Individual, firm-specific and regional effects on internal employment trajectories in Germany: with special focus on education, further training and skill formation

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Individual, Firm-specific and Regional Effects on Internal Employment Trajectories in Germany

With Special Focus on Education, Further Training and Skill Formation

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*"Labourers have become capitalists
not from a diffusion of the ownership
of corporation stocks (…) but from
the acquisition of knowledge and skills
that have economic value."*
– Schultz 1961: 5 –

1 Introduction

The employment period is an important and central stage in the life course which influences the opportunities in life in different ways (Kreckel 1990; Kocka and Offe 2000; Vobruba 1990, 2000). It is widely known that the success of employment greatly depends on education (Boockmann and Steffes 2010; Struck 2006; Erlinghagen 2005; Diewald and Sill 2004; Hillmert et al. 2004; Grotheer et al. 2004; Bender et al. 2000). In his international literature review Card (1999: 1802) concluded: "Education plays a central role in modern labor markets. Hundreds of studies in many different countries and time periods have confirmed that better-educated individuals earn higher wages, experience less unemployment, and work in more prestigious occupations than their less-educated counterparts." Education can thus be considered as a key determinant for employment trajectories by having both a selection function at the transition from education to employment and determining the returns to education (Allmendinger 1989; Hillmert 2001; Müller and Shavit 1998).[1]

Against this backdrop, the question will be raised if there are additional factors diminishing the economic usability of knowledge and skills. This paper deals with the following questions:

1. What is the effect of education on employment trajectories?

2. Can life course costs of bad employment histories, which are for example caused by poor starts to employment careers, be observed?

3. Do certain characteristics of firms influence employment careers?

4. How strong is the impact of regional disparities on employment trajectories?

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[1] This implies that education is a central factor of social inequality by causing a vertical social exclusion (Kreckel 1990).

The following section gives a brief overview of the related literature as well as theoretical considerations. The data and the econometric methods used for the analysis are described in the third section. Section 4 contains the estimation results and the final section draws some conclusions.

2   Related Literature and Theoretical Considerations

As mentioned above, there is much evidence for the significance of education; therefore, this section deals with the three factors considered as relevant for employment trajectories and thus for the usage of knowledge and skills – the previous labour market experiences, firms and regions.

2.1 Previous Labour Market Experiences and the career path

The first aspect, which is to be addressed, is the impact of previous labour market experiences on the future career path; according to cohort analyses, there seem to be life course costs of poor starts to employment careers. It is assumed that changing labour market structures caused by modernisation and economic transformation processes have especially affected entry-level employees' career paths; particularly, modernisation processes would have modified internal structures of firms and thus the related promotion prospects (Blossfeld 1986; Hogan 1981; Mayer and Blossfeld 1990). The economic transformation process seems to have increased the usage of atypical employment and to have altered mobility patterns by a growth in unemployment and non-employment periods (Giesecke and Heisig 2010; Grotheer et al. 2004; Struck 2006). It is hypothesised that these negative developments could have influenced further employment trajectories; according to this, several periods and transitions might not be isolated over the life course, but might be linked in a cumulative way.

Heckman and Borjas (1980) analysed different state dependences in their research on unemployment. In this paper, we allow for two variants of state dependences: the "lagged duration dependence" and the "duration dependence". First, lagged duration dependence accounts for the fact that the probabilities of remaining unemployed or becoming unemployed depend on the length of previous unemployment spells; this can arise if unemployment has resulted in a loss of skills and productivity-enhancing work experience or because horizons have been shortened during the unemployment spell (Heckman and Borjas 1980; Pissarides 1992). Fur-

thermore, stigmatisation effects would have diminished the probability to find employment (Blanchard and Diamond 1994; Biewen and Steffes 2010); this is termed as "scarring-effect" of unemployment (Arulampalam 2001: 585). In the worst case those employees may become trapped in a "low-pay/no-pay cycle" (Arulampalam et al. 2001: 557). Second, duration dependence indicates the effect that the probability of remaining unemployed depends on the length of time the worker has been unemployed in his current unemployment spell due to further negative signals (Heckman and Borjas 1980). This argument will be turned around for this analysis; we assume that the probability of remaining employed depends on the length of time the worker has been currently employed, for example because of productivity-enhancing work experience, even though he had been unemployed before. This is to be assessed in the following.

