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We welcome comments and suggestions on this research, please contact the authors at:

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Abstract

We use data from the National Educational Panel Study and multilevel logistic regression models to examine the impact of parental unemployment and regional labour market conditions on the probability of successful transitions from non-academic secondary schooling to vocational training in Germany. Although widely regarded as a low-cost, low-risk and high-gain path of training, we nevertheless find a clear negative effect of parental unemployment on adolescents' chances of entering an apprenticeship contract. We test for the role of poorer school performance, reduced household income, reduced self-esteem and limited access to labour market information as potential mediators of the effect, and find support for some limited role of economic deprivation only. However, we also show that in families where one parent has experienced unemployment shortly before the child's own transition from secondary schooling, students' chances of successful transitions depend much more strongly on regional labour market conditions than in families without parental experiences of unemployment. Even in a regulated transition system like Germany's, adverse labour market conditions thus reinforce the intergenerational disadvantages induced by parental unemployment.

Keywords

Educational inequality, school-to-work transitions, vocational training, apprenticeships, intergenerational effects, unemployment, regional labour markets

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Introduction

Children who grow up in families affected by unemployment often have to cope with restricted resources and an unstable home environment. As they might experience motivational problems, poorer school performance or restricted opportunities due to a lack of economic and other resources (reviews in Brand, 2015; Burgard and Kalousova, 2015), parental unemployment can influence key decisions in their life-course such as educational and labour market transitions. Several recent studies have in fact documented such intergenerational effects of unemployment on youth educational and labour market outcomes (e.g. Brand and Thomas, 2014; Coelli, 2011; Mooi-Reci and Bakker, 2015; Oreopoulos *et al.*, 2008; Rege *et al.*, 2011). Intergenerational effects of unemployment are evident also in the German context (Lohmann and Groh-Samberg, 2017; Müller *et al.*, 2017; Peter, 2016), even though unemployment rates in Germany are lower than in many other European countries.

While this recent body of research has begun to document adverse effects of parental unemployment on youth outcomes over and on top of standard measures of social background, we know little about why the effects of parental unemployment arise. Some research suggests that declines in household income is mediating the effect of parental unemployment on educational transitions (Coelli, 2011). Although some studies point to the role of parental unemployment in reducing children's school performance (Rege, Telle and Votruba, 2011), educational ambitions (Andersen, 2013) or beliefs in self-determination and self-esteem (Kalil and Ziol-Guest, 2005; Peter, 2016), empirical research has not provided a satisfactory account of the relevant mechanisms behind the negative effect of parental unemployment on children's educational transitions so far.

As a negative test of this notion, we test for intergenerational effects of unemployment in a least-likely case, i.e. in an institutional environment where the importance of secondary effects of family background (Boudon, 1974) is likely to be minimized and that might hence

be considered resilient to the adverse effect of parental unemployment on transition outcomes. Specifically, whereas previous studies have been looking at educational attainment or specific transitions within educational systems, we explore the intergenerational role of parental unemployment in the transition from non-academic secondary schooling to the vocational education and training (VET) in Germany. As is well known, it is a particular feature of that VET system that dual-system apprenticeship contracts that are awarded in a highly competitive market environment are the historically dominant form of training provision (Jacob and Solga, 2015; Protsch and Solga, 2015), and that failing to secure a training position is likely to imply sustained difficulties to find employment in Germany's occupationally segmented labour market later on (Klein, 2015; Thelen, 2014).

In this specific context, effects of parental unemployment are both plausible and relatively unlikely at the same time. Effects of unemployment are plausible because it is the non-academic tracks within Germany's tracked system of secondary education that are disproportionately attended by children of working and lower middle class parents (e.g. Neugebauer *et al.*, 2013), who in turn are also much more likely to experience unemployment in their own careers than academically trained parents in professional occupations (OECD, 2014). On the other hand, secondary effects of either family background or parental unemployment are decidedly less likely to emerge in VET transitions than for transitions to higher education, for example. Apprenticeships are regular work contracts, and offer a (low) salary as well as access to practical occupational experience and certified training. Successful apprentices are aware that employers will often offer them continued employment at the end of their training (Autorengruppe Bildungsberichterstattung, 2012). Apprenticeships are therefore perceived as a low-cost, low-risk and high-gain path of training, and differences in resources or risk aversion between families are likely to play a limited role in consequence.

Besides, the fact that markets play a major role in the allocation of training places creates a role for supply and demand factors that is absent in other transitions within educational systems. Importantly, with few exceptions (e.g. Macmillan, 2014), the role of local labour markets in driving the intergenerational effects of parental unemployment has received little attention in previous research. One might expect that aggregate conditions and personal experiences of unemployment are interacting in their effects: tight competition in the local labour market might motivate families to mobilize all their resources for their children's search processes (e.g. Beicht and Granato (2010) and Roth (2013) provide evidence on the importance of parents' social networks and vocational training), or it might be the case that employers are putting more weight on differences in skills and networks that relate to parental background in a highly competitive labour market (Zwysen, 2016).

In the present article, we use longitudinal data from the German National Educational Panel Study (NEPS) to examine these relationships empirically. Furthermore, we also explore mechanisms through which parental unemployment has an effect on successful transitions into vocational training in Germany. The particular NEPS cohort that we draw on includes detailed information on educational achievements, parental resources and students' transitions from grade 9 onwards. For this sample, we aim to capture the impact of parents' recent unemployment experiences on their children's transitions to vocational training in 2011 and 2012. Empirically, we find that parental unemployment is clearly reducing adolescents' chances for a successful transition into vocational training. We also find that reduced household income is one mediator for this effect, but also that an important share of the impact of unemployment remains unexplained by the observed mediators available to us. Moreover, in families where parents have recently experienced unemployment, students' chances of successful transitions depend more strongly on regional labour market conditions than in families without this experience.

Theoretical and institutional background

The German VET system for non-college bound youth

German students typically complete lower or intermediate secondary education around age 16 (*Hauptschule* or *Realschule* or non-academic tracks of *Gesamtschule).* For these non-university bound students, an attractive option in the VET system is to continue on a dual-system apprenticeship program (i.e. practical training in the firm combined with learning more general skills at a vocational school) which provides occupation-specific training according to a standardized curriculum in more than 400 regulated occupations. The typical alternative option for unsuccessful apprenticeship applicants is to participate in one of the prevocational training programs of the so-called 'transition system' (*Übergangssystem*). The aim of these programs is to improve vocational and general skills of applicants to support their entry to apprenticeship (Jacob and Solga, 2015), and participants are typically entering the apprenticeship market again in the following year or the year after (Thelen, 2014). Compared to obtaining an apprenticeship contract, this evidently is considered the less desirable pathway. In 2010, about half of youth entering the VET system started an apprenticeship in the firm (i.e. a dual program) and around 30 percent joined the prevocational training (Autorengruppe Bildungsberichterstattung, 2012).

Beyond these two main routes, students may attend either school-based vocational training or enter another branch of secondary education. However, school-based vocational training is only offered in certain occupational fields, mostly in health, social work and media occupations, and thus should not typically be thought of as an alternative to the traditional firm-based apprenticeship (Protsch and Solga, 2015). Transfer to another secondary-level institution, on the other hand, is an option for leavers from lower secondary school who decide to take grade 10 in order to acquire an intermediate degree before entering the VET market, or for well-performing students in the intermediate secondary schools who may transfer

to an upper secondary-level institution (traditional or vocational *Gymnasium*). About a third of students who obtain a diploma from intermediate school continue their studies in upper secondary education (Holtmann *et al.*, 2017). This group of students is likely to be very heterogeneous regarding its motivation of educational choice and future plans (apprenticeship or tertiary education). Thus, the effect of parental unemployment for this transition is not in the scope of our study. [1]

Being a training contract offered by private firms and public employers, the availability of apprenticeship positions depends on the situation in the regional economy. Business cycle conditions typically have a direct effect on firms' willingness to offer apprenticeship contracts in Germany. In particular, adverse economic conditions together with large cohort sizes result in higher levels of competition for apprenticeship contracts (Kleinert and Jacob, 2012). In addition, a local business environment might also play a role. More specifically, small firms have dropped out from VET system in large numbers due to growing standards and broader skill profiles of apprenticeships (Thelen, 2014).

