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Does the Region Make a Difference? Social Inequality in Transitions to Adulthood across Cohorts in West Germany

Katarina Weßling [1,2]

[1] Research Centre for Education and the Labour Market (ROA), School of Business and Economics (SBE), Maastricht University, P.O. Box 616, NL-6200 MD Maastricht, The Netherlands; k.wessling@maastrichtuniversity.nl or katarina.wessling@bibb.de

[2] Federal Institute for Vocational Education and Training (BIBB), Robert-Schuman-Platz 3, D-53175 Bonn, Germany

Abstract: Since the availability of study opportunities is unequal across regions, entering the phase of post-secondary education is often accompanied by leaving (the parental) home. In these life-course transitions, social background plays a crucial role in the form of resources, e.g., to afford living independently while studying. We use a unique set of geospatial data by aggregating information on the municipality level flexibly within travel-time radii and link the data to the German National Educational Panel Study (NEPS) to examine whether socioeconomic and university infrastructure in the region can compensate for a lack of parental resources (i) in transitions to university and (ii) in the likelihood of staying in or leaving the home region to study. We analyse this across cohorts between 1986 and 2015. We find that the region makes a difference: a wide availability of universities in the region offsets social inequality in the transition to university. Yet, the increasing availability of alternative educational routes over time via vocational training and universities of applied sciences causes this moderating influence to decrease across cohorts. Our findings call for gearing the attention of policymakers towards the varying relevance of regional conditions over time and across social groups for individuals' life-course transitions.

Keywords: transition to university; spatial mobility; regional effects; social inequality; National Educational Panel Study (NEPS)

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1. Introduction

The pathway to adulthood comprises crucial life-course transitions in the private and the professional domains such as entering the phase of (post-)secondary education, entering the labour market, leaving the parental home, and living alone or cohabitating for the first time. These transitions are often interdependent, e.g., transitioning to university is frequently accompanied by leaving the home region, not least because certain study opportunities are not available there.

Ever since Blau and Duncan's (1967) study on status attainment, the link between social origin and educational or occupational destination is among the most accepted findings in social inequality research (e.g., Breen and Goldthorpe 1997; Bukodi and Goldthorpe 2016; Erikson and Jonsson 1996; Sewell et al. 1969). This link between parents' and children's educational and social status typically unfolds at crucial transitions in the life course, i.e., parents' financial, educational, and social resources affect the likelihood of young adults entering university education and leaving home (Mitchell et al. 1989).

The distance to the nearest university and the regional availability of study opportunities have an impact on both the likelihood to study and the place to study (Spieß and Wrohlich 2010; Turley 2009; Weßling and Bechler 2019). In addition, economic and cultural amenities in a region are important when choosing a place to live (Greenwood 1973; von Proff et al. 2017). So far, few papers show that the relevance of regional conditions varies by parental income (Spieß and Wrohlich 2010; Frenette 2006; Turley 2009). However, scholars have paid no

attention to whether these regional conditions are similarly important for young adults from a higher compared to a lower social background over time. Our paper focuses on the interplay between social background, regions, and transitions across cohorts by asking and answering the following research questions: *Are regional opportunity structures equally important for young adults from different social backgrounds across cohorts (i) in the transition to entering university, and (ii) in the likelihood of staying in or leaving the home region to study?*

We use a unique set of socio-spatial data from administrative sources comprising (i) the regional labour market conditions, (ii) the prestige level of regionally accessible universities, and (ii) the fields of study available in the region. By aggregating this contextual information flexibly within travel-time radii, we are able to overcome the fixed aggregation of regional data in administrative units such as districts, counties, or federal states. We link these regional data sets with retrospective panel data from the German National Educational Panel Study—Starting Cohort 6—Adults (NEPS-SC6).

Our analyses cover West Germany from 1986 through 2015, allowing us to show changes in the importance of regional conditions across cohorts. Based on discrete-time event history models, we estimate interaction effects between socio-spatial contextual conditions and young adults' social background on the transition to research-oriented universities (as opposed to entering vocational training (VET) or studying at more practically oriented universities of applied sciences (UAS)[1]) and the transition of leaving (as opposed to staying in) the home region.

Our paper is structured as follows: Section 2 provides an overview of two strands of research and presents our theoretical concepts including our hypotheses. Section 3 describes the institutional context, the data sets, and our estimation strategy. Section 4 illustrates and discusses the empirical results. Section 5 concludes, provides implications for policymakers, and suggests avenues for further research.

2. Institutional Context and Literature Review

2.1. Institutional Context

In the strongly stratified German school system, successfully completing upper-level secondary education (e.g., Gymnasium or Fachhoch-, Fachoberschule) with a university entrance diploma (Abitur or equivalent) is required to enter higher education[2]. In higher education, research-oriented universities (Universitäten, n = 120) are distinguished from more practically oriented universities of applied sciences (UAS (Fachhochschulen, n = 205)), and universities of art or music (Kunst- and Musikhochschulen, n = 57) and teacher training institutions (Pädagogische Hochschulen, n = 6) (HRK 2022). Germany is one of the few countries in which university education is free of charge. Thus, much more than in countries with study fees, the major financial concern for students are housing and living costs, which is why we are not only analysing the chances to enrol for university but also where young adults do so.

Admission barriers vary by field of study and university and are only applied if the number of applicants exceeds the number of available places (e.g., Finger 2022). In competitive fields of study with large numbers of applicants, e.g., medical sciences, law and psychology, study places were allocated centrally until 2008[3]. Since then, universities organise the allocation (SfH 2022). This is important for our case because in these fields of study social inequality should be even stronger: they are less likely to be regionally available and even if they are, successful applicants might be allocated to another university away from their home region.

2.2. Social and Spatial Inequalities in Transitioning to University

It is well-documented that the effects of social class background are still at work during transitions at later educational stages, i.e., transitioning to university or the choice of field of study. Students from a higher social background are more likely to enrol in university education. Studies across several countries confirm this finding across cohorts despite the educational expansion and educational reforms designed to incentivise meritocratic

principles (e.g., Hillmert and Jacob 2010; Holm and Jæger 2008; Müller et al. 2009; Schindler and Lörz 2012; Tieben and Wolbers 2010). This holds true not only for the overall likelihood of entering university education but also for the choice of field of study. A symmetry between parents and children in fields of study is observed across generations (Kraaykamp et al. 2013). Furthermore, for students from higher social backgrounds, moving out of the parental home in order to study is considered an essential part of the typical university experience (Christie 2007; Mulder and Clark 2002).

Prominent explanations for social inequality in higher education are primary and secondary effects of social background. They indicate that educational performance on the one hand is socially selective due to the learning environment at home (primary effects). On the other hand, educational decisions are known to be group-specific (secondary effects). As such, costs, benefits and one's likelihood of success in education are perceived differently by different social groups (e.g., Boudon 1974; Breen and Goldthorpe 1997; Erikson and Jonsson 1996; Esser 1999, p. 266ff.; Gambetta 1987; Holm and Jæger 2008).

Research that relates aspects of regions with post-secondary educational prospects typically considers the distance to college or university. A large number of studies confirms that distance negatively affects study chances (Card 1993; Frenette 2006, 2009; Parker et al. 2016; Sá et al. 2006; Spieß and Wrohlich 2010; Tinto 1973). Furthermore, spatial inequalities are visible in subsequent decisions; with the availability of specific study fields in a region affects the choice of field of study (Denzler and Wolter 2011; Kelchtermans and Verboven 2010; Suhonen 2014) and of the specific university that will be attended (Denzler and Wolter 2011; Gibbons and Vignoles 2012; Sá et al. 2012).

More recent studies go beyond the distance approach; Turley (2009) estimates that each additional college within commuting distance has a positive effect on enrolment. Other approaches consider the spatial accessibility to all higher education institutions in a country (Flannery and Cullinan 2014; Sá et al. 2004, 2012). Again others, compare the extent of spatial radii in which study opportunities are aggregated (Weßling and Bechler 2019).

