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# DISCUSSION

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# DISCUSSION PAPER

// ANNETTE HILLERICH-SIGG

## Transitions from Lower Track Secondary Schools into Vocational Training: Does a Detour Pay Off?

# Transitions from Lower Track Secondary Schools into Vocational Training: Does a Detour Pay Off?

Annette Hillerich-Sigg\*

September 28, 2020

**Abstract:** This paper analyzes the effect of alternative transition paths after grade 9 of German lower secondary school on vocational training. Using a selection-on-observables approach I show that a delayed transition into vocational training after lower track secondary school is not a disadvantage conditional on a successful transition into vocational training. Students benefit from continuing general schooling or attending vocational school compared to transitioning directly with regard to wages paid during vocational training as well as average wages, prestige, and socioeconomic status of the training occupation. This comes at the cost of a lower probability to match the training occupation with the reported desired occupation and being less satisfied with the vocational training. Participation in pre-vocational training does not lead to a different type of vocational training position than after a direct transition. However, those participants are less satisfied with their vocational training.

**Keywords:** school-to-work transition, secondary school, pre-vocational training, vocational training

**JEL classification:** J24, I28, I26

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# 1 Introduction

The gold standard for a smooth school-to-work transition of German lower track secondary school students is the direct transition into vocational training after grade 9.<sup>1</sup> Direct transition quotas are, for instance, the main measure of success in evaluations of career guidance activities. Hence, the fact that only a minority of students from lower track schools manage to transition directly into vocational training after leaving school (Gaupp et al., 2008; Menze and Holtmann, 2019), has been a concern to employers, educators, and politicians. Even though it is not clear a priori that is indeed a problem. Alternative pathways include continuing general schooling or going to vocational schools in order to upgrade the secondary school qualification, or participating in pre-vocational training. Those detours are a worthwhile investment when adolescents have higher aspirations and are able to accomplish those by, for instance, upgrading their secondary school qualification. For others, pre-vocational training might help to compensate perceived and observed shortfalls of skills necessary for vocational training (Kohlrausch and Solga, 2012; Protsch, 2014). However, other reasons for a detour like the failure to secure a vocational training position or avoidance of the complex decision of occupational choice might not lead to the desired effects. There remains the concern that adolescents might waste their time or even worsen their situation on the vocational training market by being subject to stigma (Beicht, 2009).

This paper analyzes the effect of alternative transition paths after grade 9 of lower track secondary school on the type of vocational training. I contribute to the literature by studying outcomes beyond the transition probability into vocational training. I analyze differences in match quality, drop-out probability, and level of satisfaction with the vocational training as well as wages, prestige, and socioeconomic status of the training occupation. These outcomes are compared for the direct transition as well as the delayed transitions into vocational training due to the continuation of general schooling, attendance of vocational school, or participation in pre-vocational training.

To my knowledge there is only scarce literature on the effects of different transition paths after lower secondary school. Studies on the effectiveness of pre-vocational training have mostly focused on the probability to transition into vocational training. Programs that allow to reach a higher secondary school qualification are correlated with a higher probability to transition into vocational training (Beicht, 2009; Enggruber and Ulrich, 2014; Solga, 2004), but the transition is often delayed (Schuchart, 2011). If there are positive correlations, they are mostly driven by high-performing students (Menze and Holtmann, 2019). Rahn et al. (2017) show that lower track secondary school students participating in different 1-year-programs are not more likely to start vocational training. Within the pre-vocational training programs that do not provide the option of upgrading the secondary school qualification, programs where students spend more time within firms are positively related to the transition into vocational training (Achatz et al., 2012; GIB/IAB, 2012; Menze and Holtmann, 2019). So far the existing evidence suggests that pre-vocational training does not foster the development of skills (Nickolaus et al., 2018; Weißeno et al., 2016). The literature above does not allow a causal effect interpretation, as they cannot account for selection into pre-vocational training. Kübler et al. (2019)

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<sup>1</sup>The German three-tier secondary school system is traditionally supposed to prepare students in the lower track (“Hauptschule”) until grade 9 for vocational training in crafts, trades, and service occupations with moderate to low requirements. Students in the middle track (“Realschule”) are also prepared for vocational training, but remain in school until grade 10 and thus qualify for more complex occupations. Upper track secondary schools (“Gymnasium”) prepare for higher education until grade 12 or 13, but they may also enter vocational training after graduation.

find in an experimental audit study that employers prefer applicants who voluntarily participated in a pre-vocational training over those only working in an informal job. While the design of the study allows causal interpretation, the transferability of the results on Germany in general is questionable. Berlin is the only state that does not have compulsory schooling until 18 and thus selection into pre-vocational training is likely to differ from other states. Caliendo et al. (2011) find a positive effect of pre-vocational training on the transition in vocational training for unemployed youth, however, no effect on employment probability within five years after program entry.

While most of the literature analyzes the determinants of the probability to start a vocational training, there is only little evidence on the determinants of the type of vocational training or occupation. Studies show that students with higher school qualification levels, better math grades as well as females enter more prestigious occupations (Beicht and Walden, 2014; Schuchart, 2007). Continuing general schooling is associated with a superior vocational training occupation conditional on a transition into vocational training (Geier et al., 2011; Schuchart, 2011). The level of satisfaction with the vocational training after a direct or a delayed transition is comparable while it is slightly worse after a delayed transition (BiBB, 2018, pp. 257), however, these results are only based on descriptive statistics.

This paper shows that a delayed transition into vocational training after lower track secondary school is not a disadvantage conditional on a successful transition into vocational training. Using the comprehensive survey data NEPS I account for selection on a wide range of observables into the different transition paths, but cannot rule out possible selection on unobservables. Students benefit from continuing general schooling or attending vocational school compared to transitioning directly with regard to wages paid during vocational training as well as average wages, prestige, and socioeconomic status of the training occupation. This comes at the cost of a lower probability to match the training occupation with the reported desired occupation and being less satisfied with the vocational training. Attending vocational school before the vocational training makes dropping out of vocational training more likely. Participation in pre-vocational training does not lead to a different type of vocational training position compared to a direct transition. However, those participants are less satisfied with their vocational training.

The paper is organized as follows: Section 2 introduces relevant institutions of school-to-work transitions, Section 3 describes the data and the selection into transition paths, Section 4 provides expectations, and Section 5 explains the empirical approach. The results including the analysis of heterogeneous effects, mechanisms, and robustness checks are presented in Section 6, Section 7 concludes.

## **2 Institutions of School-to-Work Transitions of Lower Track Secondary School Students**

Traditionally, the lower track of the German three-tier secondary school system means to prepare students for a vocational training after leaving school at the end of grade 9.<sup>2</sup> Upon successfully completing grade 9, they receive the lower track secondary school qualification (“Hauptschulabschluss” or equivalent), which has been sufficient for many

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<sup>2</sup>In this system, middle track secondary school, lasting until grade 10, also prepares for vocational education and upper track secondary school, lasting until grade 12/13, prepares for higher education.

apprenticeship occupations. However, with larger share of secondary school students graduating with a higher education entrance qualification (“(Fach-)Hochschulreife”) and still entering the vocational training market (Bonin et al., 2016) as well as vocational training of many occupations becoming more complex (Protsch, 2014), the direct transition into vocational education has become rarer for lower track secondary school students. Policy reactions to this development have been observed with regard to education and labor market policy. Education policy is in state responsibility, while labor market policy is in federal responsibility.

Most states have expanded in different ways the possibilities for lower track students to reach a middle track secondary school qualification (“Mittlere Reife”) and thus upgrade their secondary school qualification. Most expanded lower track secondary schools’ grade range up to grade 10. While this has become the most common path for lower track students in some states, access to this option is more restricted in other states. Some states have even eliminated the lower track altogether and aggregated lower and middle track secondary school going until grade 10. Alternatively, states offer more programs at vocational schools that reward the middle track secondary school qualification. Those programs usually entail also vocational education curriculum in several occupational fields.

In the context of this paper, a student has an upgraded school qualification whenever it is higher than a lower secondary school qualification, i.e. a qualifying lower secondary school qualification (“qualifizierender Hauptschulabschluss”) or middle track secondary school qualification (“Mittlere Reife”). In some states the qualifying lower secondary school qualification can also be reached when graduating from grade 9 with very good grades. It shows that the graduate is qualified for the continuation of general schooling in grade 10. The middle track secondary school qualification requires at least 10 years of schooling and can be reached both at general and vocational schools.

A wide range of pre-vocational training programs are offered to students that do not have the potential to reach a higher secondary school qualification, but are not or do not feel ready to start a vocational training. Only very few 9<sup>th</sup> grade students participate in pre-vocational training by choice but rather by lack of alternatives.<sup>3</sup> In this case, school-leavers have to participate in pre-vocational training because most states have compulsory schooling until age 18, which can be fulfilled either at general schools or vocational schools (full-time or part-time schooling during an apprenticeship) (Vossenkuhl, 2010).<sup>4</sup> Hence, selection into pre-vocational training is likely to be negative. In 2014 roughly 253,000 young individuals started a pre-vocational training program (Statistisches Bundesamt, 2015). Pre-vocational training programs are instruments both of federal youth labor market policy and states’ education policy. Thus they are offered at vocational schools or by private educational providers financed by the employment agency (as active labor market policy program). They entail general schooling, vocational education, and work experience placements. They neither offer a vocational qualification nor general school qualification. Here, students are supposed to be prepared for vocational training whenever skills are missing and they have not found an apprenticeship position.

Transition into vocational training involves the choice among over 300 apprenticeship occupations and timely applications. Most of the students enter vocational education by a firm-based apprenticeship with part-time vocational schooling, in my sample this

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<sup>3</sup>When surveyed in grade 9, only 4% of students in my sample expected to participate in pre-vocational training after leaving school.

<sup>4</sup>Only Berlin does not have compulsory schooling until age 18, but requires ten years of schooling.

