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# School-to-Work Transitions under Unequal Conditions: A Regionalised Perspective on the 'Discouraged Worker' Hypothesis

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**Abstract:** Against the background of considerable regional disparities, we test the "discouraged worker" hypothesis, which postulates that poor regional socioeconomic conditions foster students' aspirations for more education, ultimately leading to an extension of their educational careers. Our two dependent variables are (i) whether students aspire to prolong their general school careers or enter vocational training and (ii) whether they in fact prolong their school careers. To that end, we link regional-level data to individual-level data from the German National Educational Panel Study (NEPS). To describe regional conditions adequately, we illustrate geographical patterns in socioeconomic conditions relevant for school-to-work transitions (e.g., labour market conditions and availability of vocational training opportunities). We compare two operationalisations of regional areas: (i) administrative districts and (ii) public transport areas. Our results show that students are more likely to aspire to prolong their general school careers in socioeconomically deprived regions. Moreover, the effects are stronger when school-based vocational training opportunities are scarce. The effects on actual transitions vary according to the school track attended and the availability of educational alternatives in the general school system. Finally, the operationalisation of regions varies regarding effect sizes and corresponding levels of statistical significance.

**Keywords:** school-to-work transition; discouraged worker effect; regional data; MAUP; NEPS; Germany



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## 1. Introduction

Successful completion of vocational or academic training is crucial for young adults to gain access to stable employment. While research has extensively examined the role of individual characteristics (e.g., abilities, social or ethnic background and gender) for inequalities in education and training, the role of regional contexts in which individuals live has been studied less.

We know from previous research on (regional) context effects that poor economic conditions can have a positive impact on individuals' investments in (more) education. Some studies refer to this phenomenon as 'counter-cyclicality', meaning that education becomes more attractive during economic downturns (Albert 2000; Dellas and Sakellaris 2003; Salazar et al. 2020; Sievertsen 2016). Others describe it as the 'discouraged worker effect' (DWE). In several studies, the DWE has been used specifically to describe the impact of regional conditions in addition to temporal (business cycle) socioeconomic conditions (e.g., Biggart and Furlong 1996; Tumino 2013).

A blind spot in analysing the DWE is that most empirical studies have assessed the effect of socioeconomic conditions (on the regional level) on individuals' actual educational

transitions, whereas the underlying theoretical argument would suggest studying young adults' intentions or both intended and fulfilled transitions. The DWE postulates that poor (regional) socioeconomic conditions foster students' aspirations for (prolonged) general education, which subsequently leads to actual investments in education and higher-level educational degrees at the end of compulsory school. A few very recent studies have incorporated this theoretical argument by focusing on young adults' educational and occupational aspirations (Finger 2016; Flohr et al. 2020; Hartung et al. 2022).

In this paper, we continue this strand of research by analysing both students' aspirations and their actual attainments. As it is well known that regional conditions are not equally important to everyone, we consider heterogeneous influences of students' school tracks and institutional preconditions under which the DWE can be expected to be particularly pronounced. Existing evidence on effect heterogeneities allows us to reach the conclusion that regional conditions are more relevant to those who are disadvantaged (i.e., who are in lower school tracks or are from less advantageous social backgrounds). Mostly because they are less spatially mobile, they are more likely to be affected by poor socioeconomic and infrastructural conditions in their region of residence (e.g., Flohr et al. 2020; Hartung et al. 2022; Weßling and Bechler 2019).

For a comprehensive illustration of the regionalised "discouraged worker" argument, it is reasonable to make use of panel data linked with relevant context information. This allows us to capture the effects of regional conditions on young adults' intentions and the effects on the realisation of these intentions. Data from the National Educational Panel Study (NEPS) Starting Cohort 3 (NEPS-SC3) and Starting Cohort 4 (NEPS-SC4) provide an adequate empirical basis. We link individual-level NEPS data with information on regional labour markets, the availability of vocational schools and the size of school leaver cohorts in the region. We apply different operationalisations of "regions": we compare a conventional operationalisation based on administrative boundaries with an operationalisation of regional indicators within public transport areas to assess if empirical results are sensitive to the mode of aggregation. Additionally, we focus on effect heterogeneities regarding institutional indicators (i.e., the attended school track, the availability of educational alternatives such as Gesamtschule (comprehensive school track) or the existence of a Hauptschule track (lowest secondary school track) in the respective federal state).

Following the DWE argument, our research questions are as follows:

> *Are young adults in regions with poor employment and vocational training opportunities more likely to aim at prolonging and, subsequently, at actually prolonging their general school careers? Are effects moderated by vocational training and school opportunities in the region?*

## 2. Institutional Background

We focus on students at the end of compulsory secondary school in Germany, which typically lasts until the end of 9th or 10th grade (students are, on average, aged 15 through 17) and which is structured in two or three secondary school tracks, depending on the federal state. The two lower secondary school tracks are Hauptschule (lower-level secondary school) and Realschule (intermediate-level secondary school).

Hauptschule is designed for students with more practical abilities, while Realschule is designed for students who are in the middle range of academic achievement. Some federal states combine Hauptschule and Realschule. Students graduating from these two tracks are typically bound for vocational education and training (VET). The Gymnasium represents the academic track leading to a university-entrance qualification (Abitur). Students who graduated from Hauptschule or Realschule have, in addition to VET, the opportunity to continue in general secondary education. In addition to tracked secondary schools, a number of federal states offer Gesamtschule, a comprehensive school that combines some or all types of tracks.

VET in Germany comprises (i) school-based vocational training, (ii) a special "transition system" and (iii) apprenticeship training. For an overview of the German school and VET system see Figure 1.

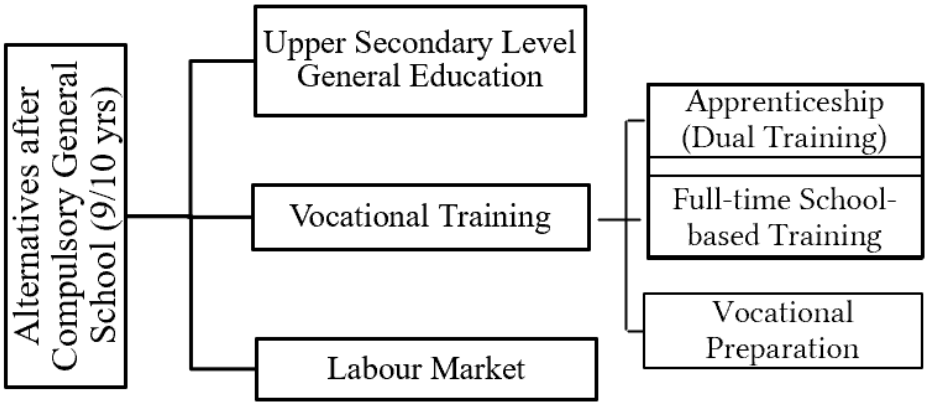



**Figure 1.** Stylised model of the German secondary education and training system.

(i) School-based VET is offered at vocational schools. It typically lasts two to four years and leads to a vocational qualification. The majority of school-based VET occupations are in the medical and social care sectors. To enrol in these training types, a Realschule degree is often required, and in practice, a considerable share (26%) of trainees even hold an Abitur (BIBB 2020, p. 178).

(ii) The "transition system" comprises vocational preparatory courses, which provide individuals with the skills and knowledge needed to enter an apprenticeship. These courses typically last one year but do not provide young adults with a formal vocational qualification. In fact, participation rates have declined since the mid-2000s, but the high share of youth in the transition system has remained a controversial issue (Severing 2010).

(iii) Apprenticeship training, also known as dual education, is the most common path for young people to obtain a vocational qualification. In 2020, approximately 45% (around 500,000 individuals) of those eligible for VET started apprenticeships (BIBB 2020, p. 123). This combines on-the-job training with classroom instruction, allowing individuals to gain both practical experience and general knowledge in a specific occupation. Apprenticeships in Germany typically last three to four years and are available in a wide range of fields. Apprentices are paid by their employers for their work, but they receive a reduced rate of pay during their training period. Moreover, apprenticeships often offer a direct path into employment, with 77% of apprentices securing full-time employment with the company with which they are trained (ibid.).

German apprenticeship has been regarded as a key factor in Germany's low youth unemployment rate and high level of skills among workers. However, since apprentices have their main contract with the firm, the availability of training places is sensitive to fluctuations in market conditions (Wagner 1999). When the labour market is strong, employers are willing to invest in training, but they are less likely to do so when the labour market is weak (Muehlemann et al. 2009). This can lead to a situation in which school leavers face more competition for vacant positions, so they may need to consider alternative options, such as additional general education.

The latter is relevant not only with regard to overall labour market conditions but also when considering regional variations in the provision of training. In recent years, regions in the states of Saarland, Schleswig-Holstein and Baden-Württemberg have had the highest proportions of apprenticeship positions relative to the number of young people seeking apprenticeships, whereas in the city states of Berlin, Bremen and Hamburg, the proportions of apprenticeship positions relative to the number of young people seeking apprenticeships were the lowest (Herzer and Ulrich 2020). Moreover, data from the Federal Statistical Office

show large variations in the availability of schools that provide school-based VET. Thus, competition for training places in different types of VET is not equal across regions. As the competitive situation forms a specific basis for school leavers' intentions and transitions, this may lead to different outcomes.

## 3. Theoretical Arguments and Hypotheses

### 3.1. Regional Availability of VET Opportunities

The theoretical concept of the DWE has been introduced to explain the consequences of the limited availability of jobs and training opportunities. In its original meaning, the DWE describes that individuals temporarily endure a difficult situation in the labour market (warehouse hypothesis) by investing in education.