The rationale behind these findings is that the spatial accessibility of study opportunities is related to transaction costs (G. S. Becker 1993). The regional provision of university infrastructure influences both monetary and socio-emotional costs (Spieß and Wrohlich 2010; Turley 2009). Financial costs comprise study fees, study materials and housing costs. Moreover, indirect financial costs such as foregone earnings are to be considered. Emotional costs relate to living apart from peers, partners and the family when moving away to study (Gillespie 2013; Schwanitz 2017).

In relating the lines of argument on social inequality on the one hand, and spatial distance and availability on the other, we expect that students from higher social background are affected to a weaker extent—or even not at all—by the regional context, because they need to attend university on any account to secure their social status (e.g., Boudon 1974; Breen and Goldthorpe 1997). Students from lower social backgrounds are, instead, much more subject to on-site opportunities for (at least) three reasons:

First, living independently is costly and depending on parental or other financial resources (grants, loans) it might be unaffordable. Thus, depending on the regional availability of study opportunities, the decision to enrol for university is contingent on the financial and socio-emotional resources that enable individuals to move out of the parental home. Moreover, housing and living costs are the major financial issue in a country like Germany where university education is free of charge. Second, their sources of information on university education are more strongly based on offers outside the parental home. If this information is more easily accessible through living in a region with a strong university infrastructure, positive effects on enrolment in higher education should be expected. Third, the perception of educational norms could additionally be shaped by the visibility of the regional university infrastructure, i.e., a prominent and present university in the local area might make studying at a university more common also among students from non-academic backgrounds. Consequently, the university infrastructure is of particular importance for students from lower social background.

We further substantiate the relation between university infrastructure and social inequality by expanding our analyses on the chances to study in the home region versus leaving home to study. We argue that if students from a lower social background are more likely to study when the university infrastructure in their region is favourable but only in their home region and not away from home, then the regional context merely represents on-site opportunities. However, if we observe that the regional university infrastructure positively influences the chance to study away from home, this might reflect an effect on the 'college-going predisposition' (Turley 2009, p. 130), i.e., attitudes towards and information on higher education shaped by the region that go beyond opportunities. Thus, we hypothesise:

H1. *The availability and visibility of study opportunities in the region can compensate for social background disadvantages in individuals' chances (i) to enrol for university education (compared with entering educational alternatives i.e., UAS and VET) and (ii) move away to study.*

2.3. Regional Labour Markets

Another relevant factor in the region that impacts life-course transitions is the economic situation. Following the 'discouraged worker hypothesis' (Micklewright et al. 1990; Raffe and Willms 1989), high temporal or regional unemployment pushes young adults to expand their educational career to avoid entering a poorly performing labour market. Beyond that, the economic situation is a proxy for the overall attractiveness of a region; as such, it impacts the likelihood to stay in versus to leave the region (Greenwood 1973; von Proff et al. 2017).

Due to the strong VET system in Germany, we expect the economic situation to be particularly relevant for the decision to study versus entering VET (Raffe 2014). VET represents a relevant alternative to university education, which is exceptional in international comparison (Powell and Solga 2011). Students of lower social background are more likely to be 'distracted' from university education, due to their need to reach financial independence earlier, VET represents an attractive alternative for them (Hillmert and Jacob 2003). Choosing VET over university is subject to regional economic conditions because training is typically scarce when regional unemployment is high (Hillmert et al. 2017; Wolter and Ryan 2011).

We expect high unemployment in the region to reduce social inequality in the transition to university because school graduates from lower social backgrounds should be more likely to study in challenging labour market settings. Moreover, we assume that high unemployment increases social inequality in the choice of place of study. Graduates from a high social background are more likely to leave poor and unattractive regional labour markets because they have the resources to do so. Thus, we hypothesise:

H2. *Poor labour market conditions in the region (i) decrease social background disadvantages in individuals' chances to enrol for university education (compared with entering educational alternatives i.e., UAS and VET) and (ii) increase social background disadvantages in individuals' chances to move away to study.*

2.4. Developments across Cohorts

The patterns of post-secondary educational trajectories have become more diverse (e.g., R. Becker 2003; Hillmert and Jacob 2003; Jacob and Weiß 2011; Mayer et al. 2007). Traditionally, VET was the domain of school leavers with lower or intermediate secondary school degrees. However, school leavers with upper secondary degrees have shown increasing participation as either an alternative to or preceding university (Becker and Hecken 2009; Hillmert and Jacob 2003). In 1990, 12% of graduates entered VET and over 80% entered higher education, compared to 2012, when 23% entered VET and 72% enrolled in higher education (BIBB 2016).

These developments are a result of changes in both supply and demand. Concerning the supply of graduates, the most significant trend has been educational expansion. Upper-

level school tracks have become increasingly accessible for non-traditional students who do not have clear academic aspirations but opt for VET. This selectivity accounts for trends in the relative chances of different groups of school leavers to enter VET versus university education (Reimer and Pollak 2010). In addition to this trend, the foundation of UASs particularly since the 1970s represents another alternative to university education—presumably for students from lower social backgrounds. However, research finds mostly no or small social background differences in the study participation at a UAS compared to university (Reimer and Pollak 2010).

With regard to the demand for graduates, structural economic change towards services and increasing costs of training have led to a decreasing share of employers that provide VET (Busemeyer 2009). Hence, relatively more school leavers with Abitur apply for VET and make use of their competitive advantage over lower qualified school leavers for a relatively decreasing number of training places. We believe that these trends are associated with changes in the importance of regions over time, because both VET and UAS are typically regionally decentralised compared with universities, and hence, more likely to be regionally available.

This should also be reflected in the place of study because due to the educational expansion the share of students from lower social background that graduate with an upper-level secondary school degree has increased over time; this should increase, over time, the effect of the regional university infrastructure in social inequality in the decision to move away to study.

Thus, we hypothesise that:

H3. *The influence of regional conditions on social inequality in (i) enrolling to university (compared with entering educational alternatives i.e., UAS and VET) and (ii) moving away to study is more important for younger cohorts compared to older cohorts.*

3. Data, Variables, and Methods

3.1. Survey Data

We use survey data from the Starting Cohort 6 of the German National Educational Panel Study (NEPS-SC6)—(Blossfeld et al. 2011; NEPS Network 2016).[4] NEPS-SC6 is a retrospective life-course data set, which comprises information on various life domains such as educational careers, employment trajectories, and family and relationship history. At the time of the interview respondents are between 18 and 65 years old. Most importantly for us, NEPS-SC6 contains retrospectively collected information on respondents' places of residences over the life course. Thus, we make use of the information on where respondents lived when they obtained their upper-level secondary school degree and where they entered university. Based on this residential information, we link time-specific regional data on the level of municipalities to the NEPS-SC6 survey.

We concentrated on two dependent variables: Our first variable of interest was the likelihood of entering university compared to alternatives—either VET or UAS—within the first five years after graduating from upper-level secondary school. We concentrate only on whether students entered university education. Thus, entering does not imply successful university completion. We restrict the sample to students who lived in the same residential context for at least two years prior to graduation from general school because we want them to be familiarized with the regional conditions that they are exposed to during their last years of schooling. Our second variable measures—conditional upon entering university—if students study in their home region) or move away to study, which is measured as moving out of the defined travel time radius (45 min). Following up on a previous study, we use the 45-min radius since it yields the strongest results. Also, this is very much in line with average commuting distances in Germany (for a detailed description see Weßling and Bechler 2019)

The independent variable derived from the survey is students' social background. We use the combined maximum parental ISEI. Individual-level control variables comprise

sex, migration background—measured as at least one parent or the respondent being born abroad, parents' educational level—measured as high (university degree), intermediate (upper-level secondary school degree+VET or Meisters' degree) and low (VET or less) –, final average grade in secondary school, and the year. A summary of the variables that we retrieved from the survey data can be found in Table 1.