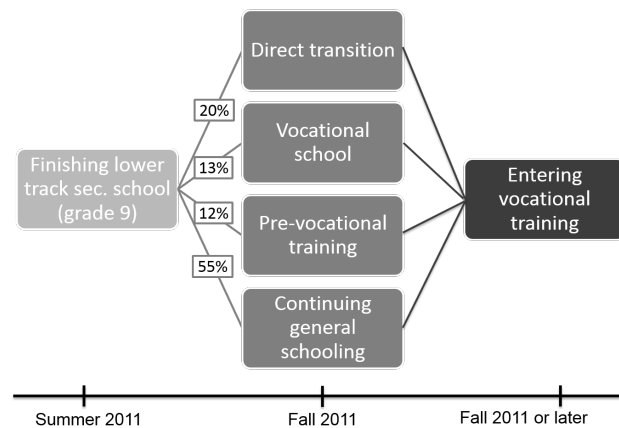
makes up 80%. The recruiting process for apprenticeships is equivalent to recruiting for other jobs, thus the individuals compete for apprenticeships posted by employers. Occasionally, employers (mostly in rural areas) are pushed by the general public to increase the supply of apprenticeships if there are too many students who would like to start an apprenticeship and who would otherwise not be able to. Vocational training for some occupations are full-time school-based, for instance nurse and nursery/kindergarten teachers. Admission for school-based vocational training are mostly based on prior academic achievement.

### 3 Data and Selection into Transition Paths

#### 3.1 Data

The starting cohort 4 of the National Educational Panel Study (NEPS) is used to examine the effect of different transition paths on the type of vocational training (Blossfeld et al., 2011).<sup>5</sup> The survey of this NEPS cohort starts with grade 9 in 2010 in all three tracks of secondary school. Students are surveyed as long as possible in the classroom context and followed individually after leaving school via at least yearly CATI interviews. For this paper, only observations of students of the lower track of secondary school or equivalent types of secondary school are used. It is possible to follow the students up to four years after grade 9.

Figure 1: Scheme of Transition Paths after Grade 9



The transition path is determined based on the individual’s status in fall 2011 right after finishing grade 9 of lower track secondary school (see Figure 1). The sample consists of 3,730 individuals for whom the transition path in fall 2011 is known. The individuals either use the traditional path of transitioning directly in vocational training (20%), attend vocational school (13%), participate in pre-vocational training (12%), or

<sup>5</sup>Data used from the National Educational Panel Study (NEPS): Starting Cohort Grade 9, doi:10.5157/NEPS:SC4:9.1.1. 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.

continue general schooling at the school where they started secondary school (55 %).<sup>6</sup> The continuation of general schooling is the most frequently chosen option. This requires that the educational system of the state and the school allows for this option. Going to a vocational school means in this context that the student participates in a program that offers the completion of the middle track secondary school qualification, but does not award a vocational qualification. However, the programs usually include a vocational curriculum in an occupational field. Pre-vocational training programs can also take place at vocational schools, but they neither offer a general school qualification (middle track or higher) nor a vocational qualification, but are designed to prepare for vocational training and increase trainability.<sup>7</sup> Pre-vocational training and programs at vocational schools are treated as common group of programs in the ‘transition system’ (“Übergangssystem”) in reporting on education (see e.g. Autorengruppe Bildungsberichterstattung, 2014). However, they differ both in participants and outcomes and thus are treated as separate transition paths here.

The analysis is focused on those individuals who start vocational training at some point in the observed time span, i.e. 2,779 individuals.<sup>8</sup> The aim is to assess differences in the started vocational training, hence the following outcomes variables are considered: matching quality of training occupation, stability of the vocational training measured by drop-out probability within the first year, level of satisfaction with the vocational training, starting wage in vocational training and a number of occupation-based information on the vocational training. Those are the socioeconomic status, the prestige, and average wage of vocational training occupation.<sup>9</sup> The socioeconomic status of the training occupation is measured with the ISEI-08 score developed by Ganzeboom (2010) and Ganzeboom, Graaf, et al. (1992). It maps occupations in a range of 11.56 to 88.96 in a combination of level of education and income. Prestige of occupation of vocational training is measured with the SIOPS-08 score developed by Ganzeboom and Treiman (2003) and Treiman (1977). It ranges from 0 to 100 and is a prestige ranking based on surveys from 55 countries. Average wage of occupation of vocational training is the average monthly wage before tax in 2010, matched on the occupation of vocational training in East/West-gender-occupation-cells using the occupation classification KldB2010.

The outcome variables are listed in Table 1 including the sample mean and standard deviation as well as means by transition type. 36 % of the sample matched the vocational training with their desired occupation in grade 9. However, the difference by direct transition and detour is large: 61 % match desired and training occupation after a direct transition into vocational training. They also drop out less often within in the first year (25 %), below the sample mean of 30 %. The ISEI-08 score for socioeconomic status of the training occupation averages at 34.77, below the score of 37 which has been determined to represent occupations that are mostly occupied by individuals having reached at least a middle track secondary school qualification (Schuchart, 2011). While skilled manual workers (mostly craft workers, some skilled service, and skilled machine operators) reach an average ISEI score of 36, semi-unskilled workers (mostly machine op-

<sup>6</sup>The distribution of transition types is likely to be slightly biased by panel attrition as students leaving school need to be followed individually. The share of students remaining at general schools is likely to be overrepresented in the sample, while direct transition, pre-vocational training, and vocational school are probably underrepresented. As we control for background characteristics relevant for panel attrition in the estimations, this should not bias the results (Steinhauer and Zinn, 2016). Nonetheless, the robustness of the estimations results to sample selection issues is tested in Section 6.3.

<sup>7</sup>Table A.1 describes the programs that are observed in the sample.

<sup>8</sup>As the selection into a vocational training is not random, this selection issue is discussed in Section 6.3.

<sup>9</sup>Detailed description in Table A.2 (in Appendix).



erators, elementary laborers, elementary sales and services) reach an average ISEI score of 31 (Ganzeboom and Treiman, 1996). Individuals attending vocational school enter vocational training positions with the highest average score of 37.64, above the threshold for middle track school qualification, while participants of pre-vocational training and individuals transitioning directly share the lowest socioeconomic status of their training occupation at 31.29. The prestige score SIOPS-08 averages at 40.23 over the sample with a smaller standard deviation. Individuals attending vocational school again have the highest score of 41.74 in their training occupation. The starting wage during the vocational training averages at 467 Euros (monthly wage after tax), with individuals following a direct transition into vocational training earning the least with 428 Euros per month. The individuals in the sample enter training occupations with average wages of 2728 Euros, with participants of pre-vocational training programs having the lowest average at 2647 Euros. Finally, the level of satisfaction with the vocational training reaches a mean of 8.08 (in a Likert scale of 1 to 10, with 10 being entirely satisfied). Here, individuals transitioning directly into vocational training are the most satisfied with an average of 8.53.

Table 1: Descriptive Statistics of Outcome Variables by Transition Type

	Total Mean	Total Std.	Pre-voc. training	Voc. school	Gen. school	Direct transition	Obs.
Match desired/ voc. training occupation	0.36	0.48	0.27***	0.29**	0.27***	0.61***	2190
Drop-out of voc. training within first year	0.30	0.45	0.34*	0.34	0.30	0.25***	2779
SES of voc. training occupation (ISEI-08)	34.77	11.82	31.29***	37.64***	36.66***	31.29***	2702
Prestige of voc. training occupation (SIOPS-08)	40.23	7.73	38.35***	41.74***	41.04***	38.78***	2702
Starting wage in vocational training	467	155	445**	509***	483***	428***	2165
Average wage of voc. training occupation	2728	606	2647**	2827***	2761***	2659***	2694
Level of satisfaction with voc. training	8.08	1.53	7.54***	7.72***	7.96***	8.53***	2303

Notes: See Table A.2 (in Appendix) for description of the outcome variables. Stat. significant difference relative to all three other groups: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Summarized, we observe that after a direct transition in vocational training individuals are more likely to have matched the training occupation with their desired occupation, are less likely to drop out within the first year, and are more satisfied. A transition through vocational school is associated with the highest wages, prestige, and socioeconomic status of the training occupation, closely followed by the continuation of general schooling. Participation in pre-vocational training is associated with similar levels of wages, prestige, and socioeconomic status as the direct transition.

As the descriptive differences in the means might be biased by selection into the transition path, the comprehensive survey data of the NEPS is used. Besides the standard personal and family background characteristics, like gender and migratory background, also health status (Beicht and Walden, 2014) and socioeconomic status of mother’s and father’s occupations (Geier et al., 2011) are available. I use final grades in German and Math of grade 9 as well as results of competence tests in math, reading, perceptual speed and more. By this, I control both for the by the employers observed skill level (grades) and

measures for ability (cognitive skills). Non-cognitive skills and personality traits have shown to be relevant for the school-to-work transition (Kohlrausch and Solga, 2012; Protsch and Dieckhoff, 2011) and, hence, are included in the analysis. The advancement of career planning in grade 9 probably influences the likelihood to transition directly in vocational training because the delay might be due to choice avoidance. It can also affect the type of vocational training and thus is included in the analysis. Socioeconomic status of the reported desired occupation and level of life satisfaction in grade 9 are used to control for differences in the default levels of the outcome variables. Level of life satisfaction in grade 9 is only included in the model for level of satisfaction with the vocational training. Career guidance activities affects transition choice and might as well affect the type of vocational training, assuming that they influence the decision quality (Fitzenberger, Hillerich-Sigg, et al., 2020; Fitzenberger and Lickleder, 2017; Solga and Kohlrausch, 2013). Application behavior is included as well, the only control variable that is measured both during and after grade 9, because those already planning to postpone the vocational training start applying later. School and class characteristics are included as well, as there are considerable differences on these levels in terms of additional career guidance, institutions, and class composition that might be relevant for the school-to-work transition (Fitzenberger, Hillerich-Sigg, et al., 2020). The share of students with a particular transition path is highly correlated with the state as the state’s education policy determines, for example, the availability of programs at vocational schools or grade 10 at lower track secondary schools. Thus, I control for the type of state the individual went to school. Finally, local labor market characteristics are known to be highly relevant for school-to-work transitions (Riphahn, 2002). Kleinert and Kruppe (2012) describe 12 apprenticeship market types across Germany, which I use as dummy variables. All variables, including variable descriptions, are listed in Table A.2 (in Appendix). I use imputation methods for missing control variables to prevent losing too many observations. The imputation methods used are described as well in Table A.2 for each variable. Controls for imputed variables are included in the estimations.

