation are quantitatively more important than direct effects. An important implication of this finding is that a focus on the development of new businesses, which characterised nearly the entire research on their employment effects, is largely misleading. It would be much more important to know more about the indirect effects of new business formation and the factors that influence their magnitude.

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Notes

1   Crowding-out effects may occur in the output market because entrants gain market share, as well as in the input market due to the additional demand of new businesses for resources, which can lead to input scarcity and factor price increases.

2   Hamburg has been merged with the regions of Schleswig-Holstein South and Hamburg-Umland-Süd. Bremen was merged with Bremen-Umland.

3   Example: The total direct level effect in 2002 is the sum of employees in the start-up cohorts during 1993–2002 divided by the total employment in private industries in 2002.

4   Employment in new businesses in t=0 and t–2 is based on identical groups of businesses. Thus, in t–2, the last 10 cohorts are considered, while in t=0, 12 cohorts are used, including the 2 cohorts that entered the market between t–10 and t–12. This procedure assures that the indirect effects are not overestimated due to employees considered working in new businesses in t–2 and working in incumbent businesses in t=0.

5   For example, start-up rates are higher in the service sector than in manufacturing industries. This means that the relative importance of start-ups and incumbents in a region is confounded by the composition of industries in that region. This would result in the overestimation of the level of entrepreneurship in regions with a high composition of industries (where start-ups play an important role) and the underestimation of the role of new business formation in regions with a high share of industries (where the start-up rates are relatively low).

6   The correlation coefficient between the regional start-up rate and the direct level effect is only about 0.41 (Table A1 in the Appendix), indicating that a relatively high level of start-ups does not automatically lead to a corresponding high direct level effect.

Appendix

Table A1   Correlation matrix

		1	2	3	4	5	6	7	8	9
1	Total employment change (ΔEMP_{total})	1								
2	Weighted employment change in incumbents (ΔEMP_{inc})	0.97	1							
3	Weighted employment change in new businesses (ΔEMP_{new})	0.67	0.47	1						
4	Start-up rate of previous ten years (log)	0.19	0.16	0.19	1					
5	Direct level effect, t–1 (log)	0.05	–0.08	0.40	0.41	1				
6	Population density, t–1 (log)	–0.04	–0.06	0.05	–0.42	–0.06	1			
7	Regional labour productivity, t–1 (log)	0.31	0.24	0.37	0.00	0.43	0.27	1		
8	Share of highly qualified employees, t–1 (log)	0.19	0.19	0.11	–0.46	–0.15	0.66	0.52	1	
9	Share of manufacturing, t–1 (log)	–0.01	0.10	–0.33	0.00	–0.75	–0.22	–0.63	–0.15	1

Note: Pooled data, 568 observations.