Although ISEI and parents' education are highly correlated, we chose to use ISEI as the main independent variable because our arguments for studying and in particular for doing so away from home were based on the financial resources of parents, which are in combination better reflected by using the occupational status.

Table 1. Descriptive statistics of survey variables included in the analyses, data: NEPS-SC6.

Variable	Category	Percentage/ Mean (SD) [Min–Max]	*n*=
Dependent Variable (1)			
Model 1: Entering university (within five years after graduation from sec. education)	Yes	62%	
	No	38%	
Independent Variables (1)			
Parents' ISEI		50 (15.6) [16–90]	
Parents' school degree (combined max.)	High	39.4%	
	Intermediate	34.8%	
	Low	25.8%	
Sex	Female (vs. male)	52.2%	
Migration background	Migr. backgr. (vs. no migr.back.)	18.1%	
Final grade		2.6 (0.60) [1–4]	
Duration		1.8 (1.1) [1–6]	
Year [observation period]		1996.5 (6.8) [1986–2011]	*1,854*
Model 2: Staying to study	Yes	22%	
	No	78%	
Parents' ISEI		54 (16.2) [16–90]	
Parents' school degree (combined max.)	High	52.5%	
	Intermediate	29.5%	
	Low	18%	
Sex	Female (vs. male)	50.1%	
Migration background	Migr. backgr. (vs. no migr.back.)	21.6%	
Final grade		3.2 (0.62) [1.6–4.5]	
Year [observation period]		1996.5 (6.8) [1986–2011]	*1,149*

3.2. Regional Data

We use time series data at the municipality (Gemeinde)[5] level from 1986 to 2015. Since regional data for East Germany is not available before the mid to late-1990s, we restrict our analyses to West Germany. This bears implications for our findings because since the German reunification in 1990 (and to a smaller extent even before) it is possible that the West German school graduates enter post-secondary education in East Germany. However, our point of departure is an ego-hood approach (Andersson and Malmberg 2015; Hartung and Hillmert 2019) i.e., we built circular regions around the place of residence of the graduates during the time of and at graduation from secondary school. Therefore, we can of course only make statements about students that attended secondary school in West Germany; but

for them, the regional conditions on which they base their decision for higher education are depicted accurately.

We make use of the following regional variables:

(i) *Classic university town:* We use the dichotomous information on whether a municipality is a classic university town. Classic university towns are labelled as such (e.g., on town signs and official city documents), and are typically characterised by an old, renowned, and prestigious university with a long tradition in classic academic fields (e.g., medical sciences, law). These universities are often located in smaller cities with a high density of students in the population. In Germany prominent examples are Heidelberg, Goettingen, or Tuebingen. The data stems from the German Council of Science and Humanities.

(ii) *Availability of fields of study:* Regarding the range of fields of study, we use the information on whether the following six broad educational fields are offered at a location: law and social sciences, medical sciences, mathematics and sciences, cultural studies, engineering, and linguistics. Our variable ranges from 0 to 6 depending on the number of broad fields available in the region. While the information on classic university towns represents the visibility of university infrastructure, the availability is better represented by the second variable on study fields in the region. The data stems from the German Council of Science and Humanities.

(iii) *Unemployment rate:* To capture the overall labour market situation, we use unemployment rates on the level of grouped municipalities (Verbandsgemeinde). The data stems from the Federal Employment Agency.

(iv) *Share of upper-secondary school graduates*: In addition, we include the share of high-school graduates in the region, which shows the competitive situation and population size. The data stems from the Federal Statistical Office.

We show correlations between the regional indicators in Table S1 in the Supplementary Materials. We link the regional time-series variables with the NEPS-SC6 survey by merging the year of upper-level secondary school graduation from the survey with the regional data for the respective year. After excluding missing information, we obtain a data set with 1854 individual cases. Data is missing in particular for parents' education and occupation. Moreover, the retrospectively collected residential data, which contain the place of residence at the time of school graduation, is only available for a representative subsample of the NEPS-SC6 (for further information on the sample und subsample see Antoni et al. 2018; Matthes and Trahms 2011).

3.3. Measuring Regional Contexts

An advantage of the ego-hood measurement of regional variables is the possibility of identifying the spatial extent to which certain mechanisms are at work. Since analytical results are sensitive to the definition of spatial units the results of models in which spatial information is used are, among others, affected by the level at which the contextual data is aggregated—a statistical phenomenon known as modifiable areal unit problem (MAUP) (Fotheringham and Wong 1991). To tackle this problem, we follow a reachability-based measurement, which has been established and applied in regional sciences studies (e.g., Duranton and Overman 2005; Scholl and Brenner 2015). We use travel-time information between all German municipalities and aggregate the four regional indicators (i.e., classic university town; availability of fields of study, unemployment, share of school graduates) within travel-time radii. Thus, we do not use an indicator on available study fields in the county, district or federal state to illustrate regional study conditions; instead, we use a radius in which study fields are available around the individual's place of residence.

Average travel times are provided by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) containing information on travel times in minutes by car[6] between all 11,442 German municipalities[7]. We use the Stata ado file 'aggind' (Hartung 2017) to obtain the relevant travel-time zones for each respondent in the survey. We recalculate the four regional variables for each year so that the unit of

analysis is no longer the municipality or the district, but a travel time radius of 45 min based on the municipality of the upper-level secondary school graduate's place of residence at the time of graduation from school. Based on previous work, we use the 45-min radius because it captures the most relevant spatial extent in which young adults consider regional opportunities and conditions (authors, year). Percentages within the travel time radii are calculated relative to the population size in a respective travel-time radius.

In Figure 1 the four regional variables are illustrated on a map for the year 1986 (first year of observation) in a 45-min travel time radius. For all available time points see (authors, year). The blue colour in the upper-left panel shows whether there is a classic university town in a 45-min travel time radius. The variable is binary with a mean of 0.43 and a standard deviation of 0.49. The upper-right panel shows in purple the number of study fields in a 45-min travel time radius and ranges from 0 (white) to six (dark violet) with a mean of 4.42 and a standard deviation of 2.14. The shading of the variable in the lower-left panel from white through yellow to red indicates the unemployment rate in percentiles, with white representing low unemployment (typically below 5%) and dark red displaying high unemployment (between 15 and 20%). The average unemployment rate across all years of observation is 6.8%, with a standard deviation of 2.5. The lower-right panel depicts the share of upper-level secondary school graduates in the population ranging from 0% (white) to 1.3% (dark green). The average share of upper-level secondary school graduates is around 0.68% (standard deviation 0.45).

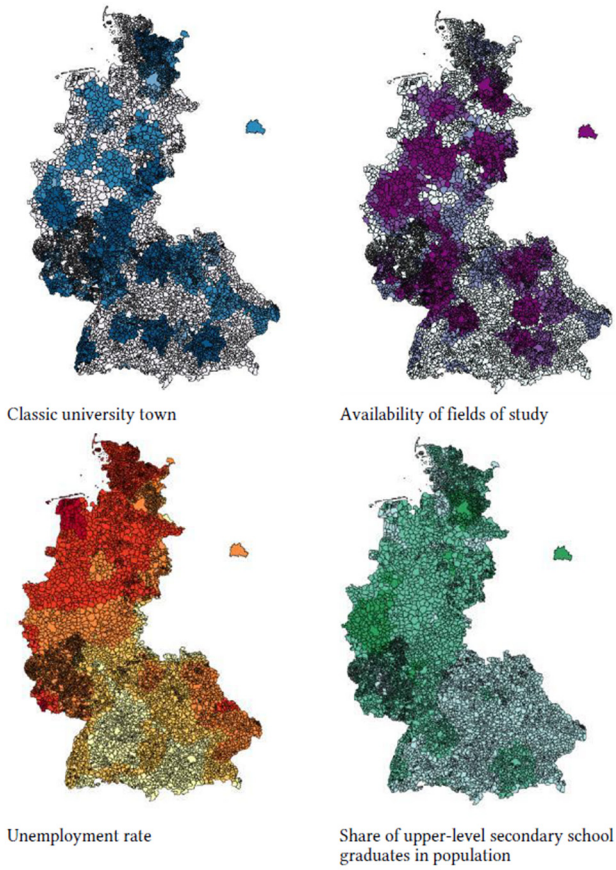


Figure 1. Regional-level variables in a 45-min travel time radius for the year 1986 (first year of observation). Data: Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities. Legend: upper-left panel blue: classic university town in a 45-min travel time radius (yes/no); upper-right panel purple: number of study fields in a 45-min travel time radius (0–6); lower-left panel yellow-red: unemployment rate in percentiles (5–20%); lower-right panel green: share of upper-level secondary school graduates in general population (0–1.3%).