2.2 Firm-specific Factors and the career path

Little attention has been paid to firm-specific factors on employment trajectories up until now. Although referring to the "new structuralism, it is important to account for firm characteristics" (Baron and Bielby 1980: 737); thus, firms' internal processes and structures influence individual career opportunities, wages and status attainment (Ahrne 1994; Baron and Bielby 1980; Struck 2006). Independent firm-specific effects of industrial sectors, firm sizes and personnel structures could be found (Gerlach and Stephan 2005; Grotheer et al, 2004; Struck 2006). In recent years the importance of further training has increased; further training is considered to be highly relevant for attaining status as well as competitive positions. Individuals, organisations and societies are assumed to benefit from that against the backdrop of demographic change; consequently, lifelong learning has become considerably more significant in public discussion to counteract the declining half-life of knowledge which requires a permanent adjustment to modern technologies and work processes (Becker and Hecken 2009; Büchel and Pannenberg 2004; Pfeifer and Reize 2000). This is due to Human Capital Theory which emphasises that education and training raises the productivity and efficiency of workers by increasing the level of cognitive ability and human capability (Becker 1962; Mincer 1962; Oi 1962). Recent literature indicates positive effects of further training on wages (Büchel and Pannenberg 2004; Pischke 2001; Wolter and Schiener 2009), whereas the impact on the risk of unemployment is ambiguous (Lechner 1999; Christensen 2001; Pannenberg 2001); furthermore, it remains unclear whether further training increases or decreases labour mobility. Düll and Bellmann (1999) and Becker (1993) find both enhanced seniority and heightened labour mobility; Hübler and König (1999) however, cannot determine a relation

between further training and mobility. We therefore assume that it is to be distinguished between good and bad opportunity structures. It is to be tested whether firms providing further training offer good opportunity structures that lead to more stable jobs and higher wages as a result of increased labour productivity.

2.3 Region-specific Factors and the career path

The impact of regional disparities on employment trajectories has hardly been researched up until now. Neoclassical Labour Market Theory treats regional differences, e.g. with regard to economic power, unemployment rates or average wages, as short-term phenomena which can be compensated by long-term factor movements; however, the argument of an inter-regional long-term equalisation is only partially sustainable due to persistent heterogeneities (Blien 2001; Krugman 1991; Möller und Tassinopoulos 2000). In contrast to the Neoclassical Labour Market Theory, spatial economics, especially the "New Economic Geography" (Krugman 1991), have stimulated the emergence of a (new) wave of empirical work concerning geographical analysis; thus, regional heterogeneities cause a diverse distribution of economic activities. The decisions of firms about locations are assumed to be affected by urbanisation effects, which apply to firms of all industries, and localisation effects, which have an impact on only one industry (Fujita et al. 2001; Krugman 1991, 1998).

Another approach of regional research, Endogenous Growth Theory, has established a link between qualification structures of the regional workforce and the growth potential. It negated the assumption of the Neoclassical Labour Market Theory that economic growth is determined exogenously in the long term (Lucas 1988); thereby, the Endogenous Growth Theory refers back to the Human Capital Theory (Becker 1962, 1975; Mincer 1962; Oi 1962) and emphasises the dependence of regional growth potential on the stock of skills and knowledge available in this region. Due to the fact that employees' productivity increases with their acquired human capital, the regional human capital endowment is considered to be an "engine of growth" (Lucas 1988), even without technological progress. Within this model, all groups of workers and firms in a region might benefit from a selective growth of productivity in certain groups of workers (e.g. the high skilled) as a result of positive external effects by increasing wages. These spillover effects may occur for example due to signalling effects and supply chains. Blien and Wolf (2002) as well as Farhauer and Granato (2006) stated that regional growth in employment is positively influenced by the share of vocational trained and high-qualified workers; furthermore, a divergent development in terms of employment and wages

was observed due to a increased skill segregation (Gerlach et al. 2002; Schlitte et al. 2010; Stephan 2001). This study will explore regional determinants in more detail.