Hiring into apprenticeship contracts is the right of employers, who will apply hiring criteria and standards they see fit as in the case of hiring into ordinary positions (Solga *et al.*, 2014). Therefore, young people with lower secondary school diploma often experience large difficulties in transition to training market, particularly at the times of economic downturn (Kleinert and Jacob, 2012; Protsch and Dieckhoff, 2011; Solga and Kohlrausch, 2013). In part, their difficulties result from the fact that they have to compete with youth who have a university entrance (*Abitur*) certificate as some *Gymnasium* leavers opt for vocational training instead of higher education, whom firms prefer to hire, particularly in the service sector but increasingly also in manufacturing (Thelen, 2014). Thus, entry into the 'transition system' is also strongly segregated by education: about half of participants are from lower secondary

school and one fifth have not received any school diploma (Autorengruppe Bildungsberichterstattung, 2012).

The impact of parental unemployment on VET transitions

Intergenerational transmission of advantage arises through economic, cultural and social resources available within the family (e.g. Bukodi and Goldthorpe, 2013; Jæger and Holm, 2007). And while the standard model is typically applied to account for the effects of social background in broader terms of class, status or parental income, parental job loss could likewise affect the availability of these resources in the family and could therefore in the long-term lead to a process of cumulative disadvantage (DiPrete and Eirich, 2006). For instance, disadvantage might cumulate if parental unemployment causes a long-term reduction of household income, adversity in family dynamics or a weakening of social networks. And if so, we expect that lack of these resources might explain a role of parental unemployment in the training market entry whenever resources affect how well students are able to navigate in that market.

Moreover, because of the allocation of apprenticeship contracts in a market, the transition from school to vocational training resembles a standard job search process in Germany, in which applicants and employers are being matched. In this process, employers make hiring decision under uncertainty. Above all, grades and diplomas signal possible productivity or trainability of the applicant to employers (Spence, 1973). However, when an employer has to choose between applicants with similar grades and diplomas, it is also likely that other signals about possible skills gain importance. We expect parental unemployment to play a role in this respect: while parental unemployment itself will typically not be observable for an employer, it might nevertheless reduce availability of resources that support apprenticeship entry and signal skills to employer.

In terms of more concrete implications of parental unemployment, several studies report that unemployment increases the likelihood of conflicts in family and affects parent-child interactions (e.g. Leininger and Kalil, 2014). Thus, children might receive less emotional support and encouragement from home after parental job loss. Research has also provided evidence that parental unemployment has a spillover effect on mental health of children (Bubonya *et al.*, 2017) and could reduce their belief in self-determination (Peter, 2016). As a result, the self-esteem of adolescents might decline after parental job loss (Kalil and Ziol-Guest, 2005). Moreover, previous research suggests that negative effects of parental unemployment on school performance (Rege, Telle and Votruba, 2011) and on educational ambitions (Andersen, 2013) likely relate to increased levels of stress in family. We expect that the encouraging and supportive family environment is important also for the transition process. Family stress might affect preparedness of parents to support their children in the application process. Moreover, high stress levels in the family might affect youth willingness to intensively look for the training position and reduce self-confidence necessary for job interviews.

In addition, unemployed parents might have difficulties in maintaining professional contacts in longer term, and this might then disadvantage their children in the transition process. First, employers have an incentive to hire through social networks to reduce the information shortage about the ability of worker (Montgomery, 1991). Thus, referrals can be particularly helpful in hiring labour market entrants who lack previous work experience. Moreover, the referrals through parental networks matter more for low educated youth who have had less chances and time than university graduates for building up their own professional networks (Kramarz and Skans, 2014). Second, job-seekers are a part of different social groups that do not have an equal access to social networks providing the information about job opportunities (Lin, 2001; McDonald *et al.*, 2009). In particular, the unemployed have more restricted access to effective professional networks, even though unemployment as such does

not have a strong consequence on the quantity of social contacts (Barbieri *et al.*, 2000). We expect that parents' more limited access to professional networks might be one reason why the unemployment plays a role in the transition process.

Finally, unemployed households might experience economic deprivation due to income reduction after a job loss or as a consequence of income volatility even preceding the job loss (Western *et al.*, 2012). Previous research suggests that household income is an important factor mediating the effect of parental unemployment on next generation's educational transitions (Coelli, 2011). In a longer-term perspective, higher income gives the opportunity to cover a wider range of expenses related with education. In particular, learning through participation in extracurricular activities (Lareau, 2011) could signal to employers additional skills valued at the workplace, such as soft skills (Heckman and Kautz, 2012).

In sum, we expect parental unemployment to affect transitions to the training market. *We specifically propose that it has an adverse effect on chances of finding a training position and that this effect is mediated by household's psychological, social and financial resources (hypothesis 1).*

The impact of regional labour markets on VET transitions

Youth transition outcomes are well-known to depend on the macrostructural environment, e.g. on the business cycle, the occupational structure and the size of educational cohorts (Gangl, 2002). In the German context specifically, the business cycle and local labour market conditions will affect the availability of training positions. The crowding-out hypothesis, for example, assumes that increased competition can change the skill composition of new hires within occupations as less prestigious job openings are increasingly filled by high-skilled workers (Devereux, 2002), which could be due to higher hiring standards of employers or lower expectations of high-skilled job-seekers (Pollmann-Schult, 2005). Thus, young people with low-

er skills and qualifications – as school leavers from non-academic schooling tracks in Germany on whom we focus on in our study – might experience especially large difficulties when there is a shortage of positions in the regional labour market. Therefore, w*e propose that a shortage of training positions will decrease the likelihood of apprenticeship entry for all school-leavers from non-academic tracks (hypothesis 2).*

Furthermore, it may be the case that the adverse effect of parental unemployment is further exacerbated by difficult conditions in the regional labour market. For instance, Macmillan (2014) finds, based on British data, that the employment chances of sons of workless fathers are disproportionally affected by high unemployment rate in the regional labour market. Zwysen (2016) shows that, in Germany, youth from disadvantaged backgrounds get crowded out of good jobs by their similarly qualified peers from advantaged backgrounds when the local labour market is slack. The reason could be that, in highly competitive markets, hiring decisions put more weight on differences in skills or networks that are connected with social background. Moreover, families have more reasons to mobilize their resources when the competition is tighter. Because parental unemployment tends to decrease relevant resources, the lower capacity of unemployed parents to support their children in the transition process is likely to be relatively more detrimental in highly competitive training markets. *Thus, we expect that parental unemployment implies relatively more adverse effects for the transition process in regions with a highly competitive apprenticeship market (hypothesis 3).*

Data sources and statistical modelling

Data

We use data from the NEPS sub-study of the Starting Cohort Grade 9 (Blossfeld *et al.*, 2011) to test these hypotheses empirically.[2] Our analysis is based on the data from the first six survey waves conducted between fall 2010 and spring 2013. Excluding special needs schools,

our final sample includes 2,854 respondents from 38 regions in Germany who made transition to an apprenticeship program in the labour market or to a prevocational training program (see Note S1 in the supplement for detailed sample selection). We assume that the economic conditions in the wider region (NUTS-2 level or *Regierungsbezirke*) are an appropriate geographic demarcation for our study as young people might regularly consider the option of short-distance commuting when seeking a training position, while moving to another region or long-distance commuting is an unlikely option for adolescents at ages 15 or 17. [3] To address the role of regional labour market conditions, we merge regional data obtained from the German Federal Employment Agency and the Federal Statistical Office to the NEPS survey data.

The dependent variable of our subsequent analysis is school-leavers' transition from one of the non-academic tracks of secondary education to vocational training (i.e. excluding students who continue in upper secondary education). About 37 percent of the school-leavers in our sample made this transition after the 9^{th} grade and 63 percent after the 10^{th} grade. We compare two alternative pathways: obtaining an apprenticeship contract in the labour market (i.e. dual program) vs. transition to prevocational training program, i.e. the less desirable alternative to an in-firm training position. Thus, as discussed before, we exclude transitions to school-based vocational training. As the NEPS data provides detailed information about the duration of training spells, we are able to focus on transitions to a first stable training position that lasted for at least 6 months. However, we also include training spells that were ongoing at the time of the last interview regardless of their actual duration, in order to retain those respondents in our sample who dropped out from the NEPS survey relatively soon after their transition to vocational training. Only a marginal number of school-leavers in our sample had a slow transition (taking at least 10 months or more after leaving school) to a stable status in the VET system. To avoid any bias to our estimates, we include a dummy variable to control for these transitions in all models.

Our central explanatory variables relate to parental employment status and resources. To obtain the information, we assembled data from both the student and the parental interviews that were carried out between fall 2010 and spring 2011. We gave priority to data from the parental survey (about half of parents participated) and combined it with the household data provided in the student questionnaire.