3.4. Modelling Strategy

To depict the typical admission procedures at universities, which are scheduled once, sometimes twice a year, we compute a discrete-time survival model instead of a conventional event history model. The model treats time not as a continuous but as a discrete (yearly) variable. We implement this discrete-time event history model in the form of a linear probability model (LPM). Thus, the model estimates the probability h_j of enrolling for university. The baseline variable $\beta_0(t)$ contains the yearly observed time points (t) starting with the year in which the upper-level secondary school degree is obtained and ending after five years.

The independent variables include students' social background—i.e., the combined maximum of the parental ISEI—$(\beta_a x_{aj}(t))$, the unemployment rate in the region $(\beta_b x_{bj}(t))$, the university infrastructure in the region $(\beta_c x_{cj}(t))$, and the provision of field of study alternatives in the region $(\beta_d x_{dj}(t))$. The main effects of interest are three interaction terms, between the social background variable and the regional indicators: $\beta_e x_{aj}(t) * x_{bj}(t)$; $\beta_f x_{aj}(t) * x_{cj}(t)$; $\beta_g x_{aj}(t) * x_{dj}(t)$.

We include several additional variables as controls in the model (for an overview see Table 1 and Figure 1). Due to the repeated observations of individuals in up to five years (observation period), standard errors are clustered.

$$\begin{aligned} P(h_j = 1|x_j) = \beta_0(t) + \beta_a x_j(t) + \beta_b x_j(t) + \beta_c x_j(t) + \beta_e x_{aj}(t) * \\ x_{bj}(t) + \beta_f x_{aj}(t) * x_{cj}(t) + \beta_g x_{aj}(t) * x_{dj}(t) \ldots + \beta_z x_j(t) \end{aligned} \tag{1}$$

We estimate the study-related mobility decision applying a binary LPM. Our dependent variable is the likelihood to study in the home region $p(X)$. We include the same independent variables to quantify the interaction effect between social background and regional conditions on the mobility decision associated with entering university.

$$\begin{aligned} P(p_x = 1|x_j) = (t) + \beta_a x_j(t) + \beta_b x_j(t) + \beta_c x_j(t) + \beta_e x_{aj}(t) * \\ x_{bj}(t) + \beta_f x_{aj}(t) * x_{cj}(t) + \beta_g x_{aj}(t) * x_{dj}(t) \ldots + \beta_z x_j(t) \end{aligned} \tag{2}$$

To obtain analytical results that are comparable across models, we present Average Marginal Effects (AMEs) (Mood 2010). AMEs are interpreted as the average change in the probability that individuals enter university and stay in their home region to study if the independent variable increases by one unit, holding all other independent variables constant.

Marginal effect plots allow us to capture the impact of a specific covariate given selected realistic values of another covariate (Royston 2013; Williams 2012). The analyses are restricted to students who lived in the same residential context for at least two years prior to graduation from general school to ensure that they were exposed to the regional conditions during their final years of schooling. All analyses were carried out with the statistical software Stata 16 (StataCorp 2018).

4. Results

Technically, all of the statistical relationships we are focusing on are based on interaction effects between the social background variable and regional/temporal variables. Therefore, we present conditional marginal effect plots in the following whereas the main models are placed in the Supplementary Materials in Table S2 (dep.var.: probability to enter university education, n = 1854) and Table S3 (dep.var.: probability to study in the home region conditional on studying at a university, n = 1149).

The first model in Table S2 comprises the baseline variable (duration) and parents' ISEI. In the second model we add the regional variables and control variables. In the third model interaction effects are specified. The findings from the main models are in line with the literature; parents' social status and school grades have strong effects on entering university (e.g., Becker and Hecken 2009; Müller et al. 2009). Also, we find the regional variables to play a role; the provision of study opportunities, the presence of a classic university town,

and higher unemployment all positively impact the probability to study at a university (e.g., Hillmert et al. 2017; Parker et al. 2016; Spieß and Wrohlich 2010).

In the models in Table S3 we find regional effects are associated with moving away to study. This seems reasonable since the question of leaving or staying in a region should be subject to regional factors. Moreover, the model is conditional upon entering university. Thus, the weak individual-level effects result from the restriction to individuals who enter university education.

4.1. Social Inequality and University Infrastructure

Our first hypothesis stated that the negative effect of a lower social background on the probability enter university—which is confirmed by prior research and in our model A2—would be compensated by a wide availability and visibility of universities in the region.

Figure 2a depicts the interaction between the parental ISEI and the presence of a classic, often prestigious university town within a 45-min travel time radius around the place of residence at the time of graduation from secondary school. The figure shows the effect of a low (=16, black circle), intermediate (=50, grey square), and high (=90, light grey diamond) parental ISEI if there is no university town (=0) versus if there is a university town (=1).