3   Data and Method

3.1 Data and Sample Definition

The database of the following empirical analyses is the German LIAB, a linked employer-employee dataset of the Institute for Employment Research, integrates the IAB Establishment Panel and administrative data on employees (Jacobebbinghaus 2008)[2]. The first part, the Establishment Panel is a representative annual survey of 16,000 establishments (Fischer et al. 2008); the second part, data on employees is based on two different sources. First, the "Employee-History" contains administrative data on individual employment histories of records submitted by employers to the German public pension insurance. The reliability of this administrative data is high, as misreporting is a summary offence; an exception concerns individual information such as the education variable which was adjusted by using imputation rules (Fitzenberger et al. 2005). Second, "Benefit Recipient History" is data on the receipt of unemployment benefits, unemployment assistance or maintenance allowance. Overall, this linked employer-employee dataset is exhaustive on the number of workers covered within the establishment sample.

Additionally, the LIAB dataset and data on regional characteristics deriving from two sources have been merged. Federal Employment Services (BA) made information about economic sectors due to employees per industrial sector available; Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) provided us with data on unemployment rates, GDP per capita, types of region regarding population density and centrality of regions and the share of students. This data is expressed as yearly averages. The indicators exist for 96 planning regions („Raumordnungsregionen") which are considered to adequately describe regional labour markets (Schwarze 1995; Rendtel and Schwarze 1996); thus, this generated dataset permits simultaneous analyses of the employer and the employee sides as well as the regional context.

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[2] We use the LIAB longitudinal version 2.

Data is restricted to persons aged 25 to 52 who are full-time employed to exclude individuals in vocational training or in work during university vacations, as well as to avoid confusion between job exit and early retirement. If a worker is simultaneously observed twice or more often, the employment spell generating the highest income is used. Finally, the composition of the sample is illustrated in Figure 1.

Figure 1: Identification of observed employees
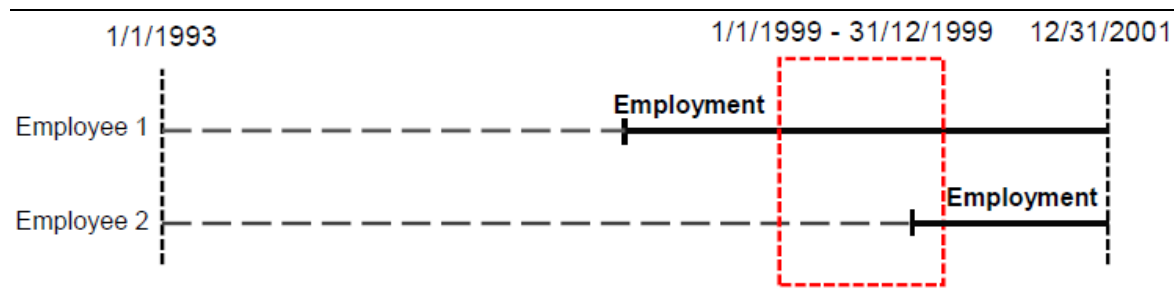
It can be seen that employment histories are left-censored and thus can be tracked from 1993 to 2002; the red rectangle displays the sampling window. The selected sample contains workers having already been employed on 1/1/1999 (e.g. employee 1 in the figure) or have been hired between 1/1/1999 and 31/12/1999 (e.g. employee 2 in the figure). These requirements leave us with a sample of 294,419 persons, 1,559 establishments and 96 regions („Raumordnungsregionen").[3]

3.2 Econometric Method

In the following, multivariate data analyses are performed including individuals, firms and regions. This hierarchical structure of the data is to be taken into account when choosing an estimation procedure. Moulton (1986, 1990) mentioned that the inclusion of macro- and meso-variables in a conventional regression analysis leads to an inefficient estimation of the coefficients and to biased standard errors; to solve this problem, three-level models with random effects are estimated. Based on this three-level approach employment trajectories are evaluated in a two-stage procedure: First, job tenure is estimated by using a Piecewise-Constant Exponential (PCE) model (Rabe-Hesketh and Skrondal 2008; Skrondal and Rabe-Hesketh 2003):

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[3] Descriptive statistics of individual, firm-specific and region-specific characteristics are reported in tables 4 to 6 in the appendix.

$$h_{ijk}(t) = h^0(t)\exp(v_{ijk}) \text{ , and } v_{ijk} = x'_{ijk}\,\beta + z^{(2)'}_{ijk}\,\zeta^{(2)}_j + r^{(3)'}_{ijk}\,\zeta^{(3)}_k$$

Here $h^0(t)$ represents a regression constant for period t. v_{ijk} is a vector with corresponding explanatory variables at the individual (x'_{ijk}), firm $(z^{(2)'}_{ijk})$ and region $(r^{(3)'}_{ijk})$ levels. Finally, β are fixed effects, whereas $\zeta^{(2)}_j$ and $\zeta^{(3)}_k$ represent random intercepts for firms and regions.