In recent research, the term has been used to describe the impact of macroeconomic conditions at the regional level rather than business cycle fluctuations (Finger 2016; Micklewright et al. 1990; Raffe and Willms 1989; Rice 1999). The focus has shifted towards the idea that individuals use existing educational alternatives to increase their competitive advantage in the labour market (Biggart and Furlong 1996; Hartung et al. 2022; Tumino 2013; van Ham et al. 2001). This implies that it is reasonable to analyse graduates' educational aspirations and intentions rather than their fulfilled transitions.

Apprenticeships in the dual system cover more than 85% of trainees (BIBB 2020). Since dual training in Germany is provided and financed by firms, training places are scarce when the regional economic situation is difficult. In particular, enrolment in VET is negatively associated with poor labour market conditions (e.g., Brunello 2009; Kleinert and Jacob 2012; Méndez and Sepúlveda 2012; Muehlemann and Wolter 2011; Weßling et al. 2015). Moreover, young adults perceive the overall regional labour market conditions as a meaningful indicator of their chances in the training market.

Following from this, we hypothesise that

**H1.** *Young adults in regions with poor labour-market conditions are more likely (i) to aim at prolonging and (ii) subsequently to actually prolong their general school careers.*

Part of the German VET system is school-based VET. By considering both the regional labour market conditions and the relative number of available school-based training places in the region, we represent the German VET system more comprehensively. Since market dependencies play a larger role in dual training than in school-based training, and school-based VET comprises only a minority of all VET places, we expect school-based VET opportunities in the region to play a moderating role by strengthening or weakening the effect of unemployment in the region. Thus, a shortage in the availability of dual VET opportunities in the region is particularly critical and leads to increased participation in general schooling when school-based VET options are limited.

Our corresponding hypothesis is as follows:

**H2.** *The effect of regional labour-market conditions on (i) aiming at prolonging and (ii) actually prolonging the general school career is stronger when full-time school-based training places are scarce.*

### 3.2. Heterogeneity in the Influence of Regional Socioeconomic Conditions

Research has shown that regional conditions are not equally relevant for all students; low-performing students and students in lower school tracks, as well as students from lower socioeconomic backgrounds, are more strongly affected by scarce opportunity structures in the region. This is mainly because they have a competitive disadvantage within their regions. At the same time, they are equipped with fewer resources to leave their regions by moving away or by commuting (Clark 2002; Gibbons and Vignoles 2012; Hartung et al. 2022; Hillmert et al. 2017).

The type of degree or school track attended is an important signal on the training market (Blommaert et al. 2014; Di Stasio 2014; Protsch and Solga 2015). Students are obviously aware of this; thus, the currently attended school track has a major impact on

educational aspirations (Buchmann and Park 2009). This impact is also dependent on regional conditions. Research has shown that students anticipate their relative chances in the training market and try to balance their relative position and skills with the regional opportunity structure (Hartung et al. 2022). In this process, students from higher school tracks are expected to hold a competitive advantage over those from lower tracks, which matters particularly when VET opportunities are limited.

Following from this, we hypothesise:

**H3.** *The effect of poor regional labour-market conditions on (i) aiming at prolonging and (ii) actually prolonging the general school career is stronger for students in lower school tracks.*

Beyond students' individual educational status, we expect characteristics of the education system to modify the influence of regional socioeconomic conditions on the intention to prolong the general school career and its realisation. We make use of differences across federal states to examine whether or not the DWE is observed equally under different institutional conditions.

An important differentiation in the decision-making situation of young adults is the availability of a comprehensive school (*Gesamtschule*) in their respective federal state. The *Gesamtschule* allows young adults, to some extent, to circumvent track placement and postpone the decision on which school track to attend or which degree to attain. The *Gesamtschule* makes it easier for young adults to prolong their school careers after successfully completing *Hauptschule* or *Realschule*, as switches between tracks can be made within one school. Thus, in federal states with a *Gesamtschule* option, students should be more likely to prolong their educational careers when training options are scarce.

Following from this, our fourth hypothesis is:

**H4.** *The effect of regional labour-market conditions on (i) aiming at prolonging and (ii) actually prolonging the general school career is stronger when a Gesamtschule option is available in a federal state.*

### *3.3. Spatial Aggregations*

We address the more technical issue of spatial aggregations, which relates to the modifiable areal unit problem (MAUP). The MAUP refers to the results of geographical analyses that may change depending on the size, shape and location of the spatial units used in the analysis. It typically arises when datasets are aggregated or disaggregated into different spatial units, such as census tracts, zip-code areas or administrative boundaries (Fotheringham and Wong 1991; Kwan 2012).

Empirical research has shown that aggregations, according to administrative boundaries, do not always realistically reflect the areas in which relevant social processes take place (e.g., Anselin and Florax 2012; Weßling and Bechler 2019; Weßling et al. 2015; Wicht et al. 2019).

We illustrate the problem of administrative boundaries that often do not capture theoretically relevant areas, for example, when searching for a training position, by presenting and comparing two different operationalisations of regional contexts. We compare the results for more conventional operationalisation in administrative districts with an operationalisation that aggregates regional information within public transport areas. We compare public transport areas with administrative districts to assess which of these operationalisations provide a more realistic reflection of young adults' action spaces. Moreover, most students are still underage when they graduate from compulsory secondary school. Therefore, the public transport areas rather than areas defined by car travel times may be realistic spatial zones in which potential opportunities are considered and commuting takes place.

## 4. Data and Methods

### *4.1. Survey Data: The German National Educational Panel Study (NEPS)*

Our analyses are based on data from NEPS-SC3 and NEPS-SC4 (Blossfeld and Roßbach 2019; Blossfeld et al. 2011; NEPS Network 2021, 2022).[1] This nationally representative panel

study began in 2010 and followed a sample of fifth graders (SC3) and ninth graders (SC4) through school education and into vocational training or higher education. The datasets are well suited for our research because they offer reliable information on students' aspirations during schooling and on their subsequent educational choices. The datasets include a wide range of students' background characteristics, and they can be linked to geographical administrative data, enabling us to examine the effects of regional socioeconomic conditions. Students who attend upper-level secondary school (*Gymnasium*) were excluded because they did not necessarily face the decision to stay in school at the time of their first potential graduation in grade 10. They can actively decide to leave school, but in most cases, they continue the standard pathway of general schooling until grades 12 or 13. We also do not consider students in special needs education. By pooling two cohorts of the NEPS, we can increase the otherwise limited number of cases.

Our dependent variables are as follows:

(i) Aspirations to continue education in general school. This information was collected in the last regular school year (i.e., at latest in the year 2011 for SC4 and in the year 2015 for SC3.

(ii) Actual continuation of education in general school compared with entering VET after the last regular year of school.

We focus on students' educational aspirations shortly before graduation from general secondary school. Depending on the federal state, *Hauptschule* and *Realschule* can last for a regular period of either 9 years or 10 years of schooling. Therefore, we needed to identify the survey wave in which students attended the last regular year of schooling. The NEPS datasets do not contain information on school duration. However, since SC3 and SC4 are samples of school classes, we indirectly determine the regular end of the school career, assuming that schooling is finished if the original class in the respective school form is not represented in the next wave of the main sample (follow-up cases after leaving the initial school class can be differentiated from school classes in the regular sample).

There are around 7% of individual cases in the NEPS-SC4 with a regular school duration of 9 years in 2010, but only around 1% in NEPS-SC3 in 2014. This is mainly because German federal states have increasingly suspended the *Hauptschule* or increased its mandatory duration from 9 to 10 years.

On the individual level, we control for school grades in mathematics and German (using a reversed coding so that 1 = insufficient . . . 6 = very good), migration background (0 = native, 1 = the student or one of the parents is of foreign descent), socioeconomic background (at least one parent has an academic degree), sex and age.

For our moderation hypotheses, we consider the attended school track and whether the federal state in which the school is located provides a *Gesamtschule* option in its secondary school system.

The initial sample comprised 16,921 cases in NEPS-SC4 and 7610 cases in NEPS-SC3. The restriction to students in *Hauptschule*, *Realschule* and *Gesamtschule* entails a significant drop in case numbers since 35% of all respondents across the two staring cohorts attend *Gymnasium*. We lose another 4750 cases due to missing regional information, which is either because there are no data available on the school-based VET indicator in the regions or the linkage procedure has failed due to territorial changes over time (for a detailed description on data linkage, see the section below). In addition, there are cases without valid information on parental education (4800), age (1549) and school performance (470).

We link the NEPS data with regional information from various sources. The link variable in the NEPS is place of residence; if this is not available, we use the place of the school. Due to missing values in the location variables and problems with the matching of administrative data and NEPS data, we lose approximately 30% of the remaining sample. These matching problems occur due to differences in the time reference of the survey and the administrative data (see the detailed description of the data linkage below).

### 4.2. Administrative Data: Regional Information

Data on the central independent variables on the regional level stem from the Statistical Office, the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) and an open-source repository. In our analyses, we capture the regional unemployment rate (in percent) as our central independent variable. We use the unemployment rate to represent the overall regional economic situation and the current availability of VET places in the apprenticeship system.

We chose unemployment rates over the actual availability of VET places for two reasons: First, unemployment is the most visible indicator of economic conditions in the region, and we know from prior research that young adults are aware of the overall regional situation when evaluating their educational plans (Hartung et al. 2022). Second, as shown in Table A1 in the Appendix A, the unemployment rate at the regional level is highly correlated with the availability of VET places (Pearson's R = 0.76), measured as the ratio between the number of applicants and the available places in the administrative districts. The unemployment rate at the level of administrative districts is available via the INKAR platform provided by the BBSR (BBSR 2023).