Our key independent variable of parental unemployment is the current main economic activity of the parent(s) that was measured only in the 9th grade survey wave. Thus, we include a dummy variable in our analysis to control for students who left school after 10th grade, which serves as an indirect control for whether parental unemployment occurred right during students' transition year or in the year before. We also want to allow for the possibility that the consequences of unemployment depend on the presence of a second earner in the family, who might buffer the job loss of one parent. We thus combine employment and partnership status into the following typology: [4]

- Dual-earner household: both parents are present and employed (65.7 percent of the sample),
- One-earner household: one parent is employed, the other is either not present or inactive (28.0 percent),
- One-earner unemployed household: one parent is unemployed, the other is employed (4.1 percent), and
- No-earner unemployed household: at least one parent is unemployed and the other is either inactive or not present (2.2 percent of our sample).

Individuals are defined as unemployed if they were non-employed and looking for a work. Thus, we do not include parental inactivity, as inactive people are a very heterogeneous group, e.g. voluntary inactive or retired people. Due to data limitations of the NEPS data, we are not able to distinguish unemployment experiences by type or duration in more detail. [5]

In addition to parental unemployment, we include several variables for indicating the potential mechanisms behind the intergenerational effect of unemployment (see also Table S1 for descriptive statistics in the supplement). All these variables were measured before entry to vocational training and after start of parental unemployment. Unless indicated differently, we use measures taken in spring 2011 or fall 2011, depending on the year of transition. [6]

To capture potential poorer *school performance* resulting from parental unemployment, we measure the standardized grade point average based on grades in German and mathematics; in contrast to German conventions, we rescale the grade data so that higher values are denoting higher performance (for discussion of competence scores see the results section and Table S2 in the supplement).

To capture the *level of stress in the family*, we use the NEPS question that asked students to estimate their satisfaction with family life on the scale from 0 to 10. Moreover, we include the standardized measure for student's global *self-esteem*, i.e. individual's positive or negative attitude toward the self (Rosenberg *et al.*, 1995). Self-esteem, exceptionally among our independent variables, was measured in the fall 2010.

The measure of *professional networks* bases on evaluation of students how likely their parents will provide them with information on interesting training positions. We use this measure as our potential mediator because, in contrast to more typical proxy measures of network composition, this measure should indicate the effectiveness of parental networks in the apprenticeship search process more directly.

We also included a measure of *households' disposable income* in the last month in our analysis. It was asked in the parental interview that unfortunately had rather low response rates. Thus, we have the information on parental income in the 9th grade only for some 56 percent of the students in our analysis sample. To impute missing household incomes, we used multiple imputation models with 45 imputations and checked their Monte Carlo error

estimates to see whether the amount of variation in the imputation results is small enough (cf. Table S3 in the supplement).

Our analysis controls for several variables. We include information about the *type of diploma*, i.e. whether respondent obtained (a) the basic diploma from lower secondary school, (b) the diploma with qualification from lower secondary school or (c) the diploma from intermediate secondary school. We exclude a small group of school-leavers who have no diploma because prevocational training program is often the only available option for them. Since the type of diploma achieved by students mostly reflects earlier (parental) track choices made between ages 10-12, i.e. prior to the parental unemployment event that we wish to evaluate, we conceive of this information as a control variable rather than a potential mediator. Although severe learning difficulties might result in downward track mobility, this will be an empirically rather rare event in the final grades of secondary schooling. Other control variables that we use are the *highest educational level of parents*, *migration background* and *household composition* (i.e. single-parent household and the presence of at least one of sibling), all measured in 9th grade. We also control for the *gender* of the school-leaver.

On the macro level, we use the regional *supply and demand ratio* for apprentice positions as our measure of local labour market conditions. It is the ratio between the number of advertised training positions by companies and the number of applicants who were interested in finding an apprenticeship. The data is provided by the German Federal Employment Office and its calculation is based on all apprenticeship positions advertised through the employment offices between March and September. [7] For our analysis, we include data for 2011 only since the supply and demand ratio did not differ much between 2011 and 2012 in NUTS-2 regions (p=0.88). However, the situation in East Germany differs from West Germany because declining cohort sizes have balanced the supply and demand ratio despite high unemployment rates and a higher share of small enterprises that are less likely to offer apprenticeships

(BMBF, 2015; Seibert and Wesling, 2012). Due to this complexity, we present the results of our main analysis for Germany as a whole, but also report additional estimates for the West German sample, where we can also use regional-level data on the prevalence of small firms in the local labour market as a structural control variable. To that end, we include regional-level data on the percentage of employees working in smaller companies with less than 100 employees in 2011 provided by the German Federal Statistical Office.

Statistical modelling

To examine the determinants of students' first stable transition into the VET system, we use two-level logistic regression models that nest individuals within regions where their school is located. Our aim is to estimate the predicted probability for the in-firm apprenticeship entry (Y_{ij}) compared to entry to prevocational training. We index individuals with *i* and regions with *j* and compile the individual level model as follows:

$$logit(Y_{ij}) = \beta_{0j} + \beta_{1j}U_{ij} + \beta_2 T_{ij} + \beta_2 X_{ij} + r_{ij} \qquad (1.1)$$

where the intercept β_{0j} and the slope β_{1j} for parental unemployment (*U*) vary across regions. The model also includes a simple dummy variable for the transition year [8] (*T*) as well as a set of individual level explanatory and control variables (*X*). Region-level equations for the intercept and the slope are:

$$\beta_{0j} = \gamma_{00} + \gamma_{01}C_{0j} + u_{0j} \qquad (1.2)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}C_{1j} + u_{1j}$$

The first equation in 1.2 models intercept as a function of region-level supply/demand ratio (*C*). The second equation includes this context variable (*C*) as a covariate in the slope equitation by adding the term $\gamma_{11}C_j$ which indicates a cross-level interaction in reduced form. Therefore, this equation models the coefficient describing the relationship between parental unemployment (*U*) and entry to apprenticeship (*Y*) from the individual model as a function of context variable (*C*). This tests our hypothesis about the importance of regional context in modifying the relationship between parental unemployment and entry to apprenticeship. [9]

Finally, we note explicitly that our analysis is mathematically equivalent to estimating a full multinomial logit model over all transition outcomes in the full sample of school leavers and then choosing to interpret only the results of the particular contrast of interest.

Empirical results

Family and individual level effects

We begin the presentation of empirical results with the micro (i.e. individual and family) level part of our model. We first estimate a baseline model without mediators to obtain the total effect of parental unemployment and thereafter add potential mediators to estimate their relative contribution in explaining the relationship between parental unemployment and entry to apprenticeship. Figure 1 presents the relevant average marginal effect (AME) estimates for the impact of parental unemployment (measured by our four-group employment status-household type classification) from the multilevel models in graphical form, while Appendix 1 provides interested readers with the full results.

We start with a baseline model including parental status, immigration background, the gender of school-leaver, parental education, secondary school diploma and transition year (Model 1 in Figure 1), which provides our (best proxy of the) estimate of the causal effect of parental unemployment on transition outcomes. In line with our expectations (hypothesis 1),

parental unemployment indeed has an adverse effect on the apprenticeship entry. The probability that young people from one-earner unemployed families are able to obtain an apprenticeship is fully 13 percentage points lower than for their peers from dual-earner families. This difference is still 10 percentage points compared to youth from one-earner families that are not affected by unemployment. Moreover, school-leavers from no-earner unemployed families have an even lower likelihood of obtaining an apprenticeship – the gap to their peers from one-earner or two-earner employed households is 12 and 15 percentage points, respectively. We also admit that confidence intervals are relatively large for this small group of school-leavers, but the results still indicate substantively significant gaps. To conclude, given that after controlling for school-leaving certificate, social background has hardly any further discernible effects on transitions in the apprenticeship market in Germany (also cf. our comments below), the finding of an adverse effect of parental unemployment is both important and obviously begs further explanation.

FIGURE 1 ABOUT HERE

In Models 2-5, we subsequently add potential mediators to our regression specification to shed some light on the mechanisms behind the effect of parental unemployment on youth transitions. In Model 2, we first included the grade point average at transition year that should signal to employers the skills of applicant (and index potential lower school performance in consequence of parental unemployment, as also evident in the descriptive data in Table S1 in the supplement). Empirically, grades are clearly important for successful VET transitions, yet their effect only marginally affects the gap in the transitions of young people from unemployed and employed families. Grades and diplomas are typically the only observable indicators of skills and trainability that prospective employers have about applicants (Solga and

Kohlrausch, 2013). However, cognitive ability often correlates between parent and child and might affect, directly or indirectly through other possible skills, the labour market success of both of them. Thus, we tested additionally the role of cognitive competences of students (Table S2 in the supplement). As expected, cognitive competences do not contribute to the explanation of adverse effect of parental unemployment.