Second, an independent competing risks model with three destination states[4]

- upward within-firm mobility (increase in wages of at least 10%),
- no change and
- downward within-firm mobility (decrease in wages of more than 5%)

is performed to explore the internal career paths after two years:

$$\Pr(c_i|A_i) = \frac{\exp(v_i^{c_i})}{\sum_{s=1}^{A_i}\exp(v_i^s)} \text{ , and } v_{ijk}^a = f_{ijk}^a + \zeta_{ijk}^a$$

This equation expresses the probability $\Pr(c_i|A_i)$ to incur a certain risk c_i among the possible alternatives A_i. The linear predictor v_{ijk}^a contains a fixed (f_{ijk}^a) and a random (ζ_{ijk}^a) term for each alternative risk a.

3.3 Identification of Labour Market States

Information about the labour market states, especially the out of labor force state, had to be identified from the original spells; these periods are difficult to define because data contain only information for employment and unemployment periods. Figure 2 demonstrates how the different labour market states have been constructed.

Figure 2: Identification of labour market states
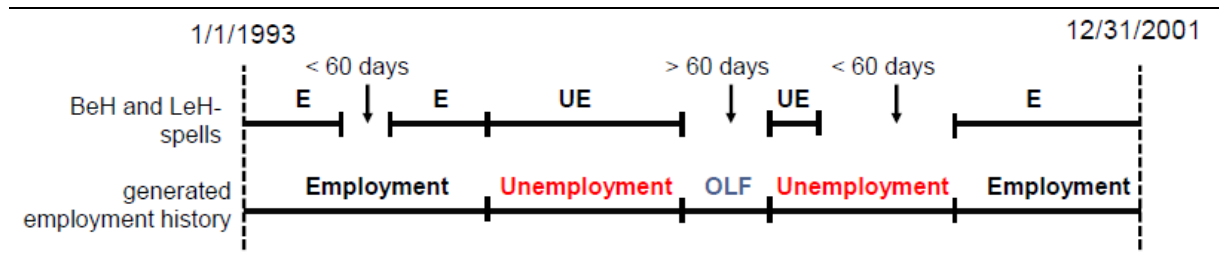
The first line represents the original Employee-History and the Benefit Recipient History spells with its non-employment gaps; according to this, a cleansing procedure with certain

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[4] A descriptive statistic on the three destination states is provided in Table 7 in the appendix.

rules has been implemented to get three labour market states, while gaps shorter than 60 days have been deleted. The three labour market states can be describes as follows:

- Employment (E): Employment with another employer within 60 days after separation (job-to-job change);
- Unemployment (UE): Receipt of unemployment benefits for at least one day within 60 days after separation;
- Out of the labour force (OLF): No job-to-job change for at least 60 days after separation and no receipt of unemployment benefits.

The estimation is performed with a large set of 56 exogenous explanatory variables which can be divided into three blocks of variables consisting of individual, firm-specific and region-specific factors. The former group includes information on gender, age, highest degree of education, nationality, job position as well as cohorts and previous employment state. Firm-specific characteristics are the firm size, qualification structure, age distribution, contractual relationships and investment, co-determination and industrial sectors. Region-specific factors are the differentiated types of regions, the economic structure, human capital endowment and productivity.

4   Results

On account of the large number of explanatory variables the explanation of the effects is divided thematically into three subsections for reasons of clarity.

4.1 Individual determinants

As mentioned before, education was considered to be a highly relevant determinant of employment trajectories; in contrast to it, we assumed that bad employment histories – for example poor starts to employment careers – cause life course costs. Table 1 contains evidence on these assumptions.