In addition to the regional unemployment rate, we construct an indicator that represents the availability of school-based VET places. We use the ratio between the number of students in full-time school-based training and the number of all students in any form of VET programme. The data on students in school-based VET are available via the Federal Statistical Office. We prepared all regional variables for the respective time points that represent the last year of schooling in the two NEPS cohorts (i.e., we matched regional data from the year 2010 to the NEPS-SC4 and regional information from 2014 to NEPS-SC3).

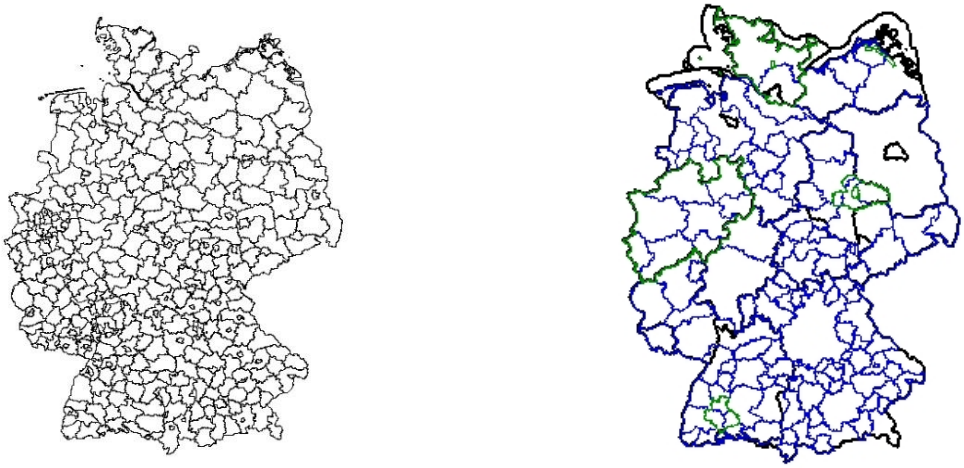
Due to a reform in the transition system of VET at the federal state level, it is not possible to obtain numbers of students in full-time, school-based VET before 2015 for North Rhine-Westphalia (Euler 2022). Therefore, in these cases, we decided to calculate all models with contextual data from 2015. In addition, we assessed the changes in the share of school-based VET students over time for all federal states in which school-based VET data were available over time; we found no considerable changes.

As a further control variable at the regional level, we include the competitive situation on the supply side in the region using the share of *Realschule* and *Gymnasium* graduates in the population, which is again provided by the Federal Statistical Office. We use the 10% of regions with the highest share of *Realschule* and *Gymnasium* graduates.

In general, when linking administrative regional data with survey data, a suitable geographical link variable is required. This can be a geocode or an area location code. Several challenges typically appear when combining the two sources of data (e.g., territorial statuses that are inconsistent over time). To illustrate spatial areas that are realistically associated with everyday practices, we use not only administrative districts but also public transport areas in which we aggregate the three regional variables.

A public transport area (in German, "Verkehrsverbund") is an organisational entity that connects various modes of transportation, such as buses, trams, subways, commuter trains and trains, within a specific region or area. Although public transport areas vary in their spatial extent, they typically operate at a regional or interregional level, encompassing multiple transportation companies that collaborate to coordinate public transit in their respective areas. Through the public transport area network or association, passengers can use a single ticket or have monthly or yearly tickets to access all modes of transportation within a single transport area. The main objective of a local public transport association is to efficiently organise public transportation within a defined regional area.

The data on public transport areas stem from an open-source repository (https://github.com/highsource/verbundkarte, accessed on 3 June 2023) and are available for the territorial state as of 2018. As public transport areas comprise several districts, we observe no loss of data due to the recoding to the NEPS territorial state of 2013. There are 102 public transport areas in Germany, which comprise between 1 and 30 administrative districts each. Figure 2 depicts maps of administrative districts and public transport areas.



(i) (ii)

**Figure 2.** Administrative districts and public transport areas. Data: (BBSR 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023. (**i**) Administrative districts, territorial state 2013, n = 412; (**ii**) public transport areas, territorial state 2018, n = 102; black = federal state borders; blue = public transport zones; green = umbrella association, i.e., comprising several transport areas; black = no public transport areas.

An overview of the distribution of the dependent variables and the control variables from the survey data and the administrative sources is provided in Table 1.

**Table 1.** Description of variables. Data: NEPS-SC3, SC4; (BBSR 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023, (Destatis 2023).

| | **Mean (SD), Min–Max/%** |
|---|---|
| Unemployment rate in district | 5.5 (2.9), 1.0–15.0 |
| Unemployment rate in public transport area | 5.9 (2.3), 2.1–13.1 |
| Share of school VET in district | 0.08 (0.05), 0.004–0.402 |
| Share of school VET in public transport area | 0.07 (0.03), 0.014–0.185 |
| High share of RS/ABI graduates in district | 7.6% |
| Gesamtschule in federal state | 59.5% |
| NEPS Cohort: SC4 in 2010 | 80.3% |
| NEPS Cohort: SC3 in 2014 | 19.7% |
| Attended school track: *Hauptschule* | 26.9% |
| Attended school track: *Realschule* | 38.9% |
| Attended school track: *Gesamtschule* | 34.2% |
| Sex: female | 46.9% |
| Migration background: student or at least one parent of foreign descent | 20.1% |
| Parents: at least one w/higher education | 16.75% |
| Age in years | 16.5 (0.7), 14–19 |
| Grade in German (rev.) | 4.1 (0.8), 1–6 |
| Grade in Math (rev.) | 4.1 (1.0), 1–6 |
| N | 4115 |

In Figure 3, the two regional variables on the availability of VET opportunities (i.e., the unemployment rate and the share of students in full-time, school-based VET in the region) have been aggregated in administrative districts. From a visual inspection, we find established East–West patterns concerning the unemployment rate. In particular, we can see a low share of school-based VET in the southwest of Germany (i.e., the federal state of Baden-Württemberg). This might be due to the strong manufacturing sector, which is

associated with a high share of dual apprenticeship positions and provides a dominant alternative to school-based training.

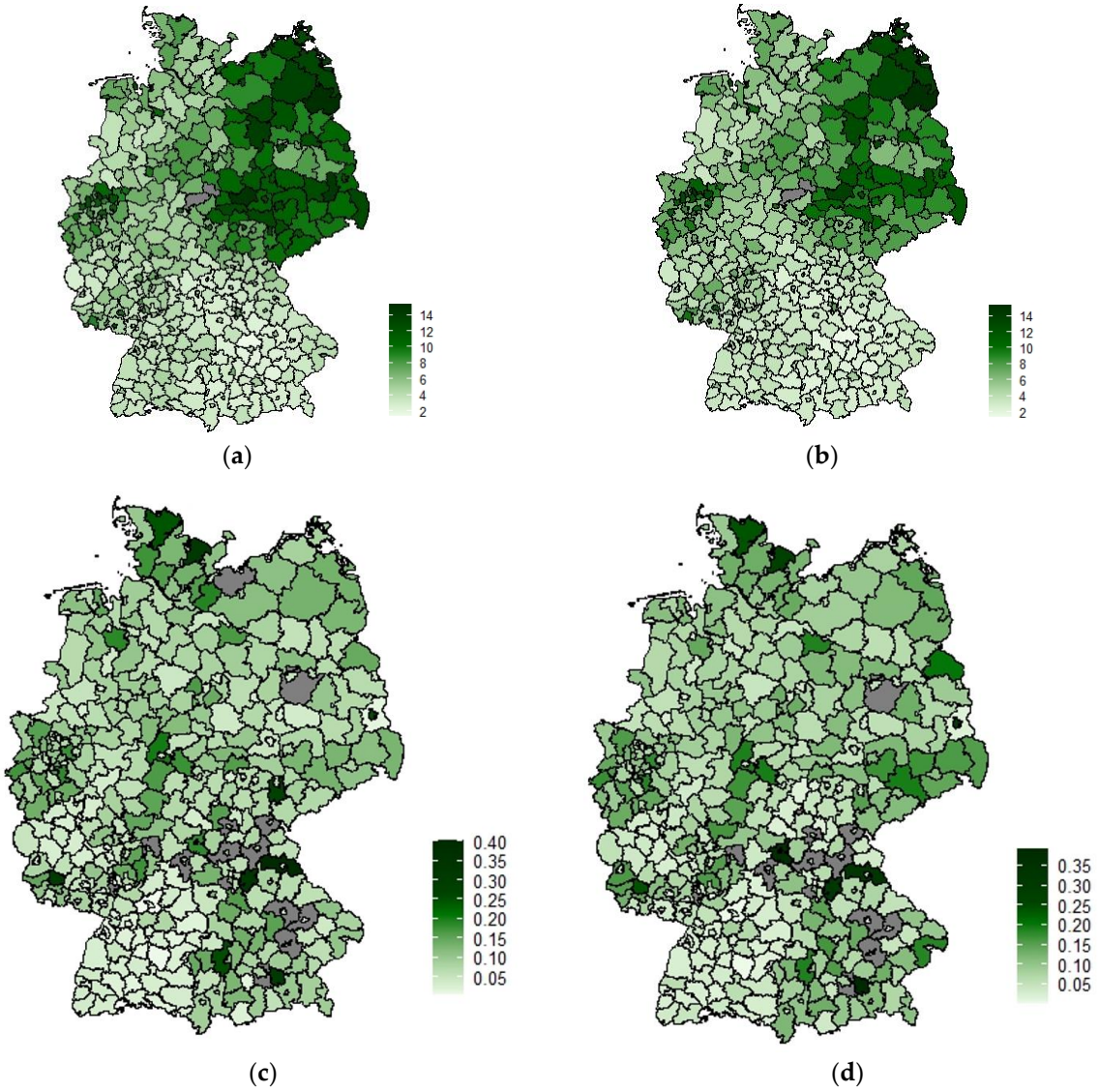



**Figure 3.** Regional variables aggregated in administrative districts. Source: (Destatis 2023; BBSR 2023); (**a**) Unemployment rate (percent) in 2010; (**b**) Unemployment rate (percent) in 2014; (**c**) Students in full-time school-based VET among all trainees in 2010 (percent); (**d**) Students in full-time school-based VET among all trainees in 2014 (percent).