We also expected psychological well-being and social networks to mediate the adverse effect of parental unemployment on transition outcomes. Model 3 includes measures for the psychological consequences of unemployment, i.e. self-esteem of school-leavers and satisfaction with family life. Contrary to our expectations (hypothesis 1), however, psychological well-being seems not to explain the entry gaps, even though self-esteem has a positive effect on transition success. Yet again, some differences in self-esteem between adolescents from families with and without an unemployed parent are descriptively present (cf. Table S1 again), but do not represent any major explanation of the effect of parental unemployment on youth transitions.

Similar tendencies appear from Model 4 that tests the importance of parental professional networks. Our results show that the information about training positions from parental networks is important for apprenticeship entry (cf. Appendix 1) and we also find that unemployed parents are somewhat less likely to be able to provide such information (cf. Table S1). Nevertheless, contrary to our expectations (hypothesis 1), findings again do not indicate that parents' limited access to networks would be an important explanation of the adverse effect of parental unemployment on transition outcomes (Figure 1).

Finally, we tested the role of household income and composition in Model 5 (Figure 1). Our estimates show that household income, i.e. the economic deprivation related to parental unemployment, at least partly explains the adverse effect of parental unemployment, thus providing some support to our hypotheses about potential mediators (hypothesis 1). However,

even after controlling for household income, young people from unemployed families are still significantly less likely to find an apprenticeship than their peers from dual-earner families (the gap, i.e. the AME, is still about 10 percentage points in Model 5). But the gap relative to peers from one-earner employed households is less than 8 percentage points and not statistically significant anymore. [10]

To probe for further mechanisms that might explain the remaining effect of parental unemployment, the one additional mediator might be students' educational or occupational aspirations. This is important because educational decisions are often done in advance already before leaving school and parental unemployment might play a role in this process. Unfortunately, the NEPS survey does not contain a suitable measure of aspirations for the short timeframe of our study. However, if anything, a lack of adolescents' aspirations should appear in their application behaviour on the apprenticeship market. Hence, as an indirect test of the aspiration argument, we also conducted a supplementary analysis of application behaviour and found that the likelihood to apply for an apprenticeship does not depend on parental unemployment, nor in fact on regional labour market conditions (cf. Table S4 in the supplement). [11] Granted, it is possible that our focus on the short-term effects of relatively recent unemployment spells of parents is a reason why we do not see any empirical effect of parental unemployment on aspirations.

All that notwithstanding, it is important to emphasize again our general finding of a negative effect of parental unemployment on transitions into vocational training in Germany, because the German VET market is actually not very prone to effects of social origins otherwise. In part, this might reflect the simple fact that entry to the lower or intermediate non-academic tracks of the German secondary schooling system is already quite selective in terms of social background. As a result, the class composition of our sample does not vary greatly, and is tilted toward working and lower middle class parents to begin with. Besides, our mod-

els control for parental education, yet it has virtually no effect on school leavers' success in the VET market after controlling for their school-leaving diploma. Moreover, we included parents' highest occupational status (either current or previous) as a robustness check, but found almost no effect and it did not affect the estimate of the parental unemployment (cf. Table S5 in the supplement). Thus, even though our available controls are certainly less than ideal, we conclude that it is very unlikely that the effect of parental unemployment that we observe in our data would simply be an effect attributable to social origins. Rather, it seems to be the case that the economic shock of parental unemployment does generate intergenerational repercussions on the educational trajectories of children even in an institutional environment that seems otherwise relatively immune to adverse effects of social origin.

Macro level influences on transitions to VET

In the second step of our analysis, we examine how the chances to obtain an apprenticeship contract are affected by the regional labour market context, and also whether the impact of parental unemployment depends on changing labour market conditions. Table 1, which provides the macro level results for the multilevel models already discussed so far, shows that young people who leave lower or intermediate secondary school in Germany are indeed less likely to find a training position in the labour market when the number of apprenticeship vacancies is smaller than the number of applicants. Also, this result is robust across both the M1 and M5 specification, i.e. does not depend on whether or not the additional mediators of models M2-M5 are included or not. As a further robustness check, we replicate the analysis for West Germany, where the VET market is less affected by sharply declining birth cohort sizes than in East Germany, and where we are also able to control for the presence of small firms in the local labour market as another structural control at the regional level. Still, we obtain a very similar estimate for the effect of competition in West Germany. Thus, in line with our

expectations (hypothesis 2), it is clearly more difficult for youth to find an apprenticeship when there is a shortage of positions in the regional market. [12]

TABLE 1 ABOUT HERE

Table 1 also indicates that the random slope parameters for unemployed households vary significantly across regions. This provides a first indication in favour of our hypothesis that the effect of parental unemployment might interact with regional labour market conditions, and we tested this more formally in further extensions of our basic model. Thus, we extend our basic multilevel model by allowing for cross-level interaction terms between parental unemployment and the supply and demand ratio in the local VET market. Our results indicate that a shortage of training positions is especially harmful for school-leavers from unemployed one-earner households (cf. Figure 2, and Appendix 2 for full details and interaction terms). As Figure 2 shows, the predicted probability of obtaining an apprenticeship contract declines much more sharply in unfavourable labour market conditions among young people from households where one parent experienced unemployment than among their peers from dual-earner families. In fact, it is only under unfavourable labour market conditions that any discernible adverse effect of parental unemployment emerges at all, while there is no difference between family types in more favourable VET markets. Our findings are the same if the sample is restricted to West Germany, and all our results hold irrespective of whether all parental resources and mediators are included in the model or not. However, we do not find any consistent pattern for young people from no-earner unemployed households, likely due to the low number of cases in our sample. Thus, our findings provide some support for our theoretical expectations (hypothesis 3).

FIGURE 2 ABOUT HERE

To address the possible correlation between the importance of small firms and the shortage of training positions in the region, we estimated logistic regression models separately for each employment status group in West Germany (Table 2). In line with previous results, we find that the supply and demand ratio in the market for apprenticeships affects youth's likelihood of obtaining an apprenticeship position in all four family types. We also find, however, that a shortage of training positions is particularly harmful for youth from households where one or both parents experience unemployment, although the coefficient is no longer statistically significant in the sample of no-earner unemployed households, probably not the least due to the small number of cases in this group. Finally, to address a possibility that regional long-term unemployment affects the interaction between parental unemployment and a shortage of training positions, we estimated models that additionally included interactions between parental unemployment and regional long-term unemployment rate. Table S6 shows that this does not change our results (see the supplement).

TABLE 2 ABOUT HERE

Conclusions

In the recent decade, the Great Recession has renewed the interest in possible intergenerational consequences of parental unemployment. This study explored how recent unemployment experiences of parents affect their children's transition from school to vocational training and how conditions in the regional training market might alleviate or exacerbate these intergenerational effects in Germany, where the nature of VET markets is likely to be less prone to social origin effects than in other educational systems. We compared two alternative pathways after

leaving the school – a highly desirable option of finding an in-firm apprentice position in the competitive training market compared to a less desirable option to enter into a prevocational training program.

Our key findings show that parental unemployment has an adverse effect on the chances of finding an apprenticeship position even in the otherwise regulated environment of the German VET market. Thus, despite low unemployment rates in Germany, there are adverse consequences for those households that experience it. We find that a smaller household income, and by implication the economic deprivation related to parental unemployment, contributes partly to a lower chances of securing an apprenticeship among youths from unemployed households. The partial importance of household income in mediating intergenerational effects of unemployment is in line with the previous research focussing on educational transitions (Coelli, 2011). The reason could well be that higher income helps families to invest more in the skill development and participation in activities that might signal extra skills and experiences to employers.

We also expected the adverse effect of parental unemployment to be linked with its consequences on the psychological well-being of family and parental difficulties with maintaining professional networks. However, we found no evidence that dissatisfaction with family life or a lower self-esteem of school-leavers would relate to this adverse effect. Possibly, our measurement of psychological consequences is limited, as it does not capture all family dynamics after parental unemployment. Thus, further research is needed using different dataset than the NEPS. Moreover, parental social networks, that have a positive effect on the apprenticeship entry success, also seem not to mediate the adverse effect of parental unemployment in any important way. It might be that unemployment affects social networks in more long-term perspective, which we were not able to capture with our data. As a result, a significant share of the adverse effect of parental unemployment is left unexplained even after

we control for all potential mediating factors on which we have information from the NEPS surveys.