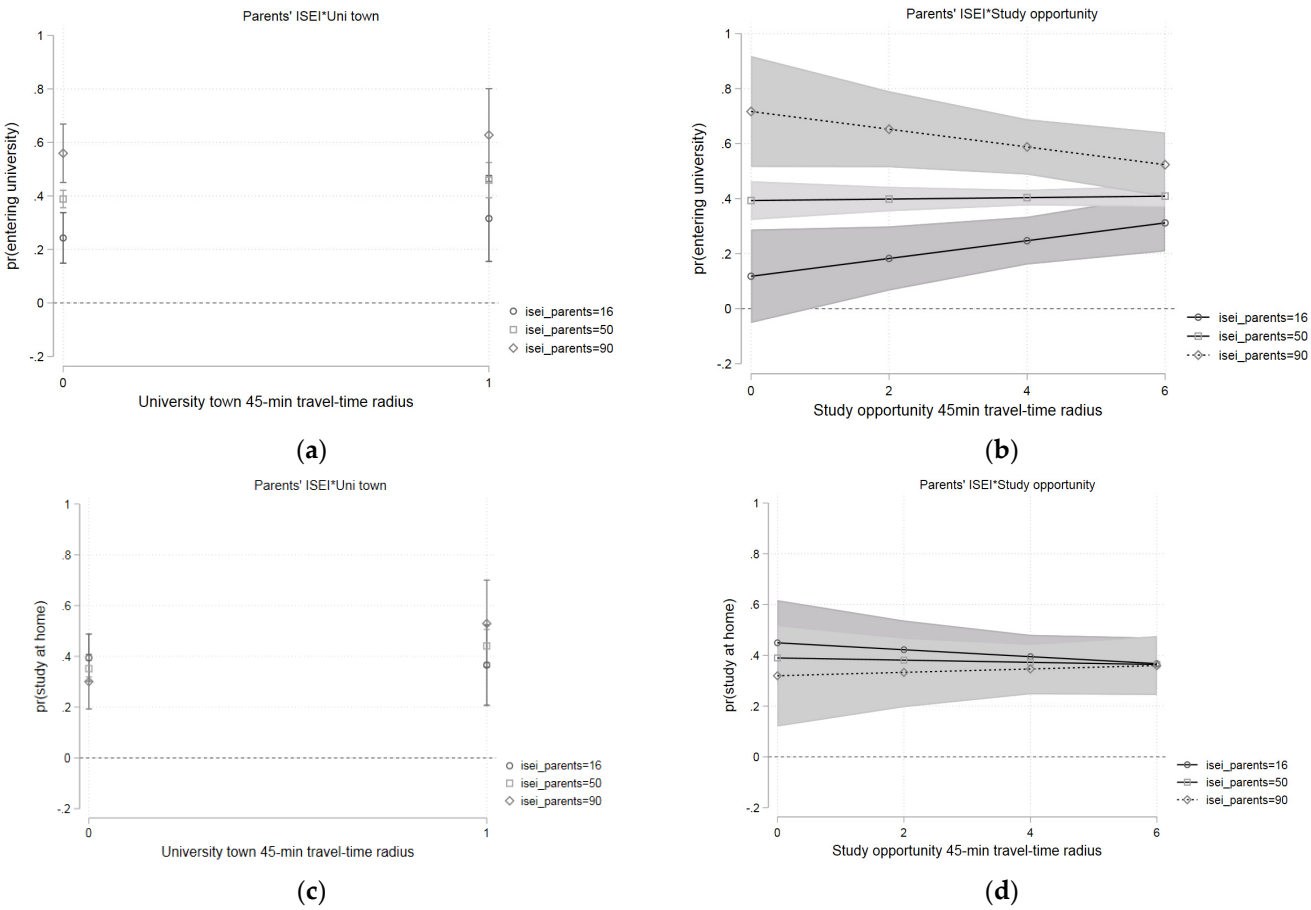


Figure 2. (**a**) Predicted probabilities; interaction between parents' ISEI and classic university town in 45 min travel-time radius on probability of entering university (vs. UAS or VET). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1854. (**b**) Predicted probabilities; interaction between parents' ISEI and fields of study available in 45 min travel-time radius on the probability of entering university (vs. UAS or VET). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities,

n = 1854. (**c**) Predicted probabilities; interaction between parents' ISEI and classic university town in 45 min travel-time radius on probability of studying in the home region (vs. moving away to study). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1149. (**d**) Predicted probabilities; interaction between parents' ISEI and fields of study available in 45 min travel-time radius) on probability of studying in the home region (vs. moving away to study). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1149.

We find a statistically significant difference in the probability to study at a university across the three parental ISEI groups when there is no university town in the area. Students from a higher social background are significantly more likely than students with an intermediate or lower social background to enter university. The difference between social background groups becomes insignificant when there is a university town in the region. However, when connecting the dots, the resulting lines are rather parallel, which speaks against an interaction between classic student town and parental ISEI.

Figure 2b presents the interaction between parental ISEI groups and the available fields of study in the region. More study field options in a 45-min travel time area reduce and even offset social background differences in the probability to study at a university.

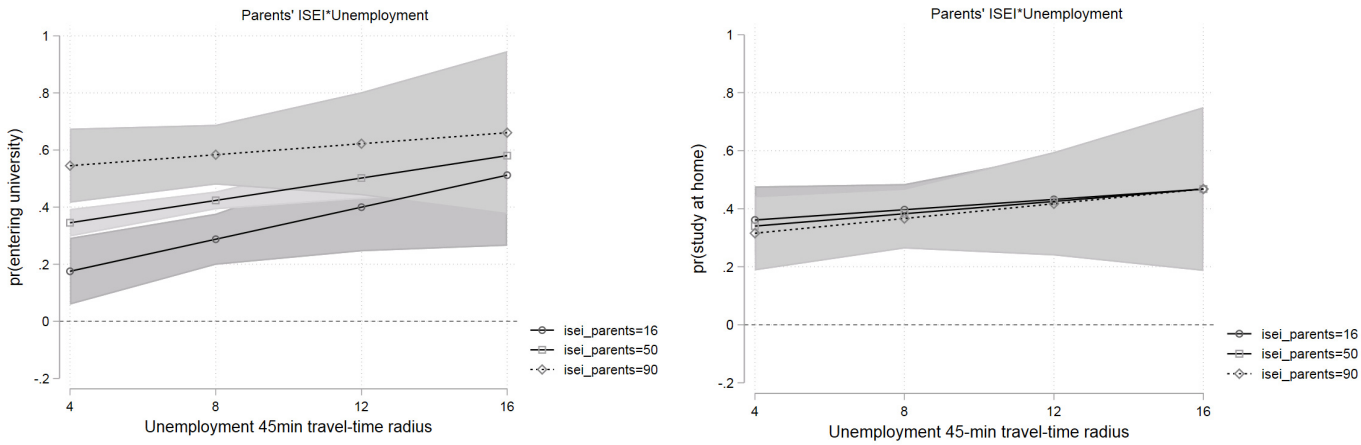
Hence, we find support for our hypotheses; in particular a wider availability of opportunities, i.e., available study fields in the region compensate for social inequality in the access to university education.

We argued further that if students from lower social backgrounds in favourable regional settings are not only more likely to study in their home region but also are more likely to take up studies away from home, then this could indicate that the regional university infrastructure represents more than mere opportunities but affect attitudes towards and information about university education. Yet, in Figure 2c,d we do not observe any significant interaction between parental ISEI and the two variables on university infrastructure. Thus, once the transition to university—compared to alternatives such as vocational training or university of applied sciences—has taken place, there is no additional effect of regional conditions on the social selectivity in the choice of place of study.

4.2. Labour Market Conditions and Social Inequality

In our second hypothesis we expect unemployment to increase the chances of students from a lower social background to enrol for university because they are more likely to prolong their educational career in unfavourable settings, where alternatives such as VET are less likely to be available. We do not expect to find the same for students from higher social background, because to maintain their social status of origin they have to attend university regardless of regional conditions.

Figure 3a shows that all social background groups are more likely to study at a university when unemployment is high but with an unemployment rate higher than 10%, differences between social groups are significantly reduced and even offset. The comparatively flat line for students from a higher social background indicates, consistent to expectations, that their educational transitions are much less responsive to regional labour market conditions (e.g., Boudon 1974; Breen and Goldthorpe 1997; Erikson and Jonsson 1996; Holm and Jæger 2008).



(**a**) (**b**)

Figure 3. (**a**) Predicted probabilities; interaction between parents' ISEI and unemployment in 45 min travel-time radius on probability of entering university (vs. UAS or VET). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1854. (**b**) Predicted probabilities; interaction between parents' ISEI and unemployment in 45 min travel-time radius on probability of studying in the home region (vs. moving away to study). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1149.

We do not find an additional social inequality effect in the relation between regional unemployment and the probability to study in the home region versus moving away to study (Figure 3b).

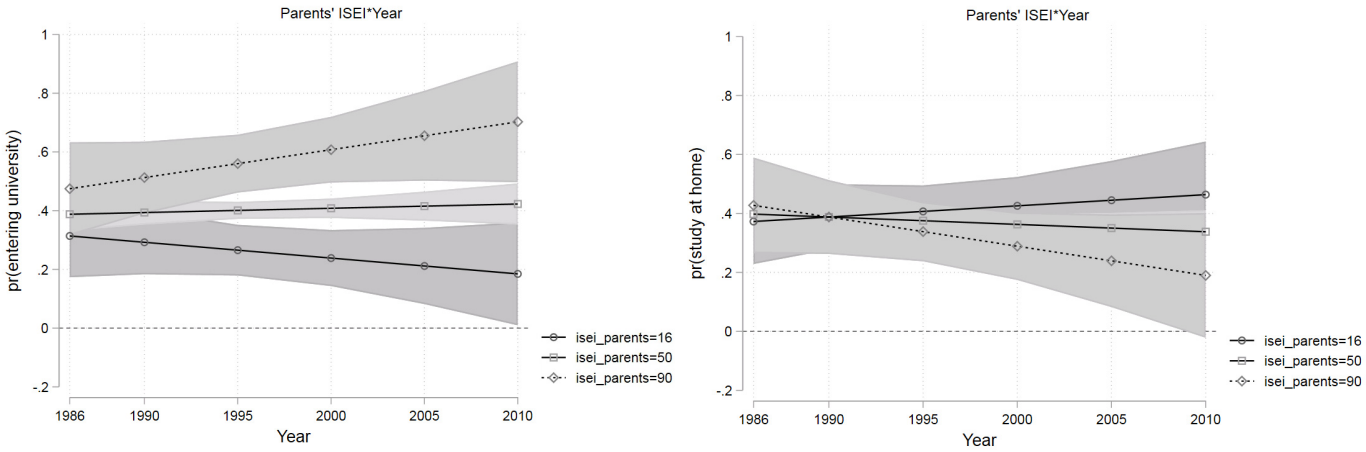
4.3. Social and Spatial Inequalities across Cohorts

In our third hypothesis we argue that the influence of regional conditions on social inequality in transitions increases for younger cohorts, due to an increase in the availability of alternatives to university education such as universities of applied sciences and vocational training.