Missing values are displayed in grey. There are only two districts for which unemployment information is not available because of differences in territorial statuses between the NEPS survey data and the administrative data (see section below for details on data linkage). Missing values in the variable on the availability of school-based VET places are due to the fact that there were either no vocational schools in the respective district or that the information was not reported to the statistical office by the schools or school authorities. Information on vocational schools is generally limited in Germany.

Figure 4 displays the regional variables in the public transport areas. For this, we created a population-weighted average for each public transport area based on the available information at the administrative district level. We find the unemployment patterns to be clearly divided between East and West Germany. Again, we observe little school-based VET in Baden-Württemberg.

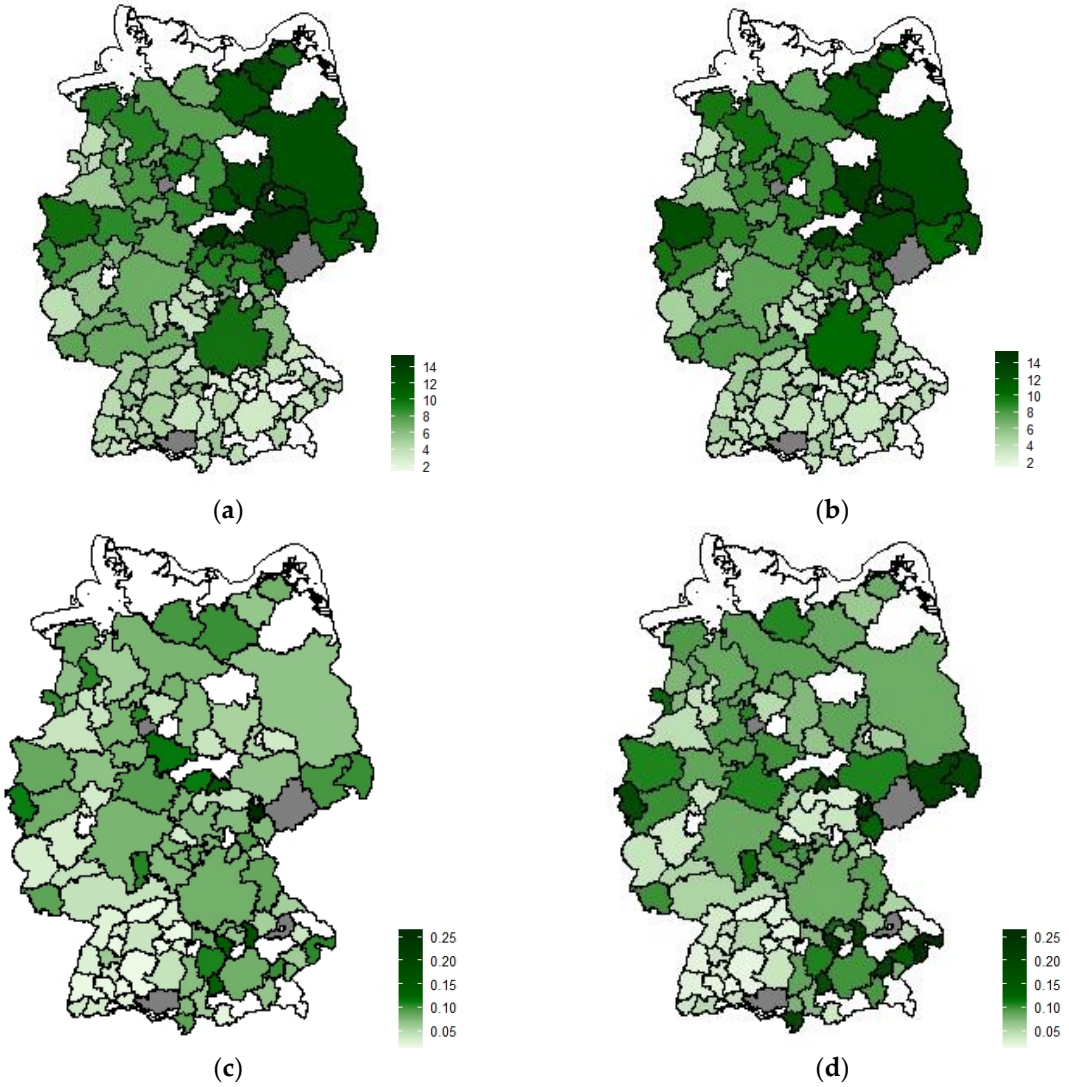



**Figure 4.** Regional variables aggregated in public transport areas. Source: (Destatis 2023; BBSR 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023. (**a**) Unemployment rate (percent) in 2010; (**b**) Unemployment rate (percent) in 2014; (**c**) Students in full-time, school-based VET among all trainees in 2010 (percent); (**d**) Students in full-time, school-based VET among all trainees in 2014 (percent).

Public transport data are rather unconventional for this specific application and have rarely been used at the regional level in the aggregation of socioeconomic information. Therefore, we describe the data in greater detail. To this end, we differentiate missing values into grey and white areas. White areas are the areas where no public transport zones exist, and grey areas are the areas where no data for existing public transport zones were available. Although several options for imputation are conceivable, we used public transport zones in the present form. If no transport zone existed or no transport zone data were available, we could have used district data or averages across districts within public transport zones. However, as discussed above, we aim to capture the conceptual idea behind public transport areas, namely that young adults are likely to consider their public transport as a space in which commuting is possible for them. This should be particularly the case when student or trainee tickets are available for public transport areas.

In Table A1 in Appendix A, we provide an overview of correlations between all regional variables that we use for our analyses on the different aggregation levels and for the two time points. Additionally, we provide correlations for the availability of dual

VET places in the region to show that the unemployment rate represents a valid proxy for capturing dual VET opportunities in the region.

### 4.3. Linking Survey Data with Administrative Regional Data

In the NEPS, a linkage with regional data is possible via the eight-digit code of administrative districts (*Amtlicher Gemeindeschlüssel*). In 2022, there were 106 independent cities and 294 administrative districts in Germany. Administrative districts vary considerably in area and population size. In the federal state of Bavaria, there are 71 districts and 25 cities, which are by far the highest numbers of districts within a federal state. Between 30,000 and 50,000 inhabitants live, on average, in smaller districts, whereas Hamburg and Berlin are independent cities with more than 2 and 4 million inhabitants, respectively.

Location information in the NEPS starting cohorts corresponds to the territorial status of 2013, which means that external regional data that do not correspond to this status need to be recoded. This concerns territorial changes (i.e., splits and mergers of districts), and if not considered, administrative districts that underwent changes will be missing. There are no problems in cases where two or more districts are merged to form a new district because regional information can be weighted by population size and combined to represent the new district. However, if administrative districts are split, it is more difficult to adjust the data, and respective districts are either missing from the analysis or they can be approximated by a weighting procedure (for a detailed description, see Weßling and Wicht 2015).

Depending on the starting cohort, the NEPS provides several location information to which external data can be merged (e.g., place of birth, place of residence or place of school). The place of residence at the end of compulsory schooling and during the last years of schooling is the relevant location for us. However, this variable contains a large proportion of missing values. Therefore, we use the place of the secondary school whenever information about the place of residence is not available.

### 4.4. Analytical Methods

We apply linear regression techniques to analyse both outcomes. Since they are measured as binary variables, we apply a linear probability model (LPM). The coefficients in an LPM can be interpreted as the change in the probability of a defined qualitative event given a one-unit change in the independent variable, holding all covariates fixed (Wooldridge 2006). The main advantages of LPMs compared with generalised linear models lie in their simple estimation and intuitive interpretation. Due to problems of heteroskedasticity, we calculated the LPMs with robust standard errors.

If the focus of the analysis is less on the overall prediction but more on the respective impact of explanatory factors, LPM provides results that are comparable with generalised linear models (Battey et al. 2019). A major problem with generalised linear models that can be avoided by using LPM is the difficulty of interpreting interaction coefficients (Karaca-Mandic et al. 2012).

We use sampling weights that are provided by the NEPS (Steinhauer et al. 2016) to avoid potential biases. First, missing information about parents' education or educational aspirations might be systematic. Second, since the NEPS is a sample of students in school classes, the end of general schooling is a major reason for (systematic) sample attrition. In our sample, individuals are initially distributed among 253 school classes in SC3 and 546 classes in SC4. Our weighting procedure also accounts for this clustered sampling design.

To avoid discrepancies between the analytical samples, we analyse educational outcomes only for the cases that previously had valid information on educational aspirations.