Table 1: Piecewise Constant Exponential- and Competing Risks Model on Individual Factors

Independent variables	Exit from Job (odds ratios)	Internal career path*	
		Upward mobility (odds ratios)	Downward mobility (odds ratios)
Sex (1 = female)	1.268 ***	0.843 ***	0.975
Nationality (1 = foreign)	1.078 ***	0.952 *	1.154 ***
Age: Reference.: 25 to 34 years of age			
35 to 44 years of age (1=yes)	0.773 ***	0.727 ***	0.965
45 to 52 years of age (1=yes)	0.767 ***	0.579 ***	1.020
Highest Degree of Education: Ref.: Secondary school and vocational training			
No vocational training (1=yes)	1.036 *	0.954 *	1.054 *
A-Level and vocational training (1=yes)	1.108 ***	1.421 ***	0.966
University-degree (1=yes)	1.283 ***	1.165 ***	0.870 *
Job Position: Ref.: Skilled blue collar			
Unskilled blue collar (1=yes)	1.173 ***	0.801 ***	0.874 ***
Master craftsman (1=yes)	0.948	1.182 ***	0.854 *
White collar (1=yes)	1.005	1.332 ***	0.688 ***
Cohorts and previous employment state: Ref.: permanently employed			
First employment (1=yes)	2.913 ***	2.174 ***	1.035
Entrance up to one year ago * Share of employment (1=yes)	2.752 ***	2.266 ***	1.240 ***
Entrance up to one year ago * Share of unemployment (1=yes)	11.027 ***	5.528 ***	1.184
Entrance up to one year ago * Share of non-employment (1=yes)	4.365 ***	4.217 ***	1.649 ***
Entrance 1 to 5 years ago * Share of employment (1=yes)	1.512 ***	1.328 ***	1.045
Entrance 1 to 5 years ago * Share of unemployment (1=yes)	1.845 ***	1.693 ***	0.707 ***
Entrance 1 to 5 years ago * Share of non-employment (1=yes)	2.022 ***	1.576 ***	1.278 ***
Entrance more than 5 years ago * Share of employment (1=yes)	1.293 ***	1.218 ***	0.868 *
Entrance more than 5 years ago * Share of unemployment (1=yes)	1.093	1.284 ***	0.941
Entrance more than 5 years ago * Share of non-employment (1=yes)	1.059	1.194 **	1.074

* The base category is "no change".
Source: Linked Employer-Employee Data (LIAB); own calculations

Results on the highest degree of education show that job exit rates as well as within-firm mobility rates differ vastly between qualification groups. While those employees with a vocational training degree after having attended secondary school work in stable jobs, the less qualified as well as the high qualified are in instable employment. This is due to Human Capital Theory that predicts higher mobility rates of better educated workers induced by a greater amount of general human capital (Becker 1962; Mincer 1962; Oi 1962). Different results were shown by Grother et al. (2004) and Boockmann and Steffes (2010) who observed firm entrants. This could be taken as an evidence for the Job Search Theory (Barron 1975; Lippmann and McCall 1976); thus, particularly already employed, high qualified workers are voluntarily mobile to improve their wages and working conditions.

Table 1 provides evidence that those low qualified workers remaining in the firm are less able to realize promotions and to avoid downward mobility; rather, the high qualified stayers are rewarded with better career prospects. This can be explained by Segmented Labour Market Theory (Doeringer and Poire 1971; Lutz and Sengenberger 1974); according to this, the high qualified employees work in the first sector in stable jobs, acquire firm-specific qualifications and get promotions. The second sector, however, offers unstable jobs and bad promotion prospects for low-skilled workers.

Results for cohorts and previous employment states in Table 1 indicate higher job exit rates for entry-level employees due to Job-Matching-Theory (Jovanovic 1979, 1984); accordingly, misallocations caused by incomplete information occur in case of new hirings that are to be corrected by subsequent labour mobility. Concerning the existence of scarring effects, there is evidence that the length of current employment diminishes the negative effect of lagged unemployment duration dependences. The longer workers with lagged unemployment or non-employment periods are currently employed, the more likely they can reduce scarring effects and stabilize their future employment trajectories. Employees who have entered the firm at most one year ago and remained in the firm have good promotion prospects but also higher risks for decline. It can be assumed that the individual employment history is an important determinant of job duration (Boockmann and Steffes 2010; Booth et al. 1999). While Arulampalam et al. (2001: 577) noticed, that "unemployment tends to bring future unemployment", we observe a diminishing effect of duration dependence. Moreover, men, Germans as well as older employees are in more stable employment, whereas only the first two groups of workers have better promotion prospects. To sum up, individuals have different career prospects depending on the education degree they especially acquired in the first period of their life course.