In addition, the characteristics of the regional training market matter for successful VET transitions. Not surprisingly, we find that young people experience more difficulties with finding an apprenticeship if the applicants' demand exceeds the supply of positions. As our sample was restricted to leavers from Germany's non-academic tracks of secondary education, this finding might in part reflect the fact that school leavers with university entrance certificates (the *Abitur*) possibly crowd out school leavers from the lower tracks of secondary education in more competitive markets. Foremost, this could apply for market segments attractive to upper secondary school leavers. However, we cannot evaluate the relative contribution of this scenario for the findings that we report in the present analysis.

More important to our present concerns is, however, that the strength of the intergenerational effect of parental unemployment depends on regional labour market conditions in Germany. Our findings show that a shortage of training positions clearly reduces the chances for young people from families with an unemployed parent, and that indeed the adverse impact of parental unemployment emerges in the tight competition for positions in slack labour markets only. When there is a surplus of training positions, parental unemployment has no adverse effect on children's chances of obtaining the desirable outcome of an apprenticeship contract. At present, we have to leave it to future research to determine the mechanisms behind this cross-level interaction in more detail. It could well be that relatively minor differences in parental resources assume a more prominent role under tight competition, or that tight competition triggers the capacities of better-off parents to mobilize all resources in some special way, or indeed that resources, motivations, signals or other social influences that were not observable to us from the NEPS data are playing the decisive role in the process.

Naturally, there are important limitations to the present study. Among them is the measurement of parental unemployment, as we cannot distinguish between short-term and long-term unemployment with the NEPS survey. Based on our theoretical expectations, however, we suppose that the intergenerational effects of unemployment are likely to increase with its duration, so that the results reported in this study are mainly driven by parents' long-term unemployment. Moreover, as the NEPS does not provide siblings data, we also have to leave it to future research to possibly corroborate our findings in family-fixed effects models that account for unobserved family background factors and that hence would allow to put forward even stronger causal claims than from our present research.

What seems clear, however, is that there in fact is an adverse effect of parental unemployment on transitions in the German VET market, and also that this effect becomes more pronounced under unfavourable labour market conditions. That is, even in an institutional environment of a VET market that is relatively free from social origin effects on outcomes otherwise, parental unemployment reduces children's chances of a successful transition into vocational training, and thereby hampers their opportunities to acquire labour market skills. As vocational certificates assume pivotal importance for subsequent labour market success in Germany, the adverse shock of parental unemployment may thus indeed generate long-lasting consequences if it is happening at the wrong point in time in children's educational trajectories.

Notes

[1] Only a very small group of students enter to inactivity or unemployment (NEET status) right after completing non-academic secondary education. For instance, Eurostat (2017) data shows that NEET rates among 15-19 year olds in Germany were around 3% in 2011. Thus, we did not include this small group to our analysis.

[2] This paper uses data from the NEPS: 10.5157/NEPS:SC4:6.0.0. 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.

[3] Five NUTS2 areas overlap with German states (in addition to city-states and small Saarland) that might be relatively large for commuting. Four of these states are in East Germany and only on in West Germany. However, our analysis focussing on West Germany showed similar results for region effects as analysis that included East Germany.

[4] An alternative approach is to separately estimate the effects of paternal and maternal unemployment. Table S7 shows that both paternal and maternal unemployment have adverse effects on finding an apprenticeship (see the supplement). However, the negative effect of maternal unemployment is not statistically significant after including household income, most likely because of the small number of unemployed mothers in our sample.

[5] About half of responses for parental status are from the student questionnaire. It could be that some 15-year-olds are not able to distinguish between parental unemployment and inactivity. Moreover, we cannot directly compare answers of students and parents as the parental survey took place slightly later.

[6] Mediating variables were measured after the start of application process (except self-esteem). However, only satisfaction with family life could be affected by application process,

but only when applying itself somehow causes problems within family. Thus, we assume that reversed causality should not be a problem in our analysis.

[7] Virtually all apprenticeship positions are advertised via the local employment offices, at least as one of multiple search channels used by firms offering the positions.

[8] We chose not to analyse separately year level data as the year of leaving school and skills or qualifications are directly correlated in our study.

[9] Participants were chosen to wave 1 with stratified cluster sampling. We tested additional models that clustered also for school identity number, main effects at the individual level and cross-level interactions were similar. In addition, main effects were similar when we clustered for federal states instead of regions.

[10] We also explored whether children of unemployed parents do paid work to contribute to household income, which could disturb their apprenticeship search. On the contrary, our empirical data indicate that having a regular job in 9th grade is more common among students from dual-earner households and also that this experience has a positive impact on chances to find training position (cf. Table S8 in the supplement).

[11] In our sample, more than 80 percent of stable participants in prevocational training said that they applied for or had a plan to apply for apprenticeship position instead of transition program.

[12] School-leavers in highly competitive markets might decide more often for continuing in school and thus exit our sample. If they do not apply for apprenticeship, they do not contribute to measurement of regional demand and supply of positions. If they apply but unsuccessfully, we most likely underestimate the negative effect of competitive training markets by excluding more unsuccessful students in these markets.

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Tables and figures

Table 1 Regional level effects on entry to apprenticeship

	Entire Germany				West Germany			
Individual level variables	M1: Baseline + context		M5: Mediating variables + context		M1: Baseline + context		M5: Mediating variables + context	
Household (ref. dual-earner)								
One-earner employed	-.028	(.018)	-.018	(.019)	-.035	(.020)	-.022	(.026)
One-earner unemployed	-.115**	(.048)	-.094**	(.043)	-.147**	(.057)	-.117**	(.027)
No-earner unemployed	-.141*	(.074)	-.099*	(.059)	-.166*	(.091)	-.101	(.067)
Control variables	+		+		+		+	
Mediating variables	-		+		-		+	
Regional level variables								
Supply and demand ratio	.449***	(.121)	.443***	(.113)	.370**	(.159)	.327**	(.159)
% employed in small firms	-		-		-.006	(.005)	-.007	(.005)
Intercept	-1.82**	(.74)	-4.73***	(1.37)	-.60	(1.33)	-3.31*	(1.34)
Variance estimates								
Intercept	.30	(.09)	.30	(.09)	.33	(.11)	.32	(.10)
One-earner unemployed slope	.23	(.38)	.22	(.40)	.38	(.50)	.18	(.42)
No-earner unemployed slope	.82	(1.12)	.74	(.66)	.88	(1.40)	-	
N individuals			2854				2539	
N regions			38				30	

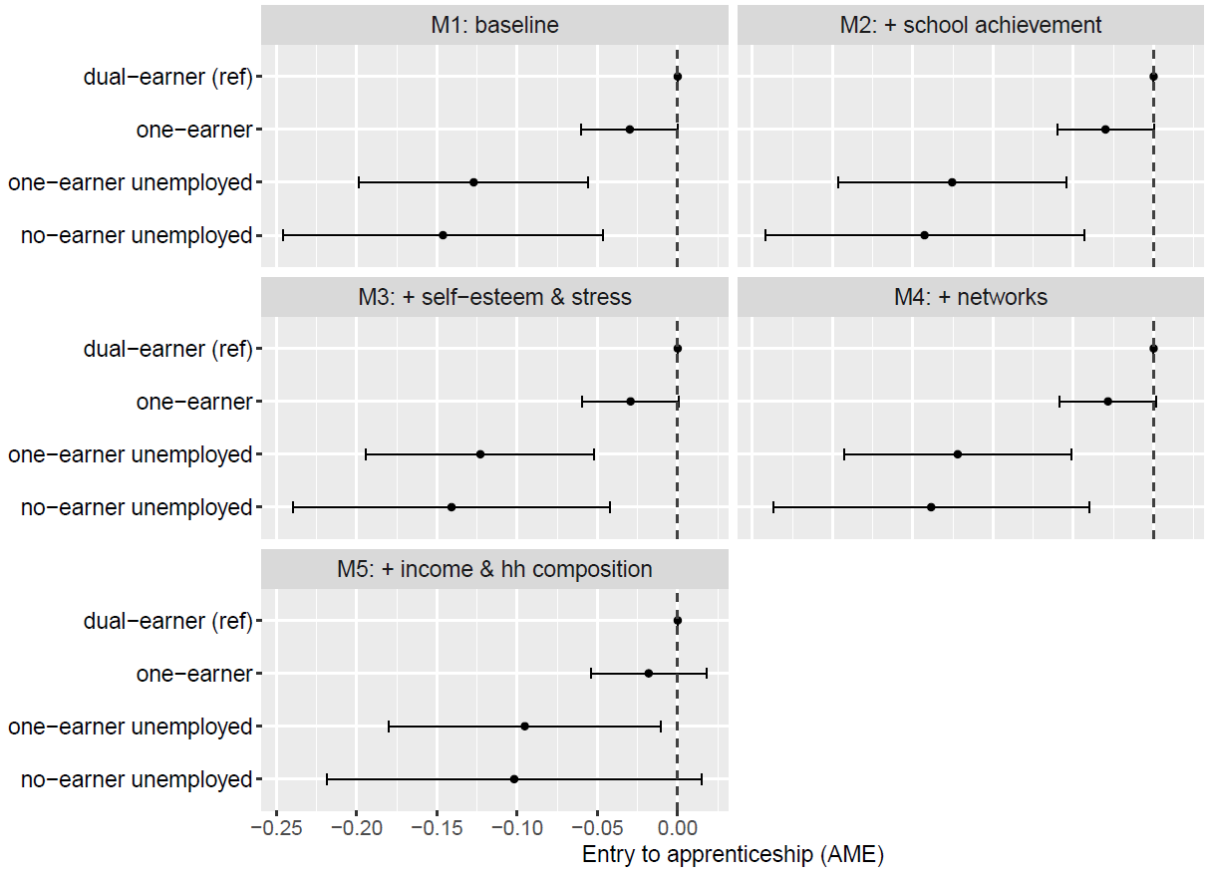
Notes: average marginal effects from two-level logistic regression models (calculated based on fixed part), standard errors in parentheses, models include all individual level variables in accordance to Appendix 1, estimated with an unstructured random-effects covariance matrix (correlations between random components not presented), *** p<.01, ** p<.05, * p<.10. To reduce complexity, we estimated M5 with 20 imputations for missing income values (M5 for West Germany does not include slope for the category "no-earner unemployed" due to convergence problems).