## 5. Results and Discussion

### 5.1. Regional Conditions and the DWE

In the first analytical step, we ran LPMs in a stepwise model setup to test our first hypothesis, in which we stated that high unemployment in the region increases young adults' aspirations for staying in general school, compared with entering VET.

In Tables 2 and 3, we present the LPM estimates. Table 2 refers to regional variables aggregated in administrative districts; Table 3 shows the results for regional variables aggregated in public transport areas. We distinguish between the type of school that students attend and run separate models for students in *Gesamtschule* and students in *Hauptschule* or *Realschule*. In the first six models, the results for students in *Gesamtschule* are presented, and in models 7–12, the results for students in *Hauptschule* and *Realschule* are shown. Under (i), results for our first dependent variable (i.e., aspirations to stay on in school) are presented, and (ii) denotes analyses for the second dependent variable (i.e., the actual transition to further general schooling).

We present the statistical effect of primary interest (i.e., the effect of regional unemployment on aspirations and transitions) in the first row. It is printed in bold if it is statistically significant ($p < 0.05$). Without adding any further controls, we find a statistically significant ($p < 0.001$) negative association between the regional unemployment rate and aspirations for continuing in general school for students who attend *Gesamtschule* (Table 2, model 1). There are only a few changes if we control for individual-level covariates (Table 2, Model 2). However, when controlling for the full set of individual-level and regional-level covariates, this effect is no longer statistically significant, indicating that *Gesamtschule* students are not more (or less) likely to aim to stay in school to avoid the VET market when the regional labour market conditions are poor. We find no significant association between regional labour market conditions and *Gesamtschule* students' actual transition chances (Table 2, Models 4–6). Overall, it is plausible to find no or smaller effects for students in *Gesamtschule* compared to students in *Realschule* or *Hauptschule*. In *Gesamtschule*, all tracks and school forms are combined in one school; thus, students are able to proceed to the next higher level more smoothly.

In support of our first hypothesis, we find that *Hauptschule* and *Realschule* students' aspirations to stay in the general school system, compared with entering VET, are positively associated with poor regional labour market conditions (Table 2, Models 7–9). The statistical effect is robust in its significance level and increases when covariates are added to the model. The statistical effect in Model 9 implies that the role of unemployment is not small: the predicted probability of aspiring to stay in general school versus to enter VET is 15% in a region with an unemployment rate of 5% compared to 45% in a region with an unemployment rate of about 15%.

We find no effect of the regional labour market situation on the likelihood of actually enrolling in further general education compared with enrolling in VET (models 10–12). This finding speaks to the basic argument of the DWE, which postulates that students are discouraged in their intentions to enter a poor labour market. Thus, poor regional conditions seem to be less about chances in the VET market and more about the anticipation of chances.

In Table 3, we provide the same models as in Table 2, but now, the regional variables are aggregated within public transport areas and not within administrative districts. Contrary to our expectations, the results are less clear when the data are aggregated in public transport zones. Only for students in *Gesamtschule* do we find a negative association between regional unemployment and aspirations for further general schooling, which becomes statistically insignificant when regional controls are added.

**Table 2.** Linear probability models for (i) aspirations to continue in general school versus entering VET and (ii) transition to further general school versus entering VET, with regional variables aggregated in administrative districts.

| | ***Gesamtschule*** | | | | | | ***Hauptschule/Realschule*** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **(i) Aspirations** | | | **(ii) Transition** | | | **(i) Aspirations** | | | **(ii) Transition** | | |
| | **1. Unemp.** | **2. Unemp+ Indv.** | **3. Unemp+ Indv.+ Context** | **4. Unemp.** | **5. Unemp+ Indv.** | **6. Unemp+ Indv.+ Context** | **7. Unemp.** | **8. Unemp+ Indv.** | **9. Unemp+ Indv.+ Context** | **10. Unemp.** | **11. Unemp+ Indv.** | **12. Unemp+ Indv.+ Context** |
| Regional unemployment rate (percent) | **−0.033 ** (0.002)** | **−0.029 ** (0.002)** | −0.006 (0.637) | −0.005 (0.709) | −0.006 (0.605) | −0.011 (0.469) | **0.016 ** (0.032)** | **0.033 ** (0.002)** | **0.031 ** (0.008)** | 0.015 (0.182) | 0.012 (0.270) | 0.010 (0.402) |
| Attended school track: *Realschule* (ref.: *Hauptschule*) | | | | | | | 0.086 * (0.024) | 0.113 ** (0.004) | 0.104 ** (0.007) | 0.026 (0.562) | 0.026 (0.559) | 0.019 (0.679) |
| Survey year: 2010 (NEPS-SC4) (ref.: 2014 (NEPS-SC3)) | | −0.009 (0.895) | −0.002 (0.975) | | 0.356 *** (0.000) | 0.395 *** (0.000) | | 0.025 (0.621) | 0.058 (0.253) | | −0.114 * (0.043) | −0.146 * (0.032) |
| Sex: female (ref. male) | | 0.013 (0.797) | 0.011 (0.817) | | 0.032 (0.486) | 0.017 (0.708) | | 0.073 * (0.014) | 0.074 ** (0.010) | | 0.078 ** (0.006) | 0.077 ** (0.005) |
| Migration background: student or at least one parent of foreign descent (ref. no migration background) | | 0.161 ** (0.006) | 0.093 (0.097) | | 0.154 ** (0.004) | 0.110 * (0.030) | | 0.102 ** (0.003) | 0.112 *** (0.001) | | 0.079 * (0.021) | 0.072 * (0.040) |
| Parents: at least one with higher education | | 0.137 ** (0.003) | 0.105 * (0.015) | | 0.062 (0.259) | 0.044 (0.378) | | 0.096 * (0.035) | 0.095 * (0.034) | | 0.075 (0.844) | 0.070 (0.380) |
| Age in years | | −0.122 *** (0.000) | −0.111 *** (0.000) | | −0.065 * (0.027) | −0.065 * (0.025) | | −0.085 *** (0.000) | −0.081 *** (0.000) | | −0.037 * (0.019) | −0.041 * (0.049) |
| Grade in German (reversed coding 1−6) | | 0.111 *** (0.000) | 0.111 *** (0.000) | | 0.116 *** (0.000) | 0.107 *** (0.000) | | 0.111 *** (0.000) | 0.106 *** (0.000) | | −0.014 (0.539) | −0.018 (0.395) |
| Grade in Mathematics (reversed coding 1−6) | | −0.006 (0.816) | −0.009 (0.684) | | 0.007 (0.756) | 0.007 (0.764) | | 0.038 * (0.012) | 0.038 * (0.010) | | 0.026 * (0.046) | 0.029 * (0.024) |
| Federal state with *Gesamtschule* | | | | | | | | | 0.064 (0.180) | | | −0.033 (0.709) |
| Share of students in full-time school-based training in the region (admin. district) | | | −0.080 (0.325) | | | −0.202 (0.120) | | | **−0.121 *** (0.000)** | | | −0.099 (0.058) |
| High share of students with *Realschule degree/Abitur* in the region (admin. district) | | | 0.148 (0.210) | | | −0.350 (0.058) | | | 0.022 (0.617) | | | 0.161 * (0.039) |
| Constant | 0.728 *** (0.000) | 2.185 *** (0.000) | 2.103 *** (0.000) | 0.327 ** (0.003) | 1.170 * (0.018) | 1.730 *** (0.001) | 0.249 *** (0.000) | 0.885 ** (0.005) | 0.915 ** (0.003) | 0.137 (0.051) | 0.753 * (0.046) | 0.841 * (0.022) |
| *N* | 1421 | 1421 | 1421 | 1324 | 1324 | 1324 | 2694 | 2694 | 2694 | 2546 | 2546 | 2546 |
| $R^2$ | 0.029 | 0.137 | 0.175 | 0.001 | 0.164 | 0.208 | 0.012 | 0.097 | 0.112 | 0.007 | 0.034 | 0.055 |

Displayed are linear (marginal) effects, *p*-values in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, bold: significant effects of interest; data: NEPS-SC3; NEPS-SC4; (BBSR 2023; Destatis 2023).

**Table 3.** Linear probability models for (i) aspirations to continue in general school versus entering VET and (ii) transition to further general school versus entering VET, with regional variables aggregated in public transport areas.