4.2 Firm-specific determinants

Firm-specific characteristics were examined to ascertain if it is to be distinguished between good and bad opportunity structures. It should be tested whether firms providing further training offer good opportunity structures that lead to more stable jobs and increasing wages by raising the productivity of workers.

Table 2: Piecewise Constant Exponential- and Competing Risks Model on Firm-specific Factors

Independent variables	Exit from Job (odds ratios)	Internal career path*	
		Upward mobility (odds ratios)	Downward mobility (odds ratios)
Firm size: Ref.: Small firm			
Small medium-sized firm (1=yes)	0.846 **	1.408 ***	0.864
Medium-sized firm (1=yes)	0.821 *	1.657 ***	0.963
Larger firm (1=yes)	0.798 **	1.686 ***	1.029
Qualification structure: Ref.: Simple tasks.			
Qualified tasks (1=yes)	0.918	1.481 ***	0.859 ***
Age distribution			
Blocked promotion-opportunities (1=yes)[1]	1.057 **	1.190 ***	0.895 ***
Contractual relationships			
Share of fixed-term employees	3.009 ***	0.797	0.349 ***
Share of apprentices	2.522 ***	0.560 **	0.801
Share of part-time employees	1.294	1.870 ***	1.796 ***
Investments			
Investments in further training (1=yes)	0.849 **	1.836 ***	0.687 ***
Technological state of machinery and equipment[2]	0.922 **	0.916 ***	1.026
Co-determination			
Works council (1=yes)	0.897	0.668 ***	0.778 ***
Sector: Ref.: Manufacturing industry			
Agriculture, forestry and mining (1=yes)	1.517 ***	0.500 ***	0.945
Construction (1=yes)	1.864 ***	0.313 ***	1.959 ***
Trade (1=yes)	1.326 ***	0.520 ***	1.056
Services for firms (1=yes)	1.013	0.418 ***	0.666 ***
Other services (1=yes)	1.145 *	0.396 ***	0.505 ***

* The base category is "no change".
[1] "1" indicates that an employee is positioned ahead the median age in the internal age distribution.
[2] "1" indicates that the establishment has state-of-the-art equipment; "5" indicates that the equipment is obsolete.
Source: Linked Employer-Employee Data (LIAB); own calculations

Table 2 indicates that firms providing further training are able to afford more stable jobs and good promotion prospect, whereas downward mobility is scarce. The reason could be that firms intend to strengthen their relationship to employees after having invested in their human capital to avoid "sunk costs" in case of job terminations by employees. These results support findings on positive effects of further training on wages (Büchel and Pannenberg 2004; Pischke 2001; Wolter and Schiener 2009); opposed to Düll and Bellmann (1999) as well as Becker (1993), but in accordance with Hübler and König (1999), we cannot find a relation between further training and mobility. Furthermore, larger firms and state-of-the-art machinery stabilise employment, while blocked promotion-opportunities and atypical employment have destabilising effects. Due to the greatly varying coefficients of the firm-level variables and the positive impact of firms providing further training, it is to be concluded that opportunity structures significantly influence employment careers.

4.3 Regional determinants

On the macro level it was to be assessed whether human capital accumulation affects employment trajectories and whether regional heterogeneities cause a diverse distribution of economic activities.

Table 3: Piecewise Constant Exponential- and Competing Risks Model on Region-specific Factors