In line with the literature, we observe an increase in social inequality in the access to university education over time (see Figure 4). This development is driven by the educational expansion and the fact that school graduates with the Abitur from intermediate and lower social backgrounds are more likely to make use of alternative educational routes such as VET and UAS (e.g., Hillmert and Jacob 2003; Jacob and Weiß 2011; Reimer and Pollak 2010).

Since the educational expansion increased the share of students from lower social backgrounds that graduate from upper-level secondary school, we expect that study-related mobility should become more unequal over time. This is because upwardly mobile students' resources to live independently should be comparatively limited.

Figure 4b confirms this, when comparing school graduates from low (solid black line, circles) with high social background (dashed grey line, diamonds). In the early years of the observation period, there is no social difference in the probability to study away from home across social groups. In contrast, in more recent years students from higher social background are more likely to leave the home region to study whereas students from lower social background have an increased probability to stay.



(**a**) (**b**)

Figure 4. (**a**) Predicted probabilities; interaction between parents' ISEI and observation time on probability of entering university (vs. UAS or VET). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1854. (**b**) Predicted probabilities; interaction between parents' ISEI and observation time on probability of studying in the home region (vs. moving away to study). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1149.

To depict changes in the importance of regional factors over time, we present three-way interactions between:

- Social background, time and the availability of study fields in the region (Figure 5a),
- Social background, time and the presence of a university town in the region (Figure 5b) and,
- Social background, time and unemployment in the region (Figure 5c).

Overall, we observe a complex pattern of social inequality in the transition to university along the lines of regional factors and developments over time. We do not observe significant three-way interactions when there is little availability of study fields or no university town in the region, i.e., unfavourable university infrastructure. The slopes of the coefficients are not changing (upper two panels in Figure 5a; upper panel in Figure 5b).

However, the data suggests a change over time in regions with a favourable university infrastructure, but not in the way we expected (lower panel in Figure 5a,b). In line with what we expected, it seems regional indicators to matter less for the older cohorts. A potential explanation for this might be the educational expansion; in earlier years, school graduates were more homogenous in terms of social background. The increased probability to obtain an upper-level secondary degree across all social groups has led to regional conditions playing a greater role in this transition process for later cohorts.

During the 1990s a wide availability of university infrastructure reduced and offset social inequality in the access to university education. Against our expectations, from 2000 onwards social inequality—when comparing students from low (solid line) with students from high social background (dashed line)—even increased when the university infrastructure is favourable. This can be explained by the temporal developments depicted in Figure 5, which are characterised by an increased uptake of educational alternatives such as VET and UAS in the 2000s by students from lower social backgrounds. Hence, the increased importance of VET and UAS made the regional availability of universities a less relevant factor in reducing social inequality in the access to university education. Consequently, the access to university education became more socially selective over time even in regions in which university infrastructure is widely available.

A high level of unemployment seems to diminish social inequality in the transition to university (see Figure 5c and also Figure 3a) without considerable changes in the time slopes.

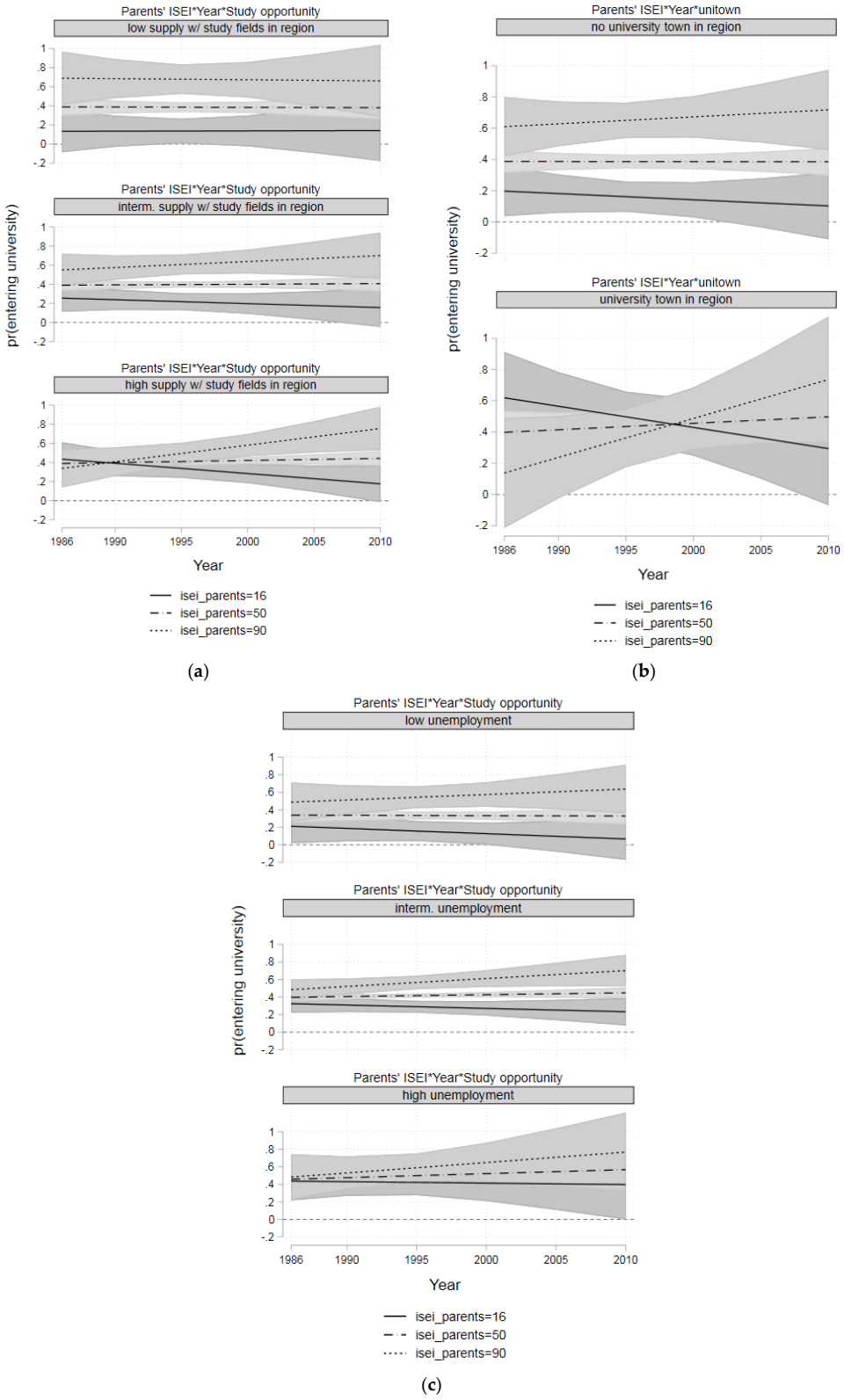
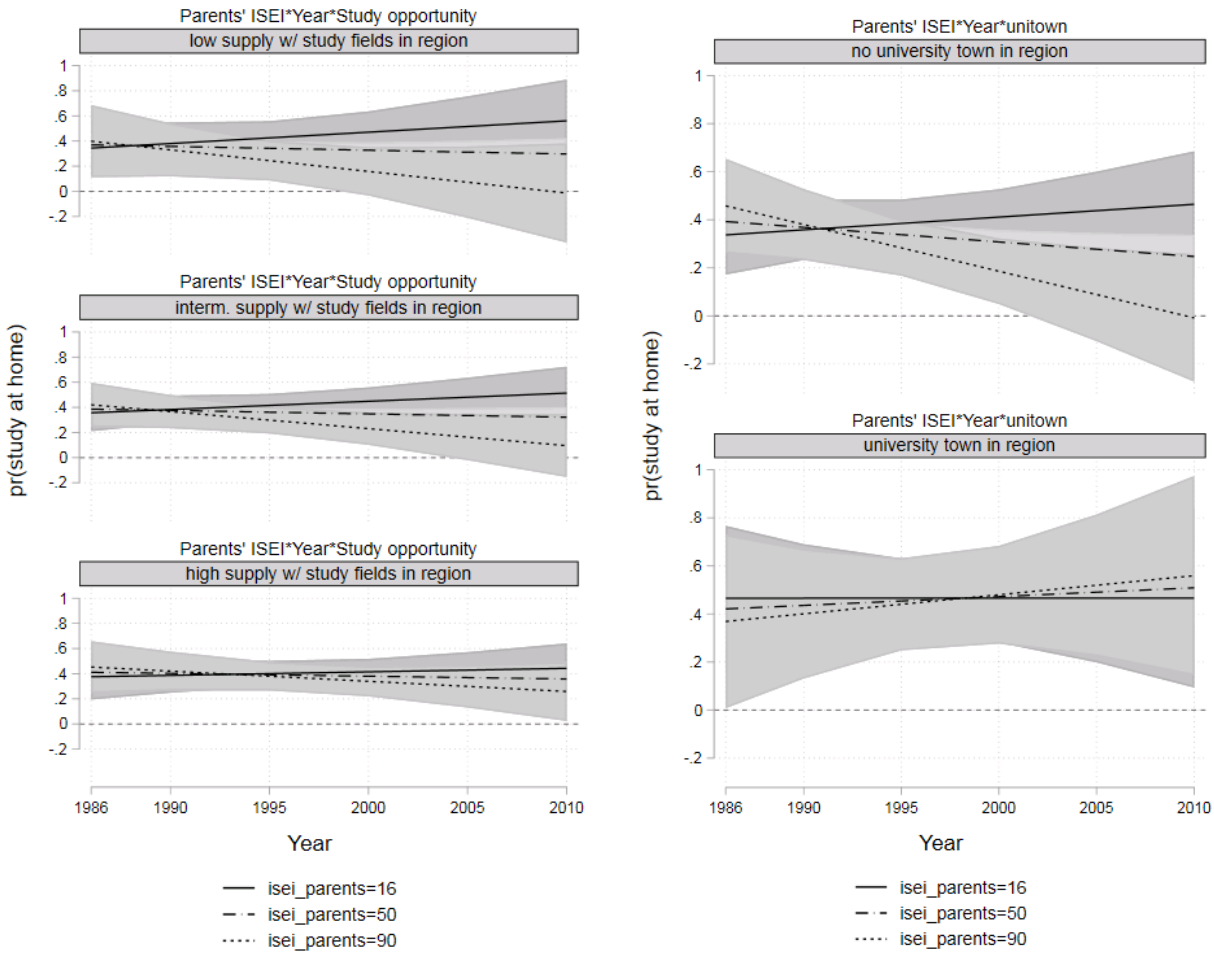