| | *Gesamtschule* | | | | | | *Hauptschule/Realschule* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | (i) Aspirations | | | (ii) Transition | | | (i) Aspirations | | | (ii) Transition | | |
| | **1. Unemp.** | **2. Unemp+ Indv.** | **3. Unemp+ Indv.+ Context** | **4. Unemp.** | **5. Unemp+ Indv.** | **6. Unemp+ Indv.+ Context** | **7. Unemp.** | **8. Unemp+ Indv.** | **9. Unemp+ Indv.+ Context** | **10. Unemp.** | **11. Unemp+ Indv.** | **12. Unemp+ Indv.+ Context** |
| Regional unemployment rate (percent) | **−0.061 *** (0.000)** | **−0.054 *** (0.000)** | 0.003 (0.857) | −0.025 (0.200) | −0.020 (0.274) | −0.014 (0.430) | 0.010 (0.344) | 0.017 (0.082) | 0.004 (0.692) | 0.004 (0.752) | 0.007 (0.543) | 0.011 (0.483) |
| Attended school track: *Realschule* (ref.: *Hauptschule*) | | | | | | | 0.129 ** (0.002) | 0.161 *** (0.000) | 0.155 *** (0.000) | 0.088 * (0.045) | 0.108 * (0.015) | 0.105 * (0.017) |
| Survey year: 2010 (NEPS-SC4) (ref.: 2014 (NEPS-SC3)) | | −0.112 (0.072) | −0.088 (0.141) | | −0.226 ** (0.004) | −0.267 ** (0.001) | | 0.002 (0.971) | 0.037 (0.548) | | 0.012 (0.874) | 0.009 (0.906) |
| Sex: female (ref. male) | | −0.011 (0.810) | −0.021 (0.651) | | 0.018 (0.700) | −0.004 (0.928) | | 0.063 * (0.034) | 0.065 * (0.026) | | 0.062 * (0.039) | 0.056 * (0.045) |
| Migration background: student or at least one parent of foreign descent (ref. no migration background) | | 0.046 (0.435) | 0.011 (0.838) | | 0.049 (0.474) | 0.011 (0.866) | | 0.118 *** (0.000) | 0.121 *** (0.000) | | 0.054 (0.117) | 0.049 (0.152) |
| Parents: at least one with higher education | | 0.136 ** (0.008) | 0.112 * (0.024) | | 0.150 * (0.015) | 0.130 * (0.019) | | 0.043 (0.339) | 0.038 (0.403) | | 0.028 (0.550) | 0.028 (0.548) |
| Age in years | | −0.107 ** (0.002) | −0.097 ** (0.003) | | −0.055 (0.134) | −0.052 (0.137) | | −0.089 *** (0.000) | −0.089 *** (0.000) | | −0.058 ** (0.007) | −0.065 ** (0.002) |
| Grade in German (reversed coding 1−6) | | 0.084 ** (0.004) | 0.080 ** (0.005) | | 0.092 * (0.012) | 0.088 * (0.012) | | 0.117 *** (0.000) | 0.115 *** (0.000) | | −0.006 (0.784) | −0.010 (0.612) |
| Grade in Mathematics (reversed coding 1−6) | | 0.018 (0.452) | 0.021 (0.361) | | 0.016 (0.469) | 0.013 (0.563) | | 0.030 (0.059) | 0.028 (0.077) | | 0.012 (0.382) | 0.015 (0.260) |
| Federal state with *Gesamtschule* | | | | | | | | | 0.081 (0.132) | | | −0.002 (0.970) |
| Share of students in full-time school-based training in the region (admin. district) | | | −0.809 (0.504) | | | −1.88 (0.145) | | | **−0.183 * (0.026)** | | | −0.265 (0.681) |
| High share of students with *Realschule degree/Abitur* in region (admin. district) | | | 0.016 (0.782) | | | 0.041 (0.436) | | | −0.009 (0.863) | | | 0.214 ** (0.005) |
| Constant | 1.003 *** (0.000) | 2.343 *** (0.000) | 1.996 *** (0.000) | 0.514 ** (0.002) | 1.065 (0.082) | 1.409 * (0.025) | 0.351 *** (0.000) | 1.184 *** (0.000) | 1.177 *** (0.000) | 0.185 ** (0.002) | 1.135 ** (0.002) | 1.140 ** (0.002) |
| *N* | 1142 | 1142 | 1142 | 1064 | 1064 | 1064 | 2329 | 2329 | 2329 | 2199 | 2199 | 2199 |
| $R^2$ | 0.062 | 0.148 | 0.175 | 0.012 | 0.125 | 0.173 | 0.018 | 0.112 | 0.113 | 0.011 | 0.053 | 0.054 |

Displayed are linear (marginal) effects, *p*-values in parentheses; * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$; bold: significant effects of interest; data: NEPS-SC3; NEPS-SC4; (BBSR 2023; Destatis 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023.

To map the German VET market realistically, we argue that it is important not only to capture the regional unemployment rate, which approximates the availability of VET places in the apprenticeship system, but also to incorporate the availability of full-time school-based VET. Due to the minor role of full-time school-based VET—only 10–15% of a cohort attend school-based VET—we did not specify a hypothesis for a corresponding main effect. Instead, we expected a moderating relationship between the availability of school-based VET and regional unemployment. We argue that in regions where regional unemployment is high and full-time school-based training options are scarce, the effect of regional unemployment on staying in general schools is likely to be strengthened.

To display potential moderation effects, we calculate interaction coefficients and present the linear effect of regional unemployment at specific values of the interaction variables by means of marginal effects plots. All plots refer to the corresponding full models (models 3, 6, 9 and 12 in Tables 2 and 3). We calculated them separately for students in *Hauptschule* and *Realschule* and for students in *Gesamtschule*, and we added all interactions separately to the models.

Figure 5 presents the estimated linear effects of the regional unemployment rate for specific values of the share of full-time school-based VET students. In support of our hypothesis, we find that the statistical effects of unemployment on (i) aspirations for prolonging school and (ii) actually doing so are particularly strong when the regional share of school-based VET is low. This holds for students in *Hauptschule, Realschule* and *Gesamtschule*. When aggregating the regional variables within public transport areas, we mostly find similar patterns, although the statistical associations are smaller and not statistically significant.

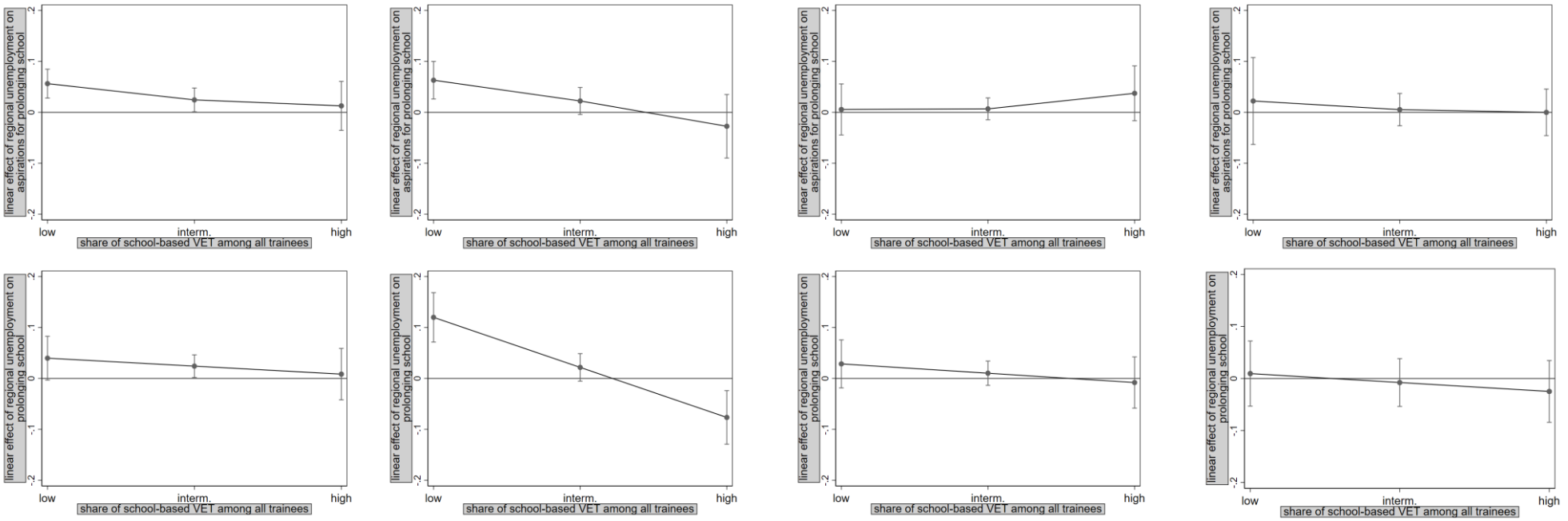
### *5.2. Heterogenous Effects of Regional Unemployment*

Research has repeatedly shown that regional conditions are not equally relevant to everyone under different circumstances. We argue along these lines and focus on the interactions between students' institutional affiliations and regional conditions regarding their impact on educational aspirations and transitions.

Figure 6 shows the differences in the effects of regional conditions by school track attended. We present the statistical effect of regional unemployment on (i) the chances of aspiring further general schooling and (ii) the chances of staying on in general schooling for students attending Hauptschule (0) versus Realschule (1). We see no statistical difference in the effect of regional unemployment on aspirations. However, we observe that Realschule students are more likely to stay in general school when unemployment in the region is high. This goes against our hypothesis, in which we expected students in the lowest tracks to be more likely to stay in school when regional socioeconomic conditions are poor and VET opportunities are scarce. This finding might be due to the fact that there are more opportunities to continue in the general school system (e.g., Gesamtschule, specialised secondary schools) for Realschule graduates, whereas *Hauptschule* graduates often enter the vocational transition system—which is part of the VET system—as an alternative to fully qualifying VET, particularly when VET places are scarce.

In the two panels on the right-hand side of Figure 6, the corresponding findings are presented with the regional data aggregated in public transport areas. We find that the patterns point in a similar direction. However, the statistical effects are smaller in size.

We further assumed that beyond the actual school track that students attend, the educational opportunity structure in the respective federal state might differ, shaping students' aspirations and chances given a particular socioeconomic situation in the region.




Students in *Hauptschule/Realschule*; aggregated in admin. districts

Students in *Gesamtschule;* aggregated in admin. districts

Students in *Hauptschule/Realschule*; aggregated in public transport areas

Students in *Gesamtschule;* aggregated in public transport areas

**Figure 5.** Linear effects of regional unemployment on (**i**) aspirations for prolonging school and (**ii**) prolonging school, by share of trainees in full-time, school-based VET among all trainees in percent. Data: NEPS-SC3; NEPS-SC4; (BBSR 2023; Destatis 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023.