		Internal career path*	
	Exit from Job	Upward mobility	Downward mobility
Independent variables	(odds ratios)	(odds ratios)	(odds ratios)
Types of region: Ref.: Densely populated agglomerations			
Agglomerations with outstanding centers (1=yes)	0.944	0.674 ***	0.470 ***
Urbanized areas of higher density (1=yes)	0.918	1.052	0.693 ***
Urbanized areas of medium density and large regional centers (1=yes)	0.897	1.015	0.609 ***
Urbanized areas of medium density without large regional centers (1=yes)	0.935	0.837 ***	0.870
Rural areas of higher-density (1=yes)	0.953	0.499 ***	0.737 ***
Rural areas of lower-density (1=yes)	1.016	0.745 ***	0.562 ***
Economic structure: Ref.: Agriculture, forestry and mining			
Manufacturing Industry (1=yes)	0.949	0.930 ***	0.978
Construction (1=yes)	0.975	1.116 ***	1.081 ***
Metal- and electrical industry, engineering (1=yes)	0.963	0.919 ***	0.919 ***
Trade (1=yes)	0.942	0.834 ***	0.966 *
Insurance and credit (1=yes)	0.952	0.908 ***	0.966
Transport and communication (1=yes)	0.964	1.143 ***	1.048 **
Health- and social services (1=yes)	0.959	1.017	1.041 **
Services for firms (1=yes)	0.962	0.965 ***	0.908 ***
Other services (1=yes)	0.977	0.879 ***	0.917 ***
Human capital endowment			
Share of students	1.001	1.003 ***	1.038 ***
Productivity			
GDP (per capita)	1.019	1.036 ***	1.039 ***
Unemployment rate	0.990	0.929 ***	0.964 ***
Period 1: 0-12 Months	0.006 *	-	-
Period 2: 13-24 Months	0.007 *	-	-
Constant	-	4.499 ***	0.891
Episodes (persons)	564553	251328	
Episodes (firms)	1559	1559	
Episodes (regions)	96	96	
Residual variance (persons)	-	0.739	1.203
Residual variance (firms)	0.181	0.426	
Residual variance (regions)	0. 00006	0.095	
log likelihood (starting values)	-155720.55	-173833.34	
log likelihood (final values)	-155072.03	-173275.51	

* The base category is "no change".
Source: Linked Employer-Employee Data (LIAB); own calculations

For the examination of human capital endowment in the regions we used the share of students as a proxy-variable. Table 3 demonstrates that employment cannot be stabilised by the share of high qualified employees. Due to internal career paths not all groups of workers seem to benefit from a high human capital accumulation. This can be explained by findings on skill segregation. Thus, high qualified workers benefit from increasing skill segregation; in contrast, it leads to unfavourable labour-market conditions for low-skilled workers (Gerlach et al. 2002; Schlitte et al. 2010; Stephan 2001).

Table 3 also illustrates that none of the observed regional determinants affect job exit rates. Two explanations can be found for this result. First, an econometric reason would be that we used a multilevel framework. Having done this, we accounted for the correlation of employees in specific regions, while other estimation methods often disregard these correlations leading to incorrect standard deviations; second, a quite simple reason is that individual and firm-specific determinants influence job exits to a much greater degree. This is also supported by Bookmann and Steffes (2010) who investigated only weak effects of the local labour market conditions on job durations. Career prospects, however, depend on various regional characteristics. The construction as well as the transport and communication sectors and the GDP raise within-firm mobility; on the contrary, the metal-, electrical and engineering industries, trade, services for firms and other services as well as the unemployment rate reduce internal mobility. These unequal career prospects in different types of region indicate a regional segmentation of the labour market.

5   Conclusions

This paper contributed to life course research by analyzing individual, firm-specific and regional effects on employment trajectories. It was assumed that the benefit of education depends on the employment history, firms and regional structures; therefore, we combined the German LIAB, a linked employer-employee dataset, and data on regional characteristics from the Federal Employment Services (BA) and the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR). Based on this new and hierarchical structured data set, a multilevel framework was deployed to evaluate employment trajectories in a two-stage procedure. First, job tenure was estimated by a Piecewise Constant Exponential model; then, an independent Competing Risks model with the three destination states "career

advancement", "no change" and "career decline" was performed to analyse the internal career paths.

The main findings can be concluded as follows. First, evidence suggested that individuals have different career prospects depending on the education degree they especially acquire in the first period of their life course. Second, long term current employment reduces scarring effects; thus, future employment trajectories can be stabilized. Third, firms offer different opportunity structures which influence the chances and risks in employment careers in different ways; particularly, further training leads to more stable jobs and better promotion prospects. Fourth, regional factors hardly explain job exit rates, but the unequal internal career prospects in different types of region indicate a regional segmentation of the labour market.

In further research we will estimate another model for the year 2002 to control for different economic situations. Additionally, the effects of the regional characteristics should be investigated in more detail.