### 3.2 Selection into Transition Paths

In order to identify relevant determinants of the selection into transition paths I use a multinomial logit model. The average marginal effects with the direct transition as base category are shown in Table A.3 (in Appendix). There are differences between transition paths regarding age, gender, and migratory background: Participants of pre-vocational training are older and those continuing general school are younger than those transitioning directly. Men are less likely to go to school (both general and vocational) while a migratory background increases the probability to participate in pre-vocational training.

Students with worse grades in Math and German are more likely to participate in pre-vocational training than transiting directly in vocational training. Worse grades reduce the probability to attend vocational school, while general schooling and direct transition do not differ in academic achievement. With regard to cognitive skills, reading and math competences are the most relevant for the transition path. Students with better reading skills are more likely to continue schooling (either vocational or general) than transitioning directly in vocational training. Higher math skills are negatively related to participating in pre-vocational training and attending vocational school, and positively related to continuing general school.

Personality traits, measured by the Big Five, are not relevant for the selection in tran-

sition paths. The self concept how the students see their skills in German, Math, and generally in school are more relevant. Particularly, the self concept on school influences the transition decision. Students with a high self concept on school are less likely to participate in pre-vocational training and more likely to continue general school. A higher self concept on Math increases the probability to continue general school. Prosocial behavior makes it less likely to continue schooling than transitioning directly in vocational training. Students, who describe their career planning to be advanced, are less likely to attend vocational school (compared to those transitioning directly). A work experience placement, which was helpful for career planning, and counseling by the employment agency, decreases the probability to continue general schooling and increases the probability of directly starting vocational training.

School and class characteristics are only relevant for the selection into some transition paths. Students are more likely to continue general schooling when their school offers grade 10 and when this transition path is very common across the state. Local labor market types play an important role in the selection into different transitions. In rural Eastern German regions with few students, high unemployment, and average market tightness students are more likely to participate in pre-vocational training and less likely to attend vocational schools. The latter is true for all Eastern German regions. Vocational schools are a more frequent choice in most Western German regions (even compared to the Western German reference group).

In order to assess the explanatory power of the model, the estimations are repeated with OLS using dummies for each transition path as outcome variable (Table A.4 in Appendix). Marginal effects of the logit estimation and the coefficients of the OLS estimations are comparable in size and direction. The  $R^2$  ranges from 0.10 to 0.41 with the transition into general school and direct transition being best explained by the model. When adding the variables stepwise to the estimation, school grades add the largest explanatory power (not shown).

Overall, it these results give the impression that there is a negative selection with regard to school grades into pre-vocational training and a positive selection into vocational schools. With regard to math competencies the positive selection is directed towards general schooling, whereas pre-vocational training and vocational school are similarly negatively selected compared to direct transitions. Career guidance activities reduce the probability to continue schooling. Students with advanced career planning are less likely to attend vocational school. However, factors beyond individual characteristics like the state's education policy and local labor market characteristics are also significant determinants.

## 4 Theoretical Considerations

Given the market situation the students face when applying for most vocational training positions, labor market theories can be applied to form hypotheses on the effect of the different transition paths on the type of vocational training.

Classical human capital theory expects that any kind of prolonged schooling would increase human capital and hence productivity (Becker, 1993). In a framework involving training costs, previously achieved levels of education prove the trainability of an applicant (Thurow, 1972). This should lead to an improved position in the applicants' pool and open up opportunities to higher paying occupations or occupations of more prestige. Thus, lower track secondary school students would benefit from continuing general

schooling, but also from participating in pre-vocational training or vocational schooling over transitioning directly into vocational training. A ranking between general schooling and vocational education is not clear *ex ante* and might depend on the match of occupational field of the pre-vocational training and the vocational training occupation. If the student can accumulate occupational knowledge matching the future vocational training occupation they would have improved their productivity. Otherwise, we do not expect differences in the effect of the different types of continuation of schooling.

Expectations from job search models (e.g. Mortensen and Pissarides, 1999) are ambiguous. On the one hand, students who transition directly into a vocational training have had a shorter job search period and are thus less likely to find a good match, e.g. with regard to wages and status. On the other hand, transitioning directly into vocational training might indicate a more advanced career planning and higher search effort during grade 9. Whether the longer search period or higher search effort is more effective is an empirical question.

Regarding the effect of a detour after grade 9, we have to consider the reasons why students might choose a different path after grade 9. The first reason might be that students realized during their career planning that they have higher aspirations and that the lower track secondary school qualification is not sufficient for their desired occupation. Thus they plan an educational upgrading of their secondary school qualification by either continuing general school or by attending vocational school. They would then benefit from the longer search period and thus are more likely to face a larger variety of apprenticeship offers. This would result in a vocational training position of higher quality. It is also likely that those individuals are more satisfied with their vocational training as they realized their career plan.

An alternative reason for the same transition path of educational upgrading would be if students want to enter a vocational training, but are unsuccessful in securing a vocational training position in the desired occupation. Here, the extended search period could allow them to realize their originally planned vocational training position or adjust their plans and thus show positive effects on the type of vocational training. In the case of readjustments of career plans the desired and realized occupation will not match anymore and this might lead to lower levels of satisfaction.

For students who are less advanced in their career planning it seems likely that they continue general schooling as the easiest, most salient option. Thus educational upgrading is more a result of choice avoidance than intentional career planning. According to search theory, after the additional school year they might be more able to make an occupational decision and feel less uncertainty regarding a vocational training. However, they probably benefit less from the additional time than those making the intentional decision. Other individuals might opt for the vocational school also due to choice avoidance regarding a vocational training, but might consider the vocational school as an interim solution between continuing general school and vocational training. Additionally to the extended search period, they might gain an advantage by becoming more familiar with an occupational field and thus improve their occupational decision.

The participation in pre-vocational training probably is in the least cases an intentional part of career planning (unlike educational upgrading discussed above). Adolescents participate due to a number of reasons: Too high aspirations, delay in career planning, choice avoidance, being unsuccessful in securing a vocational training position, and possibly too low skill levels. While they gain time and extend their search period as well, the mechanism here is more of cooling-off of high aspirations and making concessions to accept a vocational training position which is available on the local labor market.

During the pre-vocational training those individuals probably go through a career planning process, which those who transitioned directly already did during school. If the pre-vocational training includes work experience placements, the individuals can accumulate more knowledge about labor market opportunities, learn about what they like and do not like, and through networking reduce search costs. Hence, they probably end up at similar positions as those transitioning directly after grade 9, but might be less well matched to their original desired occupation and less satisfied because they had to adjusted their expectations.

This framework also fits the impression we get from comparing students' aspirations regarding their transition after grade 9 during school and their realized transition after grade 9, which is shown in Table 2. The difference between idealistic and realistic aspirations seems to be the smallest for those students entering directly into vocational training. Already two thirds of them aspired the direct transition. The majority of students continuing schooling (both general and vocational) planned to do so during grade 9, too. There is a larger share (ca. 30 %) who wished to start a vocational training directly after grade 9 (idealistic aspiration). This share is smaller when considering the options realistically, but still 23 % of the students who continue schooling planned to directly enter vocational training. Participants in pre-vocational training experience the largest adjustment of aspirations. Only 4 % expect the participation realistically when surveyed. Still half of the students who ended up in pre-vocational training realistically expected to enter directly into vocational training after school.

Table 2: Descriptive Statistics of Aspirations After Grade 9 by Transition Path

	<b>Realized Transition Path</b>			
	Pre-voc. training	Vocational school	General school	Direct transition
<b>Idealistic Aspirations</b>				
Continue general schooling	0.42	0.57***	0.57***	0.23***
Direct transition into voc. training	0.44	0.32***	0.30***	0.66***
Pre-voc. training	0.02**	0.01	0.01	0.01
other	0.11	0.10	0.12*	0.10
<b>Realistic Aspirations</b>				
Continue general schooling	0.36***	0.70***	0.71***	0.22***
Direct transition into voc. training	0.50***	0.23***	0.23***	0.72***
Pre-voc. training	0.04***	0.01	0.01**	0.01
other	0.09***	0.06	0.05	0.05

Notes: Survey questions of wave 2 (summer 2011) on idealistic school aspirations “If it were up to you: What would you prefer to do after 9th grade?” and on realistic aspirations “And when you think realistically: What do you think you will really do after 9th grade? I probably will...?”. Vocational school was not provided as an option in the survey. Stat. significant difference relative to all three other groups: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

The type of transition might also be taken as a signal for trainability and productivity (Spence, 1973). There is the impression that in particular pre-vocational training has a stigma of being a useless waiting loop (Beicht, 2009; Kohlrausch, 2012; Kübler et al., 2019). Students only participate when they did not find a vocational training position, but need to fulfill their compulsory schooling time.<sup>10</sup> This could indicate a negative selection and would lead employers to assess the participation in pre-vocational training as a signal for negative selection with respect to trainability and productivity (Spence,

<sup>10</sup>Only the state of Berlin does not have compulsory schooling until the age of 18 (Vossenkuhl, 2010).

1973) which makes it more difficult to enter high paying vocational training positions. The continuation of general schooling is likely to be a positive signal as it signals lower cost for schooling. Following this argument also vocational school would be beneficial following the signaling theory. However, the impact might depend on the prestige of vocational schools in the local labor market.

Overall, I expect the continuation of general schooling and vocational school to be beneficial for the type of vocational training compared to transitioning directly into vocational training. Regarding the match of desired and realized occupation and level of satisfaction I expect no difference or even a negative effect. Expectations for pre-vocational training compared to the direct transition are ambiguous.