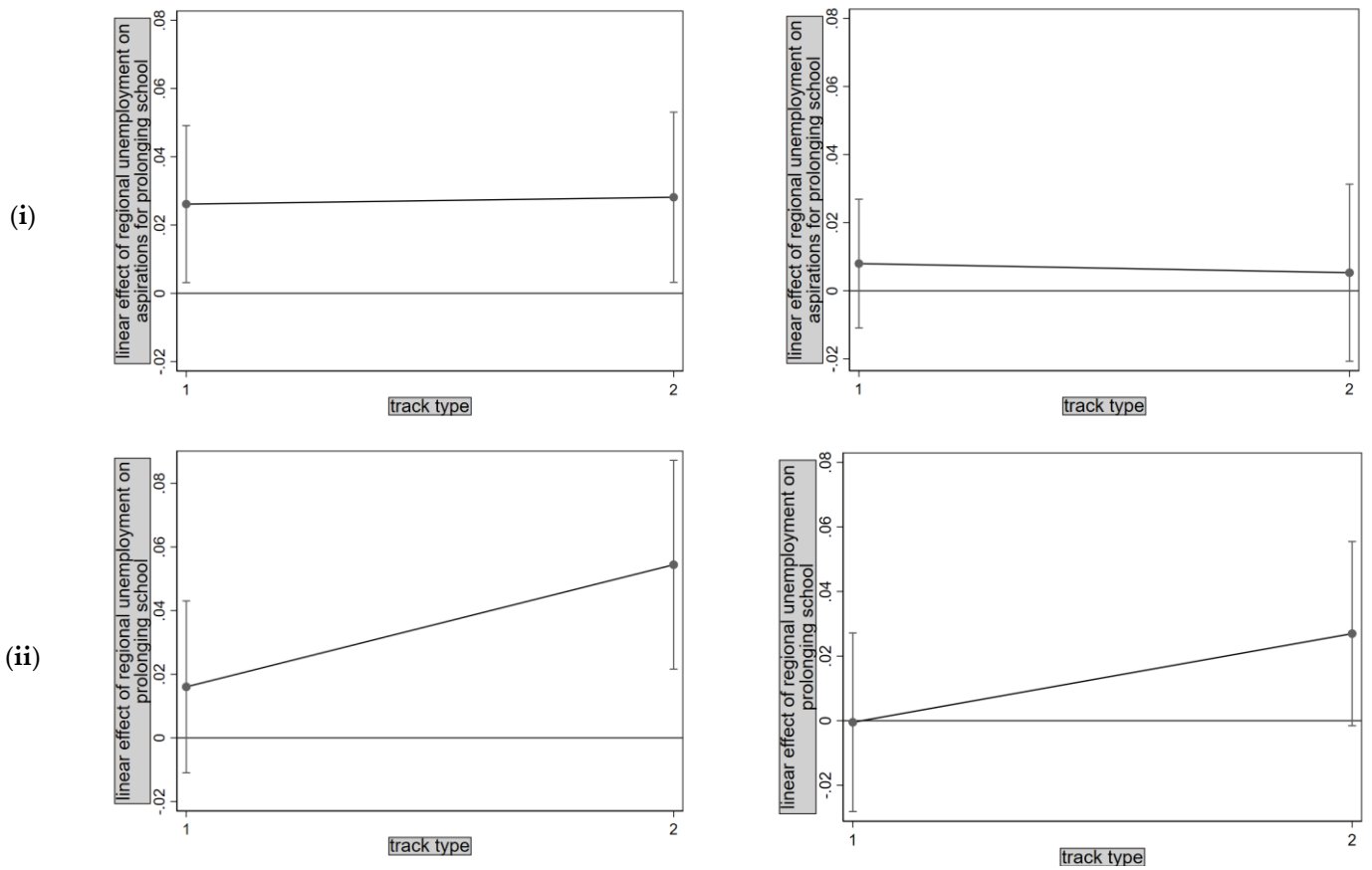



**Figure 6.** Linear effects of regional unemployment on (**i**) aspirations for prolonging school and on (**ii**) prolonging school by track type. Data: NEPS-SC3; NEPS-SC4; (BBSR 2023; Destatis 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023.

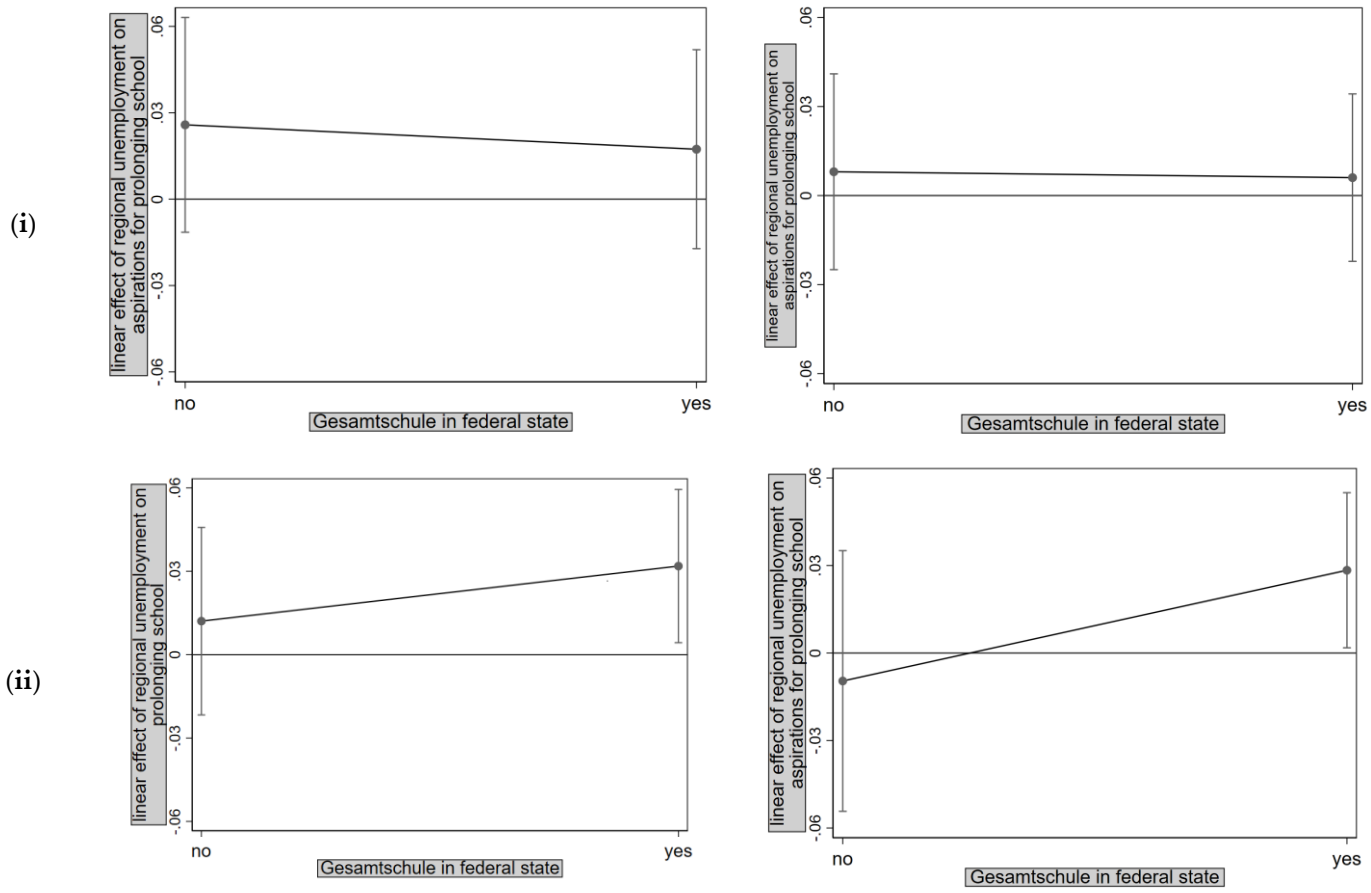
To that end, we test whether the availability of a *Gesamtschule* option in a specific federal state alters the association between the regional unemployment rate and the two outcome variables. Again, we restrict the analysis to students in *Hauptschule* and *Realschule* because students who attend *Gesamtschule* are, by definition, in a federal state with a *Gesamtschule* system. We present the results in Figure 7. We find that the effect of regional unemployment on the actual chance of remaining in the general school system is comparatively stronger when *Gesamtschule* is an available alternative in the federal state. This is plausible and in line with our expectation since the *Gesamtschule* option facilitates further schooling for students who graduated from *Hauptschule* or *Realschule*.

The right-hand panel of Figure 7 presents the corresponding results with the regional unemployment rate aggregated in public transport areas. Once more, the effects are smaller but overall similar to the results that we obtained when aggregating in administrative districts.

### *5.3. Summary*

In summary, using this particular combination of datasets, we find that our results meet many of our expectations. Poor socioeconomic conditions in a region are, in fact, associated with a higher chance of staying in the general school system rather than entering VET. This key finding of our study is in line with previous international studies, as well as with prior studies on the German case (e.g., Finger 2016; Micklewright et al. 1990; Raffe and Willms 1989; Rice 1999; Brunello 2009; Kleinert and Jacob 2012; Muehlemann and Wolter 2011; Weßling et al. 2015). We add to the literature by showing that regional unemployment

is more strongly associated with students' aspirations than with their actual transitions, indicating that students anticipate and evaluate their chances in the regional VET market.