Table 2 Regional level effects on entry to apprenticeship in West Germany by parental employment status

	Dual-earner	One-earner employed	One-earner unemployed	No-earner unemployed
Supply and demand ratio	.326***	.481***	.773***	.527
	(.082)	(.133)	(.383)	(.880)
% employed in small firms	-.005**	-.005**	-.032***	-.035
	(.010)	(.010)	(.012)	(.035)
Control variables	+	+	+	+
N	1663	734	94	48

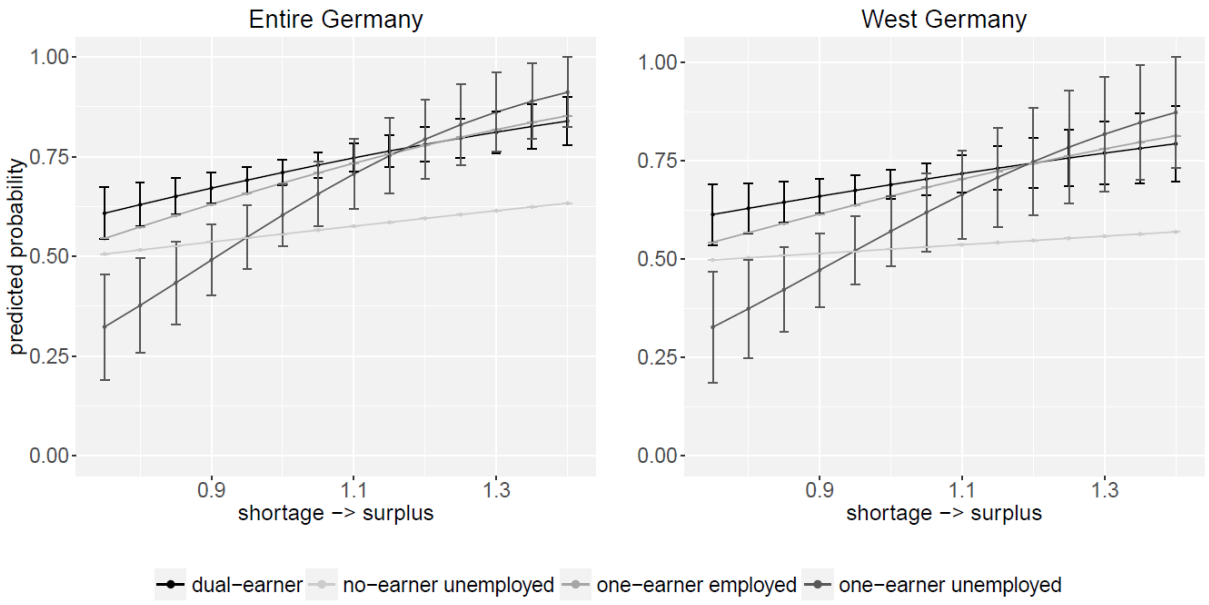
Notes: average marginal effects from logistic regression models, standard errors in parentheses, models include control variables (see M1 in Appendix 1), *** p<.01, ** p<.05, * p<.10

Figure 1 Apprenticeship entry gaps by household type.



Notes: average marginal effects from multilevel logistic regression models (calculated based on fixed part), 90% confidence intervals, full model presented in Appendix 1.

Figure 2 Regional contexts and the effect of parental unemployment on apprenticeship entry



Note: predicted probabilities for apprenticeship entry from multilevel logistic regression models with interactions between household type and regional context variable, 90% confidence intervals, full models with interaction terms are presented in Appendix 2 (predictions in this figure are based on models M1).

Appendix 1. Individual level effects on entry to apprenticeship

	M1: Baseline		M2: + Grades		M3: + Stress		M4: + Networks		M5: + Income	
Household, ref. dual-earner										
One-earner employed	-.030	(.018)	-.030	(.018)	-.030	(.018)	-.028	(.018)	-.018	(.018)
One-earner unemployed	-.127***	(.043)	-.126***	(.043)	-.123***	(.043)	-.122***	(.043)	-.095**	(.043)
No-earner unemployed	-.146**	(.060)	-.143**	(.060)	-.141**	(.060)	-.139**	(.060)	-.102*	(.059)
Immigration generation, ref. native										
1st generation	-.090**	(.036)	-.087**	(.036)	-.087**	(.036)	-.079**	(.037)	-.073**	(.037)
2nd generation	-.086***	(.027)	-.076***	(.027)	-.082***	(.027)	-.077***	(.027)	-.076***	(.027)
Female	-.114***	(.018)	-.114***	(.018)	-.108***	(.017)	-.111***	(.017)	-.110***	(.017)
Parental education, ref. lower sec.										
Intermediate secondary	.012	(.021)	.011	(.021)	.009	(.022)	.007	(.022)	-.007	(.022)
Abitur	-.053	(.035)	-.053*	(.034)	-.058*	(.035)	-.056	(.035)	-.066*	(.034)
Higher education	-.009	(.026)	-.012	(.026)	-.015	(.026)	-.017	(.026)	-.042	(.027)
No qualification	.023	(.059)	.020	(.058)	.023	(.058)	.029	(.058)	.024	(.056)
Missing	-.017	(.034)	-.020	(.034)	-.020	(.034)	-.023	(.034)	-.042	(.042)
Diploma, ref. general lower secondary										
Lower secondary qualifying	.111***	(.031)	.107***	(.031)	.095***	(.031)	.093***	(.030)	.084***	(.030)
Intermediate secondary	.281***	(.034)	.265***	(.034)	.260***	(.034)	.255***	(.034)	.243***	(.034)
Entry at 2012	.103***	(.028)	.107***	(.028)	.109***	(.028)	.108***	(.028)	.108**	(.028)
Grade point average			.032***	(.008)	.031***	(.008)	.031***	(.008)	.029***	(.008)
Satisfaction with family life					.006	(.008)	.005	(.008)	.004	(.008)
Self-esteem					.018**	(.008)	.017*	(.009)	.017*	(.009)
Parents provide information							.035**	(.017)	.032*	(.017)
Household disposable income (log)									.061**	(.028)
Single parent									-.037	(.026)
Has sibling									.022	(.018)
Intercept	1.59***	(.72)	.82***	(.33)	.80***	(0.34)	.72***	(0.32)	-2.79**	(1.14)
Variance estimates										
Intercept	.44	(.13)	.47	(.14)	.47	(.14)	.48	(.14)	.48	(.11)
N individuals	2854		2854		2854		2854		2854	
N regions	38		38		38		38		38	