## 5 Empirical Approach

Selection into the different transition paths is not random as shown in Section 3.2, thus the comparison of the means like in Table 1 is probably biased by selection effects. Given the comprehensive data available in the NEPS I use a selection-on-observables approach and estimate the following model to determine the effect of different transition paths after grade 9 compared to the direct transition into vocational training:

$$y_i = \alpha + \beta \text{transition}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st} + u_i, \quad (1)$$

where  $y_i$  is one of the outcome variables described in Section 3.1,  $\beta$  is the vector of coefficients for the type of transition – pre-vocational training, vocational school, and general school –, entering the estimations as factor variable with the base category direct transition. Thus, the effect of transition paths is estimated with respect to a direct transition into vocational training after grade 9.  $X_i$  are the individual control variables,  $X_c$  control variables on class level,  $X_{sc}$  control variables on school level,  $X_{lm}$  control variables for local apprenticeship market, and  $X_{st}$  control variables on state level as described in Section 3.1 and Table A.2 (in Appendix). Controls for imputed variables (see Table A.2) are included in the estimations. Standard errors are clustered on the school level.

For binary outcome variables, I estimate Probit models:

$$P(y_i = 1 | X_i, X_c, X_{sc}, X_{lm}, X_{st}) = \Phi(\alpha + \beta \text{transition}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st}) \quad (2)$$

In this selection-on-observables approach the causal effects of the transition paths can only be identified when all variables that influence both the selection into the transition paths and the type of vocational training are included in the model. Hence, I will discuss a number of possible limitations of this approach in the context of this analysis and to what extent they limit the causal interpretation of the results.

The available observable characteristics that might determine selection into the transition type are discussed in Section 3. Contrary to many other studies analyzing school-to-work transitions in Germany before, using the NEPS data makes it possible to account for differences in cognitive skills, independently of school grades, many non-cognitive skills, aspirations and motivational aspects (e.g. self-concepts regarding school and application effort) as well as regional labor market effects (Solga, 2015). The analysis on the selection into transition paths in Section 3.2, in particular Table A.4, shows that the

model can explain a large share of the variation. Unfortunately, the selection into pre-vocational training and vocational school are the least well explained by the observable covariates. But robustness checks in Section 6.3 show in stepwise addition of covariates the same tendency as the results of the selection estimations: The covariates seem to account for a negative selection into pre-vocational training and a more positive selection in vocational school (at least with respect to grades and cognitive skills). Given the selection-on-observables approach, I cannot entirely exclude that there are unobservable characteristics that might affect both selection into transition paths and the type of vocational training.

The control variables are collected during grade 9, before the transition path is taken. Only the variable on application effort (number of occupations applied to) is also based on information from later waves because using application effort during grade 9 for those not planning to directly transition into vocational training, anticipation effects would make the variable unreliable. Based on the timing of the survey, it seems plausible to assume that the transition path has no effect on the control variables. But anticipation effects might be relevant with regard to school grades, advancement of career planning, and take-up of career guidance support.

Students anticipating to continue schooling might be less motivated to improve their school grades, be less advanced in their career planning, and take-up less career guidance activities because they believe to still have time to do this during the next school year. Comparing average school grades of those students continuing general schooling by their realistic aspiration “continue schooling” vs. “other transition” (which means “direct transition” in the vast majority of cases, see realistic aspirations in Table 2) shows no significant difference (not shown). This applies as well for students attending vocational school. There are small differences in tested skills (those anticipating to continue schooling have significant higher reading competence), which might indicate that anticipating students received grades below their skill level. But as those skill levels are included in the model, the groups are still comparable when conditioning on covariates.

There are no indications for reduced career guidance or application activities due to anticipating the continuation of schooling (within the group of those actually continuing general schooling), but those anticipating to continue schooling describe themselves as less advanced in their career planning. As improving career planning is part of the expected effect of a detour after grade 9 (see Section 4), this should not bias the estimated effect.

Anticipation of participation in pre-vocational training is unlikely to affect the control variables as the share of students anticipating pre-vocational training as transition path is very small (see Table 2) and thus I do not expect this to be a driver of the results.

As mentioned above in Section 3.1 due to the panel structure of the data, panel attrition is not evenly distributed between transition types. Students who continue general school are followed within their school and thus are much more likely to remain in the sample than students leaving general school after grade 9. Those in the sample might be positively selected, this is particularly true for individuals taking the transition path of vocational school or pre-vocational training because the time span until the start of a vocational training is potentially longer. However, the most decisive step “staying in the sample after leaving the sample school” has to be done across all transition types and might be more relevant. Additionally, it is possible to control for background characteristics relevant for panel attrition in the estimations (Steinhauer and Zinn, 2016). Probably the most important selection in the context of school-to-work transition is the selection into vocational training. While I discuss this selection in Section 6.3 I need to

stress that the scope of this approach only allows interpretations conditional on the transition into vocational training. A more extended discussion of issues of sample selection is presented in Section 6.3.

A limitation of this approach is that it is not possible to disentangle the effect of the transition path and a possible age effect. Any of the considered detours delay the start of the vocational training by at least a year, accordingly the individuals mature and might reach other types of vocational training position independently of the transition path they take. If this is the case, the estimated effects would be positively biased. I investigate in Section 6.2 how relevant the age effect might be for my analysis, but I am not able to complete rule it out.

## 6 The Effect of Transition Path on the Type of Vocational Training

In this section the overall effects of transition paths are presented first. Additional heterogeneous effects by state type and gender and the analysis of effect mechanisms are shown as well as robustness checks.

In Table 3 the effects of different transition paths on the type and quality of vocational training are presented. The direct transition into vocational training serves as reference group for all other transition paths. The results on the different outcomes show an unambiguous picture: The detour with continuing general schooling or going to a vocational school pays off in terms of wages, socioeconomic status, and prestige of the training occupation, but comes at the cost of lower satisfaction with the vocational training and a less likely match of desired and realized training occupation. Compared to the direct transition adolescents transitioning through vocational school into vocational training earn the highest starting wages during the vocational training (positive effect of 81 Euros) and are trained in occupations with the highest average wages (+214 Euros). Thus an increase of about half (starting wage) and a third (average wage) of the respective standard deviation (see Table 1). Students continuing general school are closely behind vocational school attendees with regards to wages (+78 Euros and +193 Euros respectively) while they are trained in occupations with the highest prestige (+2.2 points) and socioeconomic status (+4.1 points), both roughly a fourth of the respective standard deviation.

However, regardless of the type of detour, students transitioning directly into a vocational training are more likely to match it with their desired occupation during grade 9 and are more satisfied with the vocational training than students continuing schooling. This is also true compared to participants of pre-vocational training. They are particularly unsatisfied with their vocational training (-0.96 in a 1 to 10 Likert scale with a standard deviation of 1.53). With regard to the type of vocational training there are no significant differences between individuals transitioning directly in vocational training and those participating in pre-vocational training first. The latter only earn slightly more during the vocational training. The probability to drop out of vocational training is significantly higher for those going through vocational school than for those transitioning directly, but it does not differ for other transition paths.



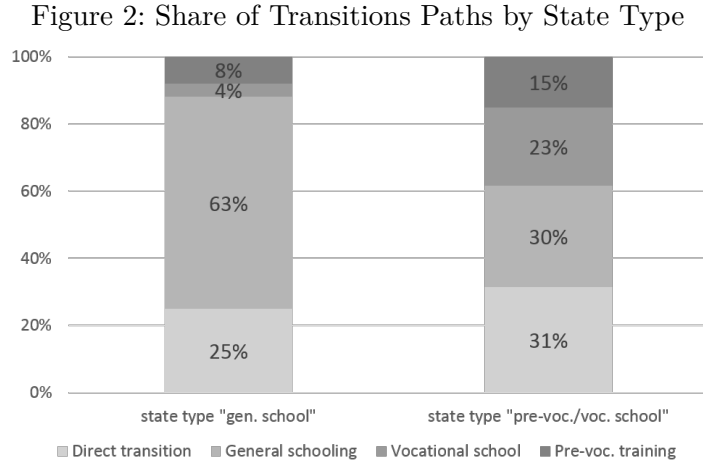
Table 3: Effects of Transition Paths on Vocational Training

	Match occup.	Drop- out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.26*** (0.04)	0.02 (0.03)	35.20*** (13.45)	-0.23 (0.57)	0.05 (0.69)	40.44 (37.53)	-0.96*** (0.14)
Voc. school	-0.25*** (0.04)	0.08** (0.04)	80.99*** (13.82)	1.85*** (0.55)	3.87*** (0.87)	214.41*** (44.28)	-0.77*** (0.14)
Gen. school	-0.28*** (0.03)	0.03 (0.03)	78.11*** (9.57)	2.20*** (0.44)	4.10*** (0.55)	192.84*** (33.84)	-0.60*** (0.09)
Observations	2190	2779	2165	2702	2702	2694	2303
$R^2$			0.11	0.12	0.23	0.35	0.11

Notes: All controls included, see full models in Table A.5 in Appendix. Average marginal effects of probit estimations for match of occupations and drop-out. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

## 6.1 Heterogeneous Effects

The observed overall effects might be driven by particular subgroups in the sample, either specified by personal characteristics or more general categories. I test heterogeneous effects by migratory background, gender, school-based vocational training (vs. apprenticeship with part-time schooling), and type of educational system of the state. There are no relevant heterogeneous effects by migratory background and school-based vocational training (hence not shown), but for two other subgroups.



Notes: State type "general school" N=1935, State type "pre-vocational training/vocational school" N=844.

The transition path chosen by students after grade 9 is correlated with the state's educational system as documented in Table A.3 (in Appendix). When going to school in a state with a high share of students continuing general schooling, students are more likely to do the same. The state's educational system might also affect the way the chosen transition path is perceived when applying for vocational training positions. The educational system sets the norm and shapes the views of employers and schools reviewing applications. Thus, subgroups of state types are formed based on the share of students choosing those two transition paths. The states Baden-Württemberg, Hesse, and Rhineland-Palatinate

have the highest shares of students participating in programs of pre-vocational training and vocational schools. Those states aggregated to one subgroup make up 30% of the sample of individuals starting a vocational training.<sup>11</sup> Figure 2 shows the share of transition paths for the two state types “general school” and “pre-vocational training/vocational school”. 63% of the students going to schools in states of type “general school” continue general school while this transition path makes up only 30% in states of type “pre-voc. training/voc. school”. In those states 23% attend vocational schools and 15% participate in programs of pre-vocational training, those two transition types together constitute the largest group. The share of students transitioning directly into vocational training is comparable with 25% and 31%, respectively.