Figure 5. (**a**) Predicted probabilities; three-way interaction between parents' ISEI, supply w/study fields in region and time on probability of entering university (vs. UAS or VET). (**b**) Predicted probabilities; three-way interaction between parents' ISEI, university town in region and time on probability of entering university (vs. UAS or VET). (**c**) Predicted probabilities; three-way interaction between parents' ISEI, unemployment in region and time on probability of entering university (vs. UAS or VET). Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, n = 1854.

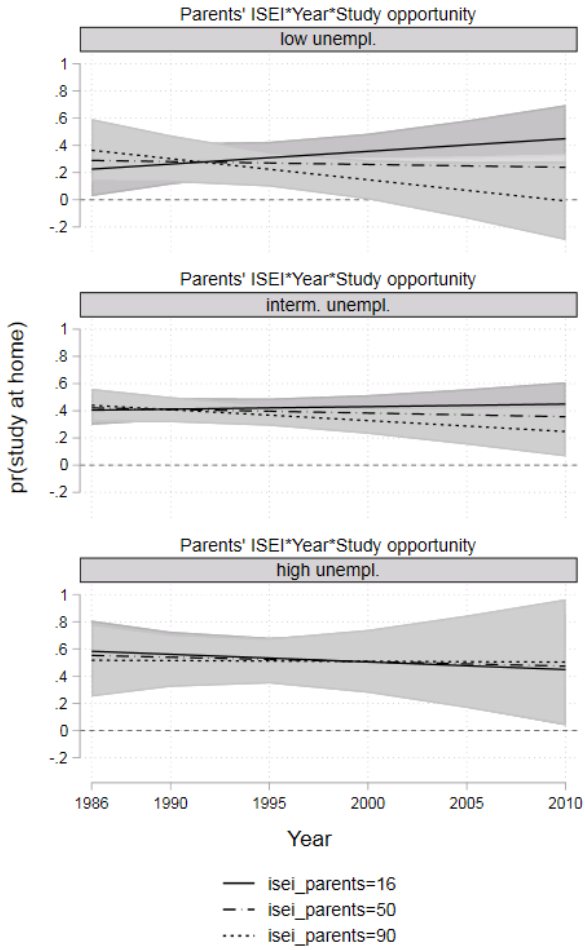
Figure 6a–c present three-way interactions between our second dependent variable—the place of study—and the regional factors and time. The importance of the availability of fields of study has not changed across cohorts. However, the probability of moving away to study when there is no university town in the region is particularly high for students from higher social background in more recent years, whereas students from lower social background tend to stay in the home region more often despite having no possibility to enrol for university in their region. This emphasizes the increased importance of educational alternatives like VET and UAS. These alternatives are particularly relevant for young adults from lower social backgrounds, and VET and UAS are distributed more equally across regions so that moving away is not required.

Differences across social groups and over time in the importance of unemployment on the place to study seem to only exist when unemployment is low. In the years between 2000 and 2010, we find students from lower social background to be more likely to stay in the home region when the overall labour market conditions are favourable whereas students from higher social background tend to leave more often despite experiencing good labour market prospects in their home region.



(**a**) (**b**)

Figure 6. *Cont.*



(**c**)

Figure 6. (**a**) Predicted probabilities; three-way interaction between parents' ISEI, supply w/study fields in region and time on probability of studying in home region. (**b**) Predicted probabilities; three-way interaction between parents' ISEI, university town in region and time on probability of studying in home region. (**c**) Predicted probabilities; three-way interaction between parents' ISEI, unemployment in region and time on probability of studying in home region. Data: NEPS-SC6, Federal Employment Agency, Federal Statistical Office, German Council of Science and Humanities, $n = 1149$.

4.4. Robustness Checks and Limitations

The focus of our paper is on the transition to studying at a university because we believe we could demonstrate that the scattered allocation of university infrastructure across regions makes this outcome the most likely one to be influenced by regional factors. Educational alternatives, i.e., VET and UAS, are more often available everywhere. However, to substantiate our findings and to make them more transparent, we take into consideration the interdependence of available educational alternatives and present in the Supplementary Materials all marginal effect plots for the educational alternatives:

(i) VET (versus university and UAS) and
(ii) UAS (versus university and VET).