Notes: average marginal effects from two-level logistic regression models (calculated based on fixed part), standard errors in parentheses, models include dummy for slow entry, M5 is estimated with 45 imputations for missing income values, *** p<.01, ** p<.05, * p<.10

Appendix 2. Cross-level interaction effects on entry to apprenticeship

	Entire Germany				West Germany			
	M1: Baseline + context		M5: Mediating variables + context		M1: Baseline + context		M5: Mediating variables + context	
Household, ref. dual-earner								
One-earner employed	-.82	(.66)	-.77	(.67)	-.94	(.71)	-.88	(.72)
One-earner unemployed	-3.93***	(1.51)	-4.04***	(1.53)	-3.87**	(1.64)	-3.92**	(1.68)
No-earner unemployed	.15	(2.15)	.08	(2.11)	.26	(2.36)	-.06	(2.35)
Supply and demand ratio	2.24***	(.70)	2.24***	(.70)	1.64*	(.93)	1.48	(.93)
% employed in small firms					-.036	(.30)	-.037	(.03)
Supply and demand ratio * household status (ref. dual-earner)								
* one-earner employed	.67	(.68)	.69	(.69)	.78	(.73)	.79	(.74)
* one-earner unemployed	3.35**	(1.55)	3.62**	(1.56)	3.25**	(1.72)	3.49**	(1.75)
* no-earner unemployed	-.96	(2.23)	-.67	(2.13)	-1.13	(2.74)	-.54	(2.58)
Intercept	-1.43**	(.73)	-4.32**	(1.36)	-.16	(1.34)	-2.98*	(1.76)
Variance estimates								
Intercept	.30	(.09)	.30	(.09)	.33	(.12)	.32	(.09)
One-earner unemployed slope	.00	-	.00	-	.00	-	.00	-
No-earner unemployed	.35	(.74)	.29	(.78)	.20	(.74)	-	
N individuals			2854				2539	
N regions			38				30	

Notes: coefficients from two-level logistic regression models, standard errors in parentheses, *** p<.01, ** p<.05, * p<.10. To reduce complexity, we estimated M5 with 20 imputations for missing income values (M5 for West Germany does not include slope for the category "no-earner unemployed" due to convergence problems).

Supplement

Note S1

NEPS sample size is more than 15000 respondents after excluding special education schools. From these students, we identified 4164 respondents that have obtained lower secondary or intermediate secondary diploma and entered after that to a stable position in the VET system. After that, we left out respondents who did school-based apprenticeship (26% of all apprentices) that reduced sample to 3347 respondents. Thereafter, we had to exclude following respondents: (1) whose both parents were inactive or information on the activity of parents was missing; (2) without region identifier; (3) without information on GPA (in wave 2 or 3); (4) few respondents who said they are participating in preparatory program because their apprenticeship starts later and they later had the apprenticeship spell; (5) respondents for whom information on parental occupation, parental education and household income was missing all together. Thus, our final sample size was 2854 respondents.

Table S1. Distribution of variables by household type in the sample (unweighted)

	Dual-earner	One-earner employed	One-earner unemployed	No-earner unemployed
Transition outcome				
Prevocational training program	29	34	46	54
In-firm apprenticeship	71	66	54	46
Immigration background				
No immigration	84	79	77	79
1st generation	5	7	11	7
2nd generation	11	14	12	14
Gender				
Women	36	40	39	39
Men	64	60	61	61
Highest parental education				
Lower secondary	17	26	19	35
Intermediate secondary	44	37	49	26
Abitur	8	9	5	8
Higher education	24	18	14	13
No qualification	1	2	0	13
Missing	7	8	13	5
Grade point average	.02	.00	-.04	-.18
SE	(.02)	(.03)	(.10)	(.10)
Type of diploma from school				
General lower secondary	24	28	33	47
Lower secondary qualifying	18	20	20	24
Intermediate secondary	58	52	47	29
Satisfaction with family life	.00	.01	-.14	.00
SE	(.02)	(.04)	(.09)	(.10)
Self-esteem	.03	-.03	-.06	-.23
SE	(.02)	(.03)	(.08)	(.11)
Parents provide information				
No	43	48	52	58
Yes	57	52	48	42
Household composition				
Two parents	90	87	81	79
Single parent	10	13	19	21
Sibling in the household				
No	26	28	33	34
Yes	74	72	67	66
Supply / demand ratio (surplus)	.97	.96	.95	.92
SE	(.00)	(.01)	(.02)	(.02)
% employed in small firms (West)	20.9	21.0	21.4	21.8
SE	(.11)	(.16)	(.47)	(.49)
Works regularly after school				
No	75	80	81	84
Yes	25	20	19	16

Table S2. The effect of competences on apprenticeship entry

	Competence in math		Competence in reading	
	M1: Baseline + GPA	M2: Baseline + GPA + competences	M1: Baseline + GPA	M2: Baseline + GPA + competences
Household, ref. dual-earner				
One-earner employed	-.031	-.031	-.031	-.032
	(.018)	(.019)	(.019)	(.019)
One-earner unemployed	-.131***	-.132***	-.128***	-.129***
	(.044)	(.044)	(.044)	(.044)
No-earner unemployed	-.143**	-.140**	-.123**	-.124**
	(.060)	(.062)	(.061)	(.061)
Grade point average	.031***	.028***	.029***	.030***
	(.008)	(.008)	(.008)	(.008)
Competence in math		.024**		
		(.011)		
Competence in reading				-.017**
				(.008)
Female	+	+	+	+
Immigration generation	+	+	+	+
Type of diploma	+	+	+	+
Entry at 2012	+	+	+	+
Parental education	+	+	+	+
Variance estimates				
Intercept	.49	.49	.47	.47
	(.14)	(.14)	(.14)	(.14)
N individuals	2740	2740	2749	2749
N regions	38	38	38	38

Notes: average marginal effects from two-level logistic regression model, *** p<.01, ** p<.05, * p<.10

Table S3. Entry to apprenticeship: Monte Carlo (MC) error estimates for coefficients and standard errors, two-level logistic model with 45 imputations

		Coef.	S.E.
Household disposable income (log)	Coef. / S.E	.3882**	.1497
	MC estimate	.0146	.0063
Household, ref. dual-earner			
One-earner employed	Coef. / S.E	-.1019	.1062
	MC estimate	.0002	.0002
One-earner employed	Coef. / S.E	-.5156**	.2255
	MC estimate	.0049	.0007
No-earner unemployed	Coef. / S.E	-.5388*	.3093
	MC estimate	.0073	.0010
Female	Coef. / S.E	-.6419***	.0977
	MC estimate	.0006	.0000
Immigration generation, ref. native			
1st generation	Coef. / S.E	-.3955***	.1933
	MC estimate	.0030	.0002
2nd generation	Coef. / S.E	-.4169***	.1431
	MC estimate	.0018	.0001
Grade point average	Coef. / S.E	.1662***	.0478
	MC estimate	.0004	.0000
Type of diploma, ref. general lower secondary			
Lower secondary qualifying	Coef. / S.E	.4095***	.1373
	MC estimate	.0013	.0000
Intermediate secondary	Coef. / S.E	1.2338***	.1579
	MC estimate	.0014	.0000
Entry at 2012	Coef. / S.E	.6825***	.1647
	MC estimate	.0014	.0001
Satisfaction with family life	Coef. / S.E	.0241	.0476
	MC estimate	.0005	.0000
Self-esteem	Coef. / S.E	.1013**	.0510
	MC estimate	.0003	.0000
Parental education, ref. lower sec.			
Intermediate secondary	Coef. / S.E	-.0495	.1308
	MC estimate	.0026	.0002
Abitur	Coef. / S.E	-.3860**	.1934
	MC estimate	.0032	.0003
Higher education	Coef. / S.E	-.2655	.1587
	MC estimate	.0049	.0007
No qualification	Coef. / S.E	.1623	.3530
	MC estimate	.0056	.0006
Missing	Coef. / S.E	-.2218	.2492
	MC estimate	.0216	.0079
Parent provides info	Coef. / S.E	.1820*	.0958
	MC estimate	.0012	.0001
Single parent	Coef. / S.E	-.2069	.1496
	MC estimate	.0055	.0011
Has sibling	Coef. / S.E	.1285	.1058
	MC estimate	.0021	.0002
Supply and demand ratio	Coef. / S.E	2.5773***	.6653
	MC estimate	.0041	.0004
N individuals / regions		2854 / 38	

Table S4. Likelihood to apply for apprenticeship, analysis for two samples: 1) all respondents, 2) respondents who entered to prevocational program

	All respondents		Participants of prev-ocational program	
Household, ref. dual-earner				
One-earner employed	-.018	(.013)	.010	(.033)
One-earner unemployed	.006	(.028)	.109**	(.053)
No-earner unemployed	.049*	(.028)	.139**	(.061)
Female	-.057***	(.013)	-.089***	(.029)
Immigration generation, ref. native				
1st generation	-.019	(.026)	-.032	(.055)
2nd generation	-.003	(.017)	-.007	(.040)
Grade point average	.001	(.006)	-.034	(.015)
Type of diploma, ref. general lower secondary				
Lower secondary qualifying	.018	(.020)	-.032	(.041)
Intermediate secondary	.037*	(.022)	-.041	(.051)
Entry at 2012	.110***	(.023)	.218***	(.051)
Supply and demand ratio	.154**	(.071)	.383**	(.166)
Intercept	.58	(.74)	-.10	(.98)
Variance estimates				
Intercept	.33	(.14)	.44	(.20)
N individuals	2810		869	
N regions	38		38	

Notes: average marginal effects from two-level logistic regression model, *** p<.01, ** p<.05, * p<.10. In some cases, school-leavers had an apprenticeship spell but they did not say in the earlier survey wave that they are applying for positions.