Based on the following model the heterogeneous effects by state type are estimated:

$$y_i = \alpha + \beta \text{transition}_i + \eta \text{statetype}_i + \mu \text{transition}_i * \text{statetype}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau D_{st} + u_i, \quad (3)$$

where  $\beta$  is the vector of the coefficients for the transition type,  $\eta$  the effect of state type “pre-voc. training/voc. school”,  $\mu$  the vector of the coefficients of the interaction term of transition type and state type.  $D_{st}$  are dummy variables for states, to make sure that  $\text{statetype}_i$  does not only capture a state effect.<sup>12</sup> The estimation results are presented as marginal effects by state type and transition type. All effects are compared to the direct transition in the respective state type.

Table 4: Heterogeneous Effects of Transition Paths on Vocational Training – by State Type

Reference: Direct transition	Match occup.	Drop- out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Pre-vocational training</b>							
state type “gen. school”	-0.18*** (0.05)	0.02 (0.04)	17.68 (14.93)	-0.58 (0.68)	-1.07 (0.78)	62.78 (44.32)	-0.87*** (0.18)
state type “pre-voc./voc. school”	-0.38*** (0.06)	0.03 (0.04)	55.55** (22.09)	0.10 (0.92)	1.62 (1.12)	15.22 (58.00)	-1.12*** (0.22)
<b>Vocational school</b>							
state type “gen. school”	-0.15*** (0.05)	0.09 (0.06)	78.64*** (22.06)	2.09** (0.89)	3.79*** (1.32)	109.71** (51.90)	-0.86*** (0.25)
state type “pre-voc./voc. school”	-0.34*** (0.05)	0.08* (0.04)	84.65*** (19.67)	1.77** (0.72)	4.40*** (1.15)	269.96*** (59.38)	-0.80*** (0.17)
<b>General school</b>							
state type “gen. school”	-0.25*** (0.03)	0.03 (0.03)	64.05*** (9.04)	1.60*** (0.49)	3.30*** (0.65)	156.94*** (35.97)	-0.62*** (0.11)
state type “pre-voc./voc. school”	-0.34*** (0.05)	0.05 (0.04)	85.06*** (19.19)	2.41*** (0.65)	4.16*** (0.86)	216.83*** (49.79)	-0.59*** (0.14)
Observations	2190	2779	2165	2702	2702	2694	2303

Notes: Marginal effects of transition type compared to respective subgroup with direct transition in vocational training. Additionally to controls equivalent to Table A.5, state dummies are included, standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 4 shows the marginal effects of the transition path in each of the state types com-

<sup>11</sup>Those states are slightly oversampled (Students are 6.2pp more likely to be in the sample.), but this oversampling is not attributed to one of the three states (Results cannot be shown due to data protection rules.).

<sup>12</sup>The respective Probit model for binary outcomes is:  $P(y_i = 1|X_i, X_c, X_{sc}, X_{lm}, X_{st}) = \Phi(\alpha + \beta \text{transition}_i + \eta \text{statetype}_i + \mu \text{transition}_i * \text{statetype}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau D_{st})$ .

pared to the respective subgroup transitioning directly into vocational training. With regard to wages, both during the vocational training and average wage of the occupation, the effects are more positive for students in states of the type “pre-voc. training/voc. school” over all transition types. However, students of those states also seem to drive the negative effects on match probability of desired and realized training occupation and level of satisfaction.

Students participating in pre-vocational training from states, where this path is more common, earn significantly higher wages during vocational training (+55.55 Euros) than those transitioning directly in those states. However, they are also much less satisfied, the effect is close to the standard deviation of 1.53. This might be due to the fact that they are much less often matched with their desired occupation than students transitioning directly in the same state type. They are 38 pp less likely to match the occupations than those transitioning directly, while students in states of type “general school” are only 18 pp less likely to match.

When attending vocational school there are no heterogeneous effects by state type with regards to being satisfied, even though the match quality is differently affected by state type. Again, students from states of type “pre-voc. training/voc. school” are driving the negative effect on match quality. They, however, benefit from higher average wages and also slightly higher starting wages during vocational training. The effect of continuing general school compared to transitioning directly are not significantly heterogeneous by state type.

There is some evidence that the observed overall effects are driven by students from the states where pre-vocational training and vocational schools are more common. With regards to wages, match quality and level of satisfaction this is particularly true for the transition path through pre-vocational training and vocational schools. The positive effects might be explained by pre-vocational training and vocational schools being more common and accepted by employers in those states. The large negative effect of pre-vocational training on the level of satisfaction in those states does not fit to this explanation. However, students from state of type “pre-voc. training/voc. school” participating in pre-vocational training have significantly higher aspirations measured by the socioeconomic status of their desired occupation than students from other state while there is no difference among those students transitioning directly (not shown).<sup>13</sup> Thus they might be particularly disappointed that their aspirations are not met and thus are unsatisfied.

Transition paths differ by gender: Men are more likely to transition directly into vocational training while women are more likely to go to vocational or general school (see Table A.3 in Appendix). Thus, I check whether there are heterogeneous effects by gender estimated with the following model:

$$y_i = \alpha + \beta \text{transition}_i + \eta \text{male}_i + \boldsymbol{\mu} \text{transition}_i * \text{male}_i + \varsigma \text{occ}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st} + u_i, \quad (4)$$

where  $\beta$  is the vector of the coefficients for the transition type,  $\eta$  the effect of gender (here: male),  $\boldsymbol{\mu}$  the vector of the coefficients of the interaction term of transition type and gender.<sup>14</sup> Additionally to the standard control variables, equivalent to model (1),  $\text{occ}_i$

<sup>13</sup>There is no difference in the level of life satisfaction in grade 9 by state type among participants in pre-vocational training. There is also no remarkable difference in selection into pre-vocational training based on observables.

<sup>14</sup>The respective Probit model for binary outcomes is:  $P(y_i = 1|X_i, X_c, X_{sc}, X_{lm}, X_{st}) = \Phi(\alpha +$

the occupational sector is added as factor variable, in order to account for occupational segregation by gender. All effects are compared to the direct transition in same gender group.

Table 5 shows the marginal effects of the transition paths by gender relative to the direct transition into vocational training. There are no heterogeneous effects by gender among the participants of pre-vocational training. The small positive effect on starting wage during vocational training is significant for men only, but the point estimate for women is very similar in size.

The effects of vocational school are more heterogeneous by gender: Differences in wages and SES status of the training occupation are small. But there is remarkable effect heterogeneity of vocational school by gender on the drop-out probability and on the level of satisfaction with the vocational training. While female attendees of vocational school drive the overall effect on drop-out probability, male attendees drive the negative effect on the level of satisfaction. Female attendees of vocational schools are 14 pp more likely to drop out of vocational training than women who transition directly into vocational training. But men who attend vocational school are much less satisfied with their vocational training than their male counterparts after a direct transition.

The effects of general school as transition path are less heterogeneous by gender. The proportion of the heterogeneous effects regarding starting wage and average wage are similar to the effects of vocational school, but the differences are smaller. The negative effects of general school on the probability to match desired and realized occupation and on the level of satisfaction are smaller for women than for men.

Table 5: Heterogeneous Effects of Transition Paths on Vocational Training – by Gender

Reference: Direct transition	Match of occup.	Drop-out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Pre-voc. training</b>							
Female	-0.26*** (0.06)	0.04 (0.04)	36.80 (23.17)	0.09 (0.96)	0.67 (1.28)	56.32 (46.09)	-0.99*** (0.21)
Male	-0.25*** (0.05)	0.01 (0.04)	35.52** (14.72)	-0.41 (0.63)	-0.28 (0.73)	29.69 (53.04)	-0.94*** (0.19)
<b>Vocational school</b>							
Female	-0.21*** (0.05)	0.14*** (0.05)	102.48*** (19.83)	2.01** (0.84)	3.27** (1.48)	192.04*** (50.48)	-0.47*** (0.17)
Male	-0.27*** (0.05)	0.01 (0.05)	65.26*** (19.51)	1.80** (0.76)	4.80*** (1.22)	235.17*** (68.09)	-1.07*** (0.21)
<b>General school</b>							
Female	-0.21*** (0.04)	0.04 (0.04)	88.07*** (13.42)	2.45*** (0.67)	4.66*** (0.93)	181.58*** (41.01)	-0.54*** (0.12)
Male	-0.33*** (0.03)	0.03 (0.03)	73.51*** (11.02)	2.03*** (0.50)	3.72*** (0.59)	200.39*** (40.62)	-0.64*** (0.10)
Observations	2190	2779	2165	2702	2702	2694	2303

Notes: Marginal effects of transition type compared to respective subgroup with direct transition in vocational training. Additionally to controls equivalent to Table A.5, occupational sectors are included, standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Overall, with regards to wages, transitioning through vocational school is the most ben-

$$\beta \text{transition}_i + \eta \text{male}_i + \mu \text{transition}_i * \text{male}_i + \varsigma \text{occ}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st}.$$

official for women, they also have the highest level of satisfaction among the detour transition paths. Prestige and socioeconomic status of the training occupation are higher for women after general school compared to transitioning directly. However, they also drop out more often and are the driver of the overall effect on drop-out probability. The heterogeneous effects for men are more ambiguous: While average wages and socioeconomic status are higher after vocational school, starting wage and prestige are slightly higher after general school. Vocational training also considerably increases the dissatisfaction. It seems that women and men who attend vocational school react differently to dissatisfaction: Women drop out of vocational training while men remain in vocational training, but are less satisfied. As female students have higher aspirations regarding the socioeconomic status of their desired occupation than men, they might drop out in order to follow those aspirations.

## 6.2 Effect Mechanisms

When interpreting the results, possible mechanisms behind the effects of the different transition paths need to be considered. For instance, intermediate outcomes of the transition path, like upgrading of secondary school qualification, could drive the observed results.