To that end, there are three observations we want to highlight. First, we expected that students are less likely to enter VET when unemployment is high. However, we find the opposite. Students from lower social background are more likely to enter VET in regions with high unemployment. Further analyses show that this finding is driven by final school grades. Students from lower social backgrounds with grades below average are more likely

to enter VET, whereas students from lower social backgrounds with higher grades are more likely to enter university education (see Figure S2c,d in the Supplementary Materials). Thus, low performing students with a high school leaving certificate use their competitive advantage over students with a lower or an intermediate school degree to enrol for VET.

Second, we find unemployment in the region to play a much larger role when directly testing for an outcome sensitive to labour market conditions, i.e., entering VET. On-the-job training is highly susceptible to labour market conditions, and we find pronounced effects of regional unemployment on social inequality in the access to VET.

Third, in testing regional influences also directly on alternatives to university, i.e., VET and UAS, we can show that school leavers from higher social background are much less likely to enrol for these alternatives and that they are much less likely to be affected by regional conditions. Moreover, we observe for graduates from higher social background almost no changes in the regional influences over time; if at all, their probability of entering UAS or VET has decreased over time.

Further robustness analyses entail variations in the operationalisation of the regional variables. We ran the same models with alternative travel time radii (15, 30, 60 min) as well as with administrative districts and federal states as units in which we aggregate the regional variables (available upon request). We follow a previous study in using the the 45-min travel time radius, which provides on average the strongest results (Weßling and Bechler 2019). This is in line with previous research on regional context influences and commuting distances (Eckey et al. 2010).

Despite the extensive analyses there are limitations that need to be discussed. We have a problem with relatively low case numbers given the observation period and the type of effects we calculate, i.e., interaction effects and in particular three-way interaction effects. This is problematic especially at the margins of the distributions as can be seen in the large confidence intervals of the plots. For instance, in the last four years of the observation period the case numbers are very low; also, for high numbers of regional unemployment (over 12%), the cells are thinly populated. Thus, we cannot entirely rule out that a lack in significance of our findings at the margins is due to the low case numbers. However, the overall patterns we observe in the data suggest that if anything we underestimate the relation between regional factors, temporal developments, and social inequality in transitions to adulthood.

Another limitation concerns the data structure. Dealing with retrospective survey data, we cannot control for subjective measures such as aspirations for education and places of residence. Prior research suggests that aspirations are influenced by regional conditions (Hartung and Hillmert 2019; Hartung et al. 2022). Thus, if aspirations where separable from decisions and transitions, more fine-grained analyses on the mechanisms through which regional factors operate would be possible. Moreover, personality might play a role as a mitigating factor (Hooijen et al. 2020). However, papers that rely on panel data comprising subjective information would then again not be able to link individual transitions with regions and developments over a long period, which is a focus of our paper.

5. Summary and Conclusions

In linking research on life-course transitions and social inequality with regional contexts over time, this paper engaged in putting into practice the renewed idea of 'making a place for space' (Logan 2012) in sociological research. In analysing whether regional context conditions are equally important for young adults from different social backgrounds (i) in the transition to entering university, and (ii) in the likelihood of staying in or leaving the home region to study, we focused on two crucial transitions in the individual life course. Our main question of interest was whether regions make a difference in terms of social inequality in these transitions over time. The answer we can provide, based on the empirical data at hand, is a definite yes.

We used data on regional labour market conditions, the prestige level of regionally accessible universities, and the fields of study available in the region. We aggregated

the three contextual variables within travel-time radii. This allowed us to overcome the fixed aggregation of regional data in administrative units. The regional data was linked to retrospective panel data (NEPS-SC6). Based on event history models, we estimated that interaction effects between socio-spatial contextual conditions, young adults' social background and the time variable.

Our empirical analyses suggested that social inequality in the transition to university is reduced or even offset in regions with a strong provision of university infrastructure and high unemployment. We observe this relation over time and find that it holds in particular for older cohorts. This is for two reasons. The educational expansion led more individuals from lower social backgrounds to obtain a university entrance diploma (Abitur), who nevertheless did then not continue their educational career in university. Rather, in more recent years alternatives to university education such as UAS and VET became more prominent alternative routes, especially for young adults from lower social backgrounds. Thus, regional university offers became less relevant. For students from higher social backgrounds, regional study opportunities and the local labour market structure never played a role in their decision to enrol for university. This finding is strongly in line with the overall idea of social status reproduction, i.e., regardless of local opportunities, students from higher social background opt for the academic path to reproduce their social status.

Bearing in mind the limitations discussed above, we believe that our findings are relevant for research and policy for three reasons. First, we expand on previous research that showed that the spatial accessibility to higher education institutions influences the chance to enter university (Flannery and Cullinan 2014; Sá et al. 2004, 2012; Turley 2009; Weßling and Bechler 2019) by showing school graduates are particularly responsive to regional conditions when they are from a lower social background. In doing so, we relate regional research with research on social inequality in the access to university (e.g., Hillmert and Jacob 2010; Holm and Jæger 2008; Müller et al. 2009; Schindler and Lörz 2012; Tieben and Wolbers 2010). Thus, we show that the region as a dimension of (in)equality is worth investigating further in a life course perspective. Hence, policy makers and practitioners should be made aware of how much and for whom inequalities in regional living conditions can affect individual social inequality. Second, in linking the transition to university with the decision to move away to study, we relate to research showing that life course decisions are intertwined (Mulder and Clark 2002) and that there is a strong the preselection in the first step is already: students from lower social backgrounds do not even consider pursuing university education when this is only possible away from home. Third, we show that temporal developments and regional conditions are not independent from each other, and that their interrelations are fruitful to investigate and to understand when analysing social inequality across the life course.

Overall, our findings are specific to the German context with its strong VET system, in which the rather untypical alternative of VET is relevant also for students, who obtained a university entrance certificate. Moreover, the extension of UAS in the course of the educational expansion is a relevant aspect that drive our findings on the temporal developments. An interesting possible avenue for future research is to apply comparable analyses to countries with similar VET systems and a comparable development of the educational expansion such as the Netherlands or Switzerland.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/socsci12050303/s1, Table S1. Correlation between regional variables; Table S2. Discrete-time event history LPM on the probability of entering university within the first five years after school graduation (AME); Table S3. LPM on the probability of staying in the home region to study (AME); Figure S1a–f. Predicted probabilities; interaction effects on probability of entering UAS (vs. VET or uni); Figure S2a–g. Predicted probabilities; interaction effects on probability of entering VET (vs. UAS or uni).

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Informed Consent Statement: Not applicable.

Data Availability Statement: In this study secondary data from external sources were used. The data is available via the responsible institutions. Data sources are cited throughout the study.

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Conflicts of Interest: The author declares no conflict of interest.

Notes

1 Although both, research-oriented universities and UAS, are considered tertiary education we are treating them separately because we expect that the access to universities should be particularly influenced by the availability of university infrastructure in the region. Moreover, UAS and VET are regionally decentralised compared with universities, which should increase the regional availability of universities. However, to provide a complete picture, we present the outcomes for VET and UAS as dependent variables in the Supplementary Materials.

2 Universities offer additional opportunities for individuals without Abitur to enroll in university education, e.g., individuals with a vocational certificate at the level of a master craftsman or similar, with a given amount of work experience.

3 The Zentralstelle für die Vergabe von Studienplätzen (ZVS), now: Stiftung für Hochschulzulassung (SfH), allocated study places centrally until 2008.

4 This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort Adults, doi:10.5157/NEPS:SC6:12.1.0. From 2008 to 2013, NEPS data was collected as part of the Framework Program for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg in cooperation with a nationwide network.

5 Municipalities correspond to the European classification of LAU-2, or local administrative units (Eurostat 2016).

6 We compared the data with information on travel time via google map requests for a subsample of 1000 municipalities in order to compare between travel times by car, public transport and distance. The overall correlation is about 0.8.

7 State 2013 (BBSR 2015).

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