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Appendices

Table 4: Description of individual characteristics (Indication of means and/or shares in percentages)

Characteristics	Full sample	Stayers	Persons leaving
Males	69.52	70.79	62.16
German(s)	92.02	92.13	91.37
Age[1]			
25 to 34 years of age	32.41	30.46	43.82
35 to 44 years of age	41.10	42.13	35.11
45 to 52 years of age	26.48	27.41	21.06
Highest Degree of Education[1]			
No vocational training	13.78	13.66	14.43
Secondary school and vocational training	75.86	76.99	69.27
A-Level and vocational training	3.59	3.35	4.96
University-degree	6.78	6.00	11.34
Job position[1]			
Unskilled blue collar	28.89	29.01	28.22
Skilled blue collar	33.06	34.09	27.06
Master craftsman	1.22	1.25	1.04
White collar	36.83	35.65	43.68
Previous employment-state[1]			
Share of employment	31.21	29.61	40.56
Share of unemployment	4.90	4.26	8.67
Share of non-employment	6.43	5.63	11.14
First employment	1.13	0.89	2.56
Permanently employed	56.31	56.32	37.07
Cohorts[1]			
Entrance up to one year ago	11.79	8.84	28.97
Entrance 1 to 5 years ago	27.90	27.46	30.51
Entrance more than 5 years ago	60.31	63.70	40.52
Number of observations	251,328	251,328	43,091

[1] Percentages don't add up to exactly 100 due to imprecise rounding.
Source: Linked Employer-Employee Data (LIAB); own calculations

Table 5: Description of Firm-specific Characteristics (Indication of means and/or shares in percentages)

Characteristics	
Firm size[1]	
Small firm	35.51
Small medium-sized firm	30.17
Medium-sized firm	16.28
Larger firm	18.04
Qualification structure[1]	
Simple tasks	18.10
Qualified tasks	81.89
Contractual relationships[1]	

Share of fixed-term employees	4.87
Share of apprentices	8.68
Share of part-time employees	12.21
Investments	
Investments in further training	81.14
Technological state of machinery and equipment[2]	2.92
Co-determination	
Works council (1=yes)	57.45
Sector[1]	
Agriculture, forestry and mining	5.03
Construction	13.89
Manufacturing industry	35.39
Trade	11.94
Services for firms	6.03
Other services	27.72

[1] Percentages don't add up to exactly 100 due to imprecise rounding.
[2] "1" indicates that the establishment has state-of-the-art equipment; "5" indicates that the equipment is obsolete.
Source: Linked Employer-Employee Data (LIAB); own calculations

Table 6: Description of the Regional Distribution of Employment-relevant Factors (Indication of means and/or

shares in percentages)

Characteristics	Mean	Minimum	Maximum
Human capital endowment			
Employment rate	47,57	34,80	63,80
Productivity			
Unemployment rate	11,77	5,50	22,90
GDP (per capita)	22,63	14,50	41,90
Economic structure[1]			
Agriculture, forestry and mining	2,36	0,35	9,61
Manufacturing Industry	13,50	5,87	27,51
Metal- and electrical industry, engineering	14,51	4,39	38,75
Construction	9,57	5,09	16,58
Trade	15,08	11,25	23,23
Insurance and credit	3,14	1,29	9,90
Transport and communication	4,97	2,32	10,75
Health- and social services	10,79	6,64	15,09
Services for firms	8,13	4,15	17,13
Other services	17,91	11,14	30,81

[1] Percentages don't add up to exactly 100 due to imprecise rounding.
Source: Linked Employer-Employee Data (LIAB); own calculations

Table 7: Status of Stayers after Two Years (Indicated in percentages)

Internal career path[1]	Cohort 1 (Entrance at most one year ago)	Cohort 2 (Entrance 1 to 5 years ago)	Cohort 3 (Entrance more than 5 years ago)	Full sample	Number of obser- vations
Downward mobility	5.79	6.16	7.33	6.87	17,268
No Change	54.49	67.81	73.58	70.31	176,710
Upward mobility	39.72	26.03	19.09	22.82	57,350

[1] Percentages don't add up to exactly 100 due to imprecise rounding.
Source: Linked Employer-Employee Data (LIAB); own calculations