The first intermediate outcome considered is whether the individuals upgrade his/her secondary school qualification (see Section 2). Even though it might be the original goal, not all students continuing schooling are able to upgrade their school qualification. 82% of the transition path “general school”, 67% of the path “vocational school”, 46% of the path “direct transition”, and 26% of the participants in pre-vocational training have reached a qualifying lower secondary school qualification or higher at the beginning of vocational training. Hence, I will check whether the upgrading of school qualification is the driving force behind the observed effects.

Considering that upgrading is the foremost goal and obvious benefit of delaying the begin of vocational training, at least for a transition through general and vocational school, we would expect that the positive effects of the delayed transition is mostly driven by those individuals upgrading their school qualification. However, it is also possible that the schooling itself, without credentials, increases productivity and represents a positive signal to the employer. The effects of transition paths by level of secondary school qualification at the start of the vocational training are estimated in the following model:

$$y_i = \alpha + \beta \text{transition}_i + \eta \text{upgrade}_i + \mu \text{transition}_i * \text{upgrade}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st} + u_i, \quad (5)$$

where  $\beta$  is the vector of the coefficients for the transition type,  $\eta$  the effect of upgrading the secondary school qualification,  $\mu$  the vector of the coefficients of the interaction term of transition type and upgrading. The dummy variable  $\text{upgrade}_i$  is one when the individual has reached a qualifying lower secondary school or middle track secondary school qualification until the start of the vocational training.<sup>15</sup> Interpretation of this model is problematic because upgrading could be a “bad control” (Angrist and Pischke, 2009, pp. 64–68) as it is an intermediate outcome. Thus, this analysis only serves for better understanding possible mechanisms.

<sup>15</sup>The respective Probit model for binary outcomes is:  $P(y_i = 1 | X_i, X_c, X_{sc}, X_{lm}, X_{st}) = \Phi(\alpha + \beta \text{transition}_i + \eta \text{upgrade}_i + \mu \text{transition}_i * \text{upgrade}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st})$ .

Table 6 shows the effects of the transition paths with and without upgrading of the school qualification compared to the respective subgroup transitioning directly into vocational training. The results show that the effects of delayed transition paths are not completely driven by upgrading, but it does play an important role, at least for some pathways. When participants of pre-vocational training upgrade their school qualification, they earn higher wages than individuals with the same level of school qualification starting the vocational training directly. The advantage of pre-vocational training without upgrading is much smaller and weakly significant. Participation in pre-vocational training without upgrading makes individuals much less satisfied with their vocational training than individuals without upgrading starting vocational training directly. I find a similar effect for continuing general schooling. Here, the low level of satisfaction seems to be driven by those not upgrading their school qualification, too. The positive effect of continuation of general school on average wage of the training occupation seems to be mostly driven by upgrading, while the other effects training hardly differ by upgrading. The advantage of vocational schooling over the direct transition into vocational training is not driven by a upgraded school qualification: The effect heterogeneity is very small. However, overall individuals, who upgraded their school qualification, are more likely to drop out of vocational training than those transitioning directly. This result is particularly strong after vocational school. The higher drop-out rate combined with less dissatisfaction might point to higher educational aspirations of those who upgraded. They do not seem to drop out because they are unsatisfied with their vocational training (at least not compared to those who did not upgrade), but probably want to pursue higher education.

Table 6: Effects of Transition Paths and Intermediate Outcomes on Vocational Training – Upgrading of Secondary School Qualification

Reference: direct transition	Match of occup.	Drop-out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Pre-vocational training</b>							
no upgrading of qualification	-0.27*** (0.04)	-0.01 (0.04)	29.62* (15.11)	0.24 (0.67)	0.51 (0.67)	62.29 (45.24)	-1.11*** (0.19)
upgrading of qualification	-0.24*** (0.06)	0.06 (0.05)	69.78*** (24.29)	-0.77 (0.97)	-0.31 (1.29)	-4.35 (51.83)	-0.71*** (0.19)
<b>Vocational school</b>							
no upgrading of qualification	-0.30*** (0.06)	0.04 (0.05)	81.83*** (22.39)	1.78** (0.79)	3.17** (1.23)	211.64*** (69.69)	-0.78*** (0.20)
upgrading of qualification	-0.21*** (0.05)	0.12*** (0.04)	73.28*** (16.54)	1.41* (0.82)	3.58*** (1.13)	200.93*** (56.36)	-0.70*** (0.16)
<b>General school</b>							
no upgrading of qualification	-0.34*** (0.05)	0.03 (0.04)	68.79*** (13.20)	0.96 (0.71)	1.78* (0.93)	78.39 (48.51)	-0.90*** (0.14)
upgrading of qualification	-0.26*** (0.04)	0.07*** (0.03)	65.90*** (10.56)	1.58*** (0.54)	3.38*** (0.70)	185.55*** (43.15)	-0.44*** (0.11)
Observations	2190	2779	2165	2702	2702	2694	2303

Notes: Marginal effects of transition type compared to respective subgroup with direct transition in vocational training. All controls equivalent to Table A.5 included, standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

I additionally check whether the overall effect is driven by those who reach a middle track secondary school qualification until the beginning of the vocational training, which is

the goal of most who continue general school or attend to vocational school. I exclude those with a middle track secondary school qualification from the estimation sample, which leaves us with roughly 60 % of the sample, and repeat the estimations of Table 3. The effect sizes decrease slightly, more strongly for general schooling, but the overall direction, significance, and ranking of transition paths remain the same (not shown). While I cannot exclude that part of the observed effect of the different transition paths are due to the upgrading, it does not seem plausible that this is the sole driver of the effect. This is particularly true for the effect of vocational school.

Of those adolescents starting vocational training, about 70 % of adolescents transition directly after finishing general, vocational school, or the pre-vocational training program. Another 16-19 % needs another year until starting vocational training, the rest takes two or more years. This transition period could be an intermediate outcome of the transition path chosen after school and also influence the outcome in vocational training. Excluding stepwise those individuals of the estimation sample, who took one year or two years and more until starting vocational training, slightly changes the size of the effects, but neither ranking, significance, or direction of the effect (see Table 7 for the probability to match desired occupation with realized training occupation). Thus, it seems plausible that the observed effects are not driven by additional activities after the transition path of interest here.

Table 7: Effects of Transition Paths on Match of Desired Occupation and Training Occupation and Time Lag of Vocational Training Start

	baseline sample	Start voc. train. within 1 year	Start voc. train. within 2 years
<b>Type of transition</b> , reference: Direct transition			
Pre-vocational training	-0.255*** (0.037)	-0.187*** (0.040)	-0.234*** (0.038)
Vocational school	-0.251*** (0.037)	-0.205*** (0.041)	-0.249*** (0.039)
General school	-0.282*** (0.028)	-0.253*** (0.029)	-0.283*** (0.029)
Observations	2190	1727	2004

Notes: Average marginal effects of Probit estimations. All controls equivalent to Table A.5 included. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

The latter analysis gives some indication that the negative effect of the delayed transition into vocational training on the probability to match training occupation with the reported desired occupation might not driven by the time lag between reporting the desired occupation and entering vocational training. If career planning would be volatile and adolescents change their desired occupation within a couple of years, the observed negative effect of the delayed transition on the probability to match occupations would strongly decrease here. I observe that reducing the sample to those entering vocational training within one year after school/pre-voc. training leads to smaller negative effects of delayed transition, but the effects are still strong.

Closely related to the analysis above is the question whether the effects of detours are driven by an age effect as discussed in Section 5. By construction, students transitioning not directly into vocational training are older than the comparison group when they enter vocational training. There are also differences between the type of transition path:

Students continuing general schooling are with on average 17.2 years the youngest at start of the vocational training, participants of pre-vocational training are 17.4, and those attending vocational school are on average 17.7 years old. Those age differences derive either from differences in the length of the program (programs at vocational schools usually last two years, while the continuation of general schooling should last one year.) or from a time lag after the observed transition type, for instance due to additional participation in pre-vocational training programs. The age at the end of grade 9 is included as control variable, thus delayed school enrollment or grade repetition should not be relevant. As the age effect cannot be disentangled in comparison with the direct transition, those observations are excluded from the sample to estimate a model interacting the type of transition with the age category (categories: 16 and younger, 17, 18 years and older):

$$y_i = \alpha + \beta \text{transition}_i + \eta \text{age}_i + \mu \text{transition}_i * \text{age}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st} + u_i, \quad (6)$$

where  $\beta$  is the vector of the coefficients for the transition type (base category: general schooling),  $\eta$  the vector of the coefficients for the age category at the start of the vocational training (base category: 17 years),  $\mu$  the vector of the coefficients of the interaction term of transition type and age.<sup>16</sup> The aim of this analysis is to show whether there is effect heterogeneity by age within the type of transition. If an age effect is driving the results, the effects should be larger for individuals who are older at the start of the vocational training (smaller for those who are younger).