Students in *Hauptschule/Realschule*; aggregated in admin. districts

Students in *Hauptschule/Realschule*; aggregated in public transport areas

**Figure 7.** Linear effects of regional unemployment on (**i**) aspirations for prolonging school and on (**ii**) prolonging school by availability of *Gesamtschule* in federal state. Data: NEPS-SC3; NEPS-SC4; (BBSR 2023; Destatis 2023); https://github.com/highsource/verbundkarte, accessed on 3 June 2023.

Our data suggest that regional socioeconomic conditions are relevant for students in *Hauptschule* and *Realschule*, whereas students in *Gesamtschule* are not affected by regional labour market conditions. In particular, *Realschule* graduates are "discouraged" from entering VET in poor regional labour markets. We believe that this has to do with the fact that there are more alternatives (specialised secondary schools, *Gesamtschule*) for *Realschule* students compared to those graduating from *Hauptschule*. This is in line with research showing that the type of track represents a crucial signal in the training market and that students are aware of this (Buchmann and Park 2009; Blommaert et al. 2014; Di Stasio 2014; Protsch and Solga 2015). Consequently, students from higher school tracks can make use of their competitive advantage in regions with limited VET opportunities. This finding speaks to results on the well-known "Matthew effect" (i.e., cumulative (dis)advantages in education and training) because research has frequently shown that students from less privileged backgrounds are more likely to be in the lower tracks. In addition, students in these lower tracks are particularly disadvantaged when regional labour and training market conditions are scarce.

Moreover, to adequately represent the German VET system, we captured the availability of school-based VET in addition to the regional socioeconomic situation. A higher availability of school-based VET in regions seems to reduce aspirations and transitions to

further general schools in favour of alternatives, such as entering VET. The "discouragement" is particularly strong when both conditions are met, that is, unemployment is high and the availability of school-based VET is low.

We do not find that aggregating regional data in public transport areas, which we assumed to be a realistic spatial range for young adults' educational decision-making processes, makes the results clearer. On the contrary, effect sizes are smaller and effects are mostly statistically insignificant. This could indicate that public transport zones are—at least on the basis of national averages—not the most appropriate spatial scale. However, this could also indicate data limitations.

### *5.4. Limitations*

The aggregation of regional information in public transport areas bears at least three challenges in its current form. First, since not all German regions belong to public transport areas, or data for existing transport areas are missing from our data source, we have an increased amount of systematic missings (e.g., almost the whole federal state of Schleswig-Holstein). This systematic missings might have biased our results. Second, compared to administrative districts, public transport zones are heterogeneous in size. Some transport areas comprise only one or two districts and others include up to thirty districts. This means that the larger ones will be too large for daily commutes; thus, only some of the public transport zones are adequate operationalisations of the social contexts that we refer to in our theory. Third, to fully implement the idea of public transport areas, it is necessary to have knowledge of actual accessibility by means of timetables and transport connections. Particularly in rural areas, reachability might be a critical issue rather than the pure size of the transport area. However, making real-life connection data available is time-consuming and technically challenging.

Despite the outlined limitations, we believe that our explorative attempt is already informative for research on regional influences. Useful next steps would be to complement the missing information in the data and to invest in research on the relations between different aggregation levels and forms (e.g., districts, commuting zones, labour market regions and public transport areas). In a perfect data world, flexible regional aggregations are preferable. The smallest level of aggregation currently realisable with the NEPS survey and most other survey data are municipalities or administrative districts. If raster cells or other very small-scale units were available, flexible aggregations would allow for the calculation of realistic distances and spaces.

To address the issue of regional context effects in a causal way, we would have liked to see location changes as a potential form of exogenous variation. However, this is not possible with NEPS data because the survey is based on a school sample. Thus, location and school changes are rare, and if students relocate or change schools, they are no longer given the full set of questionnaires; in most cases, this means that the location variable is no longer available.

## 6. Conclusions

The aim of our paper is to test the "discouraged worker" hypothesis, which postulates that poor regional socioeconomic conditions foster students' aspirations for more education, ultimately leading to an extension of their educational careers. Bearing the discussed limitations in mind, we are confident that our paper makes at least three meaningful contributions to the existing state of research.

First, the DWE has often been analysed by focusing on the influence of regional conditions on *fulfilled transitions*, although the underlying theoretical argument suggests studying young adults' *intentions* or a combination of both. Recent research has already started to focus on the effects of regional conditions on students' aspirations (Finger 2016; Flohr et al. 2020; Hartung et al. 2022). We have continued along these lines by focusing on (i) whether students aspire to prolong their general school careers or enter VET and (ii) whether they, in fact, prolong their school careers. We have found that associations

between regional socioeconomic conditions and aspirations are stronger compared with transitions. Second, we have used a comprehensive set of regional and institutional indicators that reflect the situation of the German secondary school and VET system. We have included data from the statistical office on the availability of full-time, school-based VET in the region rather than focusing only on the apprenticeship system, and this has yielded relevant insights into students' discouragement from VET. Moreover, we have assessed the relevance of alternatives to VET in the general school system by making use of variations in the availability of *Gesamtschulen* across federal states. We have also shown that the relevance of regional socioeconomic conditions varies according to the school track attended.

Third, although using the public transport area aggregations did not return particularly significant results, we have illustrated the MAUP by addressing the more technical issue of adequate spatial units (Kwan 2012; Fotheringham and Wong 1991). Our considerations have underlined the fact that measuring spatial context effects in the "right" spatial zone is by no means a trivial problem; it requires theoretical carefulness and is often empirically demanding. These types of analyses are typically confronted with problems in the availability of regional data that can be flexibly aggregated, but the regulations of data protection may also limit the possibility of linking different data sources, particularly when merging survey data with regionalised administrative information.

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**Data Availability Statement:** Only secondary data was used for the analyses from several sources, all sources are cited in the manuscript.

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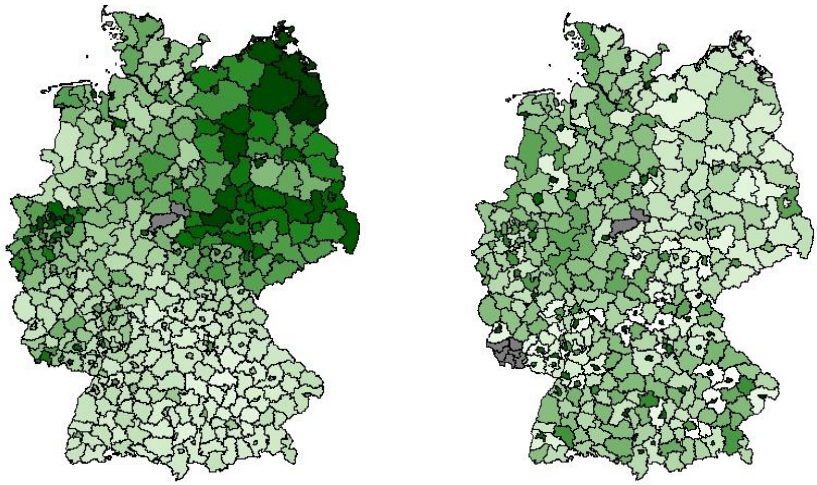
## Appendix A



Unemployment rate in 2010 in administrative districts

VET places in 2010, measured as ratio between applicants and available places in administrative districts

**Figure A1.** Regional variables aggregated administrative districts. Source: (BBSR 2023).

**Table A1.** Matrix of bivariate correlations (Pearson's r) between regional indicators including VET places on the level of administrative district, data: (Destatis 2023; BBSR 2023), in bold: correlation above 0.5.

| | **Share of Students in Full Time School Based VET by All Students in VET in 2010** | **Share of Students in Full Time School Based VET by All Students in VET in 2014** | **Unemployment Rate in 2010** | **Unemployment Rate in 2014** | **Share of Realschule and Abitur Graduates 2010 by Population in 1000** | **Share Realschule and Abitur Graduates 2014 by Population in 1000** | **VET Places in 2010; Ratio between Applicants and Available Places** |
|---|---|---|---|---|---|---|---|
| Share of students in full time school based VET by all students in VET in 2010 | 1 | | | | | | |
| Share of students in full time school based VET by all students in VET in 2014 | **0.7739** | 1 | | | | | |
| Unemployment rate in 2010 | 0.0656 | 0.144 | 1 | | | | |
| Unemployment rate in 2014 | 0.0802 | 0.1526 | **0.9642** | 1 | | | |
| Share of Realschule and Abitur graduates by population in 1000 in 2010 | −0.048 | −0.048 | −0.0105 | −0.004 | 1 | | |
| Share Realschule and Abitur graduates by population in 1000 in 2010 | −0.0972 | −0.1133 | 0.0013 | 0.0146 | **0.8438** | 1 | |
| VET places in 2010; ratio between applicants and available places | −0.1109 | −0.1101 | **0.7129** | **0.5998** | 0.1889 | 0.2627 | 1 |
| VET places in 2014; ratio between applicants and available places | −0.1312 | −0.1112 | **0.6764** | **0.6754** | 0.1889 | 0.1845 | **0.9542** |

## Note

[1] This paper uses data from the National Educational Panel Study (NEPS): Starting Cohort 3–5th Grade, http://dx.doi.org/10.5157/NEPS:SC3:12.0.0, and Starting Cohort 4–9th graders, http://dx.doi.org/10.5157/NEPS:SC4:12.0.0. From 2008 to 2013, NEPS data were collected as part of the Framework Programme for the Promotion of Empirical Educational Research funded by the German Federal Ministry of Education and Research (BMBF). As of 2014, the NEPS survey is carried out by the Leibniz Institute for Educational Trajectories (LIfBi) at the University of Bamberg, in cooperation with a nationwide network.

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