Table S5. Apprenticeship entry and parental occupation

	Model without income		Model with income	
Household, ref. dual-earner				
One-earner employed	-.028	(.018)	-.018	(.018)
One-earner unemployed	-.121***	(.043)	-.095**	(.043)
No-earner unemployed	-.142**	(.060)	-.105*	(.059)
Parental occupation, ref. skilled manual				
Manager or professional	-.019	(.030)	-.032	(.031)
Specialist	-.011	(.027)	-.014	(.027)
Service worker or clerk	-.008	(.024)	-.007	(.031)
Unskilled	-.048	(.042)	-.035	(.041)
Missing	-.006	(.034)	.003	(.034)
Parental education, ref. lower secondary				
Intermediate secondary	.006	(.022)	-.007	(.022)
Abitur	-.057	(.034)	-.064*	(.034)
Higher education	-.014	(.028)	-.035	(.028)
No qualification	.029	(.057)	.023	(.056)
Missing	-.023	(.035)	-.038	(.044)
Female	-.111***	(.017)	-.110***	(.017)
Immigration generation, ref. native				
1st generation	-.077**	(.037)	-.074**	(.037)
2nd generation	-.077***	(.027)	-.078***	(.027)
Grade point average	.031***	(.008)	.029***	(.008)
Type of diploma, ref. general lower secondary				
Lower secondary qualifying	.092***	(.030)	.084***	(.030)
Intermediate secondary	.254***	(.035)	.244***	(.034)
Entry at 2012	.108***	(.028)	.107**	(.028)
Satisfaction with family life	.005	(.008)	.005	(.008)
Self-esteem	.017**	(.009)	.017*	(.009)
Parent provides info	.035**	(.017)	.032*	(.017)
Single parent			-.035	(.026)
Has sibling			.022	(.018)
Household disposable income (log)			.065**	(.027)
Variance estimates				
Intercept	.48	(.14)	.48	(.11)
N individuals	2854		2854	
N regions	38		38	

Notes: average marginal effects from two-level logistic regression model with 45 imputations, controlling for slow entry, *** p<.01, ** p<.05, * p<.10

Table S6. Cross-level interaction effects on entry to apprenticeship, including regional long-term unemployment rate

	Entire Germany			West Germany		
	M1	M5	M6	M1	M5	M6
Household, ref. dual-earner						
One-earner employed	-.82	-.77	-.89	-.94	-.86	-1.10
	(.66)	(.67)	(1.28)	(.71)	(.72)	(1.78)
One-earner unemployed	-3.94***	-4.00***	-5.71**	-3.79**	-3.78**	-7.67
	(1.51)	(1.53)	(2.68)	(1.64)	(1.66)	(4.96)
No-earner unemployed	.11	.07	-2.53	.32	.04	-1.73
	(2.16)	(2.11)	(3.72)	(2.52)	(2.36)	(6.20)
Supply and demand ratio	2.21***	2.22***	2.18***	.936	.784	.725
	(.70)	(.70)	(.70)	(.93)	(.93)	(.93)
% employed in small firms				-.036	-.042	-.042
				(.03)	(.03)	(.03)
% long-term unemployed	-.012	-.007	-.011	-.056**	-.056**	-.059**
	(.016)	(.017)	(.017)	(.024)	(.024)	(.026)
Supply and demand ratio * household status (ref. dual-earner)						
* one-earner employed	.67	.68	.71	.78	.77	.84
	(.68)	(.68)	(.73)	(.73)	(.74)	(.89)
* one-earner unemployed	3.37**	3.58**	3.98**	3.16*	3.32*	4.79*
	(1.55)	(1.56)	(1.67)	(1.71)	(1.72)	(2.50)
* no-earner unemployed	-.91	-.65	-.40	-1.19	-.64	.01
	(2.23)	(2.17)	(2.27)	(2.73)	(2.56)	(3.32)
Long-term unemployment * household status (ref. dual-earner)						
* one-earner employed			.00			.00
			(.02)			(.03)
* one-earner unemployed			.03			.06
			(.04)			(.07)
* no-earner unemployed			.05			.03
			(.06)			(.08)
Control variables	+	+	+	+	+	+
Mediating variables	-	+	+	-	+	+
Variance estimates						
Intercept	.30	.30	.30	.28	.28	.28
	(.09)	(.09)	(.09)	(.10)	(.09)	(.09)
One-earner unemployed slope	.00	.00	.00	.00	.00	.00
No-earner unemployed	.35	.28	.37	.20	-	-
	(.75)	(.68)	(.65)	(.74)		
N individuals	2854			2539		
N regions	38			30		

Notes: coefficients from two-level logistic regression models, standard errors in parentheses, *** p<.01, ** p<.05, * p<.10. Models include region-level measure for long-term unemployment, i.e. the percentage of long-term unemployed from all unemployed. To reduce complexity, we estimated M5 and M6 with 20 imputations for missing income values (M5 for West Germany does not include slope for the category "no-earner unemployed" due to convergence problems).

Table S7. The effect of maternal and paternal employment status on apprenticeship entry, two-parent families only

	M1: Baseline		M2: + all covariates (except income)		M3: + household income	
Mother's status						
Unemployed	-.098*	(.058)	-.096*	(.057)	-.048	(.050)
Inactive	-.007	(.021)	-.008	(.020)	.004	(.020)
Father's status						
Unemployed	-.169***	(.053)	-.159***	(.053)	-.113**	(.048)
Inactive	-.103*	(.052)	-.096*	(.052)	-.088*	(.049)
Intercept	1.83***	(.19)	.74***	(.24)	-1.82	(1.24)
Variance estimates						
Intercept	.40	(.13)	.44	(.14)	.43	(.11)
N individuals	2414		2414		2414	
N regions	38		38		38	

Notes: M1 includes gender and immigration generation, type of diploma and parental education; M2 includes additionally GPA, dummy for slow entry, entry time, satisfaction with family, self-esteem and social networks; M3 adds household income. Average marginal effects from two-level logistic regression model with 45 imputations, *** p<.01, ** p<.05, * p<.10

Table S8. The effect of holding a regular job on apprenticeship entry

	Entry to apprenticeship	
Regular job	.052***	(.019)
Household, ref. dual-earner		
One-earner employed	-.015	(.043)
One-earner unemployed	-.093**	(.043)
No-earner unemployed	-.098*	(.070)
Female	-.109***	(.017)
Immigration generation, ref. native		
1st generation	-.074**	(.036)
2nd generation	-.074***	(.027)
Grade point average	.028***	(.008)
Type of diploma, ref. general lower secondary		
Lower secondary qualifying	.081***	(.030)
Intermediate secondary	.240***	(.034)
Entry at 2012	.103**	(.028)
Satisfaction with family life	.006	(.008)
Self-esteem	.017*	(.008)
Parental education, ref. lower sec.		
Intermediate secondary	-.006	(.022)
Abitur	-.064*	(.034)
Higher education	-.039	(.027)
No qualification	.025	(.056)
Missing	-.037	(.041)
Parent provides info	.030*	(.017)
Household disposable income (log)	.060**	(.025)
Single parent	-.037	(.025)
Has sibling	.024	(.018)
Variance estimates		
Intercept	.50	(.12)
N individuals	2854	
N regions	38	

Notes: average marginal effects from two-level logistic regression model with 45 imputations, controlling for slow entry, *** p<.01, ** p<.05, * p<.10