Table 8: Effects of Transition Paths and Age Effect

Reference: 17 years	Match of occup.	Drop-out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>16 years and younger</b>							
Pre-vocational training	0.07 (0.08)	0.14** (0.07)	-19.35 (27.88)	-0.83 (1.22)	-0.26 (1.45)	-185.57** (86.08)	0.19 (0.38)
<i>Vocational school</i>	<i>-0.19*</i> (0.10)	<i>0.05</i> (0.11)	<i>10.41</i> (46.32)	<i>-0.23</i> (1.86)	<i>-0.41</i> (3.56)	<i>78.34</i> (139.65)	<i>0.03</i> (0.68)
General school	0.06* (0.03)	-0.02 (0.03)	-1.33 (10.66)	0.79 (0.50)	-0.62 (0.66)	28.69 (31.29)	0.22** (0.11)
<b>18 years and older</b>							
Pre-vocational training	-0.15** (0.07)	0.12** (0.05)	22.87 (22.49)	-1.34 (0.89)	1.04 (1.32)	23.78 (70.06)	0.09 (0.35)
Vocational school	-0.06 (0.06)	0.07 (0.06)	24.33 (23.94)	-0.24 (0.91)	1.25 (1.50)	-11.19 (78.83)	-0.23 (0.23)
General school	-0.07** (0.03)	0.11*** (0.03)	36.53*** (12.19)	0.08 (0.49)	0.89 (0.80)	112.11*** (32.13)	-0.37*** (0.12)
Observations	1578	2029	1580	1985	1985	1979	1616

Notes: Observations after direct transition are excluded. Marginal effects of transition type in the respective age category compared to 17 years. Effects of vocational school in age category “16 years and younger” should not be interpreted due to small sample size. All controls equivalent to Table A.5 included, standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table 8 shows the marginal effects of the age at start of vocational training by transi-

<sup>16</sup>The respective Probit model for binary outcomes is:  $P(y_i = 1|X_i, X_c, X_{sc}, X_{lm}, X_{st}) = \Phi(\alpha + \beta \text{transition}_i + \eta \text{age}_i + \mu \text{transition}_i * \text{age}_i + \gamma X_i + \delta X_c + \theta X_{sc} + \vartheta X_{lm} + \tau X_{st})$ .



tion type compared to the average age of 17 years, estimated with the reduced sample (excluding direct transitions). As consistent with an age effect older apprentices who participated in pre-vocational training are less likely to match desired and realized training occupation, but there are no other significant marginal effects compared to younger participants of pre-vocational training. The marginal effects of older students attending vocational school compared to average aged students are not significant and small in size. The subgroup of students attending vocational school and being 16 years and younger is very small hence the results should not be interpreted. Hence, there is no indication that the overall effects of vocational school are driven by an age effect. However, effects of the continuation of general schooling are mostly significant for older individuals and also of considerable size. As consistent with an age effect they are less likely to match desired and realized occupation and younger students. They are also less satisfied than younger apprentices and earn higher wages. There are no differences with regard to prestige and socioeconomic status of the training occupation by age.

There is some indication for an age effect for those who continued general school at least with respect to most of the outcome variables. The effect of continued general schooling on prestige and socioeconomic status does not seem to be driven by the age at start of the vocational training. There is no indication for an age effect for pre-vocational training and vocational school. Only the effect on match quality seems to be driven by age of participants of pre-vocational training.

### 6.3 Robustness Checks

In this section we test for a number of possible threats to the identification of the effect of the transition paths regarding selection issues.

To evaluate the model specification and learn how the control variables affect the estimated effects of the transition paths, I add covariates stepwise as shown in Tables A.6-A.12 (in Appendix). Overall the estimated effects of transition paths remain quite stable over the stepwise addition of covariates. It is, however, noticeable that adding control variables changes the estimated effects of pre-vocational training (for match of occupations, drop-out, and wage) and vocational school (prestige and SES of occupation) the most. The estimated effects of pre-vocational training change the most when personal and family characteristics or career planning variables are added (see, for example, for the drop-out probability, Table A.7). For the adjustment of the estimated effects of vocational and general schooling are non-cognitive skills and local labor markets additionally relevant (see, for example, for average wage of vocational training occupation, Table A.11). Apparently, the control variables correct for negative selection into pre-vocational training as the effect becomes larger, significant, or positive/less negative. The opposite is observed for the effect of vocational schools. Including control variables show to be relevant to correct for selection in transition paths and behave in an expected manner.

There are a number of steps in this analysis where sample selection might affect the results. I test whether the selection into the sample, into vocational training, or missing outcome variables drive the results.

The research question requires panel data information and thus panel attrition might be an issue. Individuals continuing general schooling are more likely to remain in the panel because the survey is conducted on class level as long as possible. I estimate the propensity score to remain in the panel based on the 5,030 lower track secondary school

Table 9: Effects of Transition Paths on Vocational Training – Weighted for Sample Selection

	Match occup.	Drop- out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Weighted by inverse probability to remain in panel</b>							
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.24*** (0.04)	0.03 (0.03)	31.27** (14.29)	-0.12 (0.56)	0.06 (0.69)	44.53 (39.21)	-0.90*** (0.14)
Voc. school	-0.25*** (0.04)	0.08** (0.04)	81.71*** (14.19)	1.89*** (0.58)	3.89*** (0.89)	221.28*** (46.56)	-0.76*** (0.14)
General school	-0.27*** (0.03)	0.03 (0.03)	81.86*** (9.86)	2.25*** (0.46)	4.21*** (0.57)	188.58*** (34.97)	-0.59*** (0.09)
Observations	2190	2779	2165	2702	2702	2694	2303
<b>Weighted by inverse probability to start vocational training</b>							
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.25*** (0.04)	0.03 (0.03)	38.40*** (13.85)	-0.20 (0.59)	0.13 (0.74)	52.41 (39.63)	-0.94*** (0.14)
Voc. school	-0.25*** (0.04)	0.08** (0.04)	82.62*** (14.37)	1.79*** (0.57)	3.94*** (0.89)	228.46*** (45.13)	-0.74*** (0.14)
General school	-0.28*** (0.03)	0.03 (0.03)	78.58*** (9.76)	2.10*** (0.46)	3.99*** (0.59)	194.32*** (33.87)	-0.58*** (0.09)
Observations	2190	2779	2165	2702	2702	2694	2303

Notes: All controls included, see full models in Table A.5 in Appendix. Average marginal effects of Probit estimations for match of occupations and drop-out. Model for propensity score estimation for sample selection (first panel) includes control variables of main analysis without variables on application behavior. Model for propensity score estimation for selection in voc. training (second panel) is equivalent to model of the first column in Table A.13. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

students, which are observed in 9<sup>th</sup> grade, using the control variables of the main analysis (not including the variables on application behavior). The main analysis (see Table 3) is repeated with observations weighted by their probability to remain in the sample (inverse probability weighting). The results are shown in the first panel of Table 9. The results hardly change after weighting. The point estimates for wage during vocational training and average wage in training occupation slightly change, but significance, direction, and ranking of the effects remain the same.

The next level of potential selection is the selection into vocational training. The effects of transition paths on the type and quality of vocational training identified above only apply for those individuals who start a vocational training at some point in the observed time span. However, we know that only 68 % of those adolescents, who do not transition directly in a vocational training, actually end up in a vocational training. While it is beyond the scope of this paper to fully account for this selection, I want to make this selection transparent and test whether the control variables used in the main estimations can also explain the selection in vocational training. Table A.13 in Appendix shows the results of three Probit estimations on the probability to start a vocational training. The first column includes the full sample, the second column the reduced sample of those, who do not transition directly in vocational training, and the third column including the type of transition path in the model. I find that the significant explanatory variables of the selection in vocational training do not change by sample. Migratory background, socioeconomic status of mother’s occupation, and low household income decreases the probability to start a vocational training. School grades and cognitive skills are not or very weakly significant with small effects. Good work experience placements, student job, and many applications also make it more likely to enter vocational training and are, besides local labor market characteristics, the most relevant driver of selection into vocational training. Accordingly, those variables are also included in the estimation model above.

I additionally test whether weighting by the probability to enter into vocational training changes the results (second panel in Table 9). The propensity score is estimated using the model of the first column in Table A.13. The results hardly change by inverse probability weighting. The effects of pre-vocational training and vocational school on wage during vocational training and average wages slightly increase.

Table 10: Effects of Transition Paths on Vocational Training – Reduced Sample

	Match occup.	Drop- out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.30*** (0.06)	0.04 (0.05)	67.04*** (18.60)	-0.00 (0.78)	1.20 (0.94)	92.89* (55.40)	-0.95*** (0.15)
Voc. school	-0.24*** (0.05)	0.06 (0.04)	69.91*** (17.45)	1.51* (0.80)	3.41*** (1.03)	239.98*** (59.05)	-0.91*** (0.19)
Gen. school	-0.29*** (0.03)	0.00 (0.03)	87.31*** (11.51)	1.54** (0.61)	3.43*** (0.73)	207.64*** (44.16)	-0.64*** (0.12)
Observations	1453	1453	1453	1453	1453	1453	1453

Notes: All controls equivalent to Table A.5 included. Average marginal effects of Probit estimations for match of occupations and drop-out. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Even if individuals stay sufficiently long in the panel and enter a vocational training, we do not necessarily observe all outcomes variables for them. Thus, I reduce the sample

for all estimations to those observations for whom we observe all outcome variables. The estimation results of this sample of 1,435 individuals are presented in Table 10. This reduced sample seems to be a more positive selection compared to those transitioning directly into vocational training. The effects mostly increase, particularly with respect to wages for those participating in pre-vocational training. The higher drop-out probability of former students of vocational schools decreases and is not significant anymore, however, this subgroup in the reduced sample is also less satisfied with vocational training than in the estimation sample.

Table 11: Descriptive Statistics of Imputed Outcome Variables by Transition Type – Full Sample

	Pre-voc. training	Voc. school	Gen. school	Direct transition	Obs.
Match desired/ training occupation	0.21***	0.24*	0.21***	0.47***	2779
High wage in voc. training	0.30	0.40***	0.36***	0.26***	2779
High SES of voc. training occupation	0.17***	0.41***	0.36***	0.16***	2779
High prestige of voc. training occupation	0.29***	0.44*	0.43***	0.31***	2779
High av. wage of voc. training occupation	0.29***	0.48***	0.41***	0.30***	2779
High level of satisfaction with voc. training	0.16***	0.23***	0.32***	0.52***	2779

Notes: Stat. significant difference relative to all three other groups: \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

As an alternative check of the relevance of the estimation sample I construct dummy variables indicating a high level of each of the continuous outcome variables and impute missing variable with zero.<sup>17</sup> The descriptive means by transition paths are shown in Table 11. Table 12 shows the average marginal effects of the respective Probit estimations on the full sample of individuals who started a vocational training. The overall effects do not change: Continuing schooling (both general and vocational) is superior in terms of economic outcomes to starting a vocational training right after school, but comes at the cost of lower satisfaction and match quality of the occupation. The full sample results show also the same effects of pre-vocational training which does not give an advantage over the direct transition, only with respect to the wage during vocational training which is slightly higher compared to the direct transition into vocational training. The ranking between the delayed transition paths mostly stays the same, only for the match of desired and realized training occupation pre-vocational training and vocational school switch ranks. The effects are very close together in the reduced sample (-0.26 and -0.25, see Table 3), and are now with the full sample -0.20 and -0.18.

This representation of the effects also allows an easier interpretation of some of the results. We learn, for instance, that the continuation of general school or the vocational school increase the probability for a high wage at the beginning of the vocational training, high prestige and high average wage of the training occupation by 15.7 to 18.6 pp compared to the direct transition. The probability of a high socioeconomic status of the training occupation is only increased by 7 to 9.5 pp. The probability to be very satisfied with the vocational training is 33.7 pp lower after participating in pre-vocational training, 26.4 pp lower after going to vocational school, and 19.7 pp lower when continuing general school compared to transition directly in vocational training.

Overall, it seems that the results are robust to sample changes. Weighting for probability to remain in the sample or to enter an vocational training does not change the results.

<sup>17</sup>The definition of the variables are described in Table A.2 in Appendix.

Table 12: Effects of Transition Paths on Vocational Training – Full Sample

	Drop-out	Match of occup.	High Wage	H. Prestige of occup.	H. SES of occup.	H. Av. wage of occup.	H. Level of satisfaction
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	0.021 (0.029)	-0.196*** (0.029)	0.084** (0.035)	0.019 (0.026)	-0.018 (0.031)	0.023 (0.030)	-0.337*** (0.030)
Voc. school	0.075** (0.035)	-0.178*** (0.031)	0.157*** (0.031)	0.164*** (0.030)	0.070** (0.035)	0.186*** (0.035)	-0.264*** (0.033)
Gen. school	0.032 (0.026)	-0.222*** (0.023)	0.182*** (0.024)	0.171*** (0.021)	0.095*** (0.028)	0.170*** (0.026)	-0.197*** (0.027)
Observations	2779	2779	2779	2779	2779	2779	2779

Notes: Average marginal effects of Probit estimations. All controls equivalent to Table A.5 included. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Reducing the sample to those for whom all outcome variables are observed leads to the largest changes, but the general tendency of the results remains the same.

## 7 Conclusions

I find that a delayed transition into vocational training after lower track secondary school is not a disadvantage conditional on a successful transition in vocational training. Students benefit from continuing general schooling or attending vocational school compared to transitioning directly with regard to wages paid during vocational training as well as average wages, prestige, and socioeconomic status of the training occupation. This comes at the cost of a lower probability to match the training occupation with the reported desired occupation and being less satisfied with the vocational training. Attending vocational school before the vocational training makes dropping out of vocational training more likely. Participation in pre-vocational training does not lead to a different type of vocational training position than after a direct transition. However, those participants are less satisfied with their vocational training.

These results on economic outcomes are in accordance with the theoretical considerations expecting positive effects of continued schooling (both general and vocational). They show as well that participants of pre-vocational training probably face some stigma as they do not benefit from the delay compared to the direct transition despite potential increase in human capital. The heterogeneous effects by state type support this argument as the effect of pre-vocational training and vocational school is more positive in states where this transition path is more common. Hence, participants in this case might face less stigma. The results confirm as well the expectation that they are negatively selected and need time to compensate lower skills and delayed career planning.

Overall, benefits of vocational school seem to be slightly higher compared to general school, particularly with regard to wages, with level of satisfaction and match quality being similar. Vocational school seem to offer advantages beyond the upgrading of school qualification. Comparison among the detour transition path show that those results are not driven by age. However, those programs are not equally available across states and some evidence suggests that the programs' benefits are driven by states where they are relatively common. The analyses on effect mechanisms show that upgrading of secondary school qualification plays an important role for the positive effects of a delayed transition, but it does not explain the entire effect of general and vocational

school. Particularly, attending vocational school seems to be beneficial independent of upgrading the secondary school qualification as the effects differ only little.

Robustness checks show that the results are robust to several selection issues. They show as well that control variables are important to account for selection into transition paths. We have to keep in mind that these results do not allow an overall evaluation of pre-vocational training, vocational, and general schools, but condition on the successful transition into vocational training after the detour. It is beyond the scope of this paper to assess whether possible negative labor market outcomes for those not entering vocational training after pre-vocational training or the continuation of schooling would offset the observed positive effects. There is also more research necessary to study the long term labor market effects of the different transition types, for example, when IAB employment biographies are linked with NEPS survey data. This paper cannot assess whether individuals, who transition directly into vocational training, benefit in the long run from the earlier start of accumulating firm- and occupation-specific human capital. When returns to firm-specific human capital are high in their occupations the lower wage and prestige levels might be (partly) offset later.

The downside of the positive economic effects is that the detour seems to have a negative effect on the match quality and level of satisfaction with the vocational training. The particularly low levels of satisfaction of former participants of pre-vocational training seem to be driven by those from states where pre-vocational training is a relatively common transition path and those not upgrading their secondary school qualification. Equivalently, after continuing general school without a higher secondary school qualification adolescents are less satisfied with the vocational training. Disappointment of not being able to improve their labor market opportunities and reach the desired occupation might be an explanation for the observed effect. But this explanation does not hold for those attending vocational or general school with higher secondary school qualification because they were able to enter more prestigious and better paying occupations than those transitioning directly. As drop-out probability is also positively correlated with upgrading and continued schooling, maybe high educational aspirations might explain the dissatisfaction as those apprentices decide to pursue a higher education entrance qualification and tertiary education instead of vocational training.

Further analyses on effect mechanisms show that a time lag after pre-vocational training or school does not drive the effects and, at least for pre-vocational training and vocational school age at start of the vocational training is not the driver of differences between the detour transition path. Hence, it seems unlikely that age is the driving force behind these effect, but the effect of age cannot be ruled out completely. Preferences with regard to the desired occupation as well as the expectations regarding a vocational training could change over time and thus with age. A delayed start of vocational training automatically leads to a higher age and thus we cannot disentangle the effect of delayed transition and age when comparing it to the direct transition. Thus causal interpretation of the results is limited. The age effect could bias the estimations of the effect of detours upwards.

Given that individual preferences determine the relative utility of economic outcomes and satisfaction, it remains an open question which transition path is overall the most beneficial. But we can establish that a delayed transition, even through pre-vocational training, is not per se a waste of time and a stigma on the labor market. The determination of the individual preferable transition path seems to require timely, personal career guidance counseling.

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## Appendix

Table A.1: Observed Programs of Pre-vocational Training

Program and description	Share
<b>“Berufsvorbereitungsjahr (BVJ)”</b> : 1-year school-based program providing both general and vocational curriculum, including career guidance, and the possibility to gain the lower track secondary school qualification (if it was not reached after grade 9)	0.28
<b>“Berufseinstiegsjahr (BEJ)”</b> : 1-year program, mostly school-based, but includes a work experience placement and requires a lower track secondary school qualification. Only offered in the state of Baden-Württemberg.	0.23
<b>1-year “Berufsfachschule”</b> : school-based 1-year “Berufsfachschule” requires a lower track secondary school qualification and offers both general and vocational curriculum	0.17
<b>“Berufsgrundbildungsjahr (BGJ)”</b> : requires a lower track secondary school qualification and is often credited as first year of vocational training	0.13
<b>Other program offered by the employment agency</b>	0.09
<b>“Einstiegsqualifizierung (EQ)”</b> : 6 to 12 months work experience placement with part-time vocational school	0.03
<b>other program</b>	0.06
Observations	440

Table A.2: Description of Variables

Variable	Description
<b>Outcome variables measured in waves 3 to 9</b>	
Match of desired occupation and occupation of vocational training	Binary variable, set to 1 when occupations match on the 3-digit-level of the KldB2010. Desired occupation is the reported realistic occupation aspiration in grade 9 (wave 2, summer 2011). Variable is missing when either desired occupation or occupation of vocational training is missing.
Drop-out of vocational training within first year	Binary variable, set to 1 when duration of vocational training is less than 12 months and no vocational qualification is reported.
Level of satisfaction with vocational training	Categorical variable measuring the level of satisfaction using a Likert scale ranging from 1 (entirely dissatisfied) to 10 (entirely satisfied). The individuals are asked separately about their satisfaction with the school-based and firm-based part of their vocational training. Thus for apprenticeships we calculate the average of the two values, for school-based vocational training we only take the school-based value.
Starting wage in vocational training	The wage is reported as monthly wage after tax, and is set to zero when school-based vocational training without pay.
Socioeconomic status (SES) of occupation of vocational training	The ISEI-08 score developed by Ganzeboom (2010) and Ganzeboom, Graaf, et al. (1992) maps occupations in a range of 11.56 to 88.96 in a combination of level of education and income.
Prestige of occupation of vocational training	The SIOPS-08 score developed by Ganzeboom and Treiman (2003) and Treiman (1977) ranges from 0 to 100 and is a prestige ranking based on surveys from 55 countries.
Average wage of occupation of vocational training	Average monthly wage before tax in 2010, matched on the occupation of vocational training in East/West-gender-occupation-cells using the occupation classification KldB2010. Data source of wages: Federal Statistical Office (Statistisches Bundesamt), Verdienststrukturerhebung 2014.

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Continuation of Table A.2

Variable	Description
High level of satisfaction with vocational training	Binary variable, set to 1 if level of satisfaction is 8.5 or better, set to 0 otherwise (including missings).
High starting wage in vocational training	Binary variable, set to 1 if starting wage in vocational training is 500 Euros or more, set to 0 otherwise (including missings).
High SES of occupation of vocational training	Binary variable, set to 1 if the ISEI-08 score of the occupation of the vocational training is 37 or higher, set to 0 otherwise (including missings). The score of 37 has been determined to represent occupations that are mostly occupied by individuals having reached at least a middle track secondary school qualification (Schuchart, 2011).
High prestige of occupation of vocational training	Binary variable, set to 1 if the SIOPS-08 score of the occupation of the vocational training is 43 or higher, which is equivalent to above the median. Set to 0 otherwise (including missings).
High average wage of occupation of vocational training	Binary variable, set to 1 if average wage is 2837 Euros or above, set to 0 otherwise (including missings).
<b>Control Variables measured in wave 1 and 2</b>	
<i>Personal characteristics and family background</i>	
Age in 2011	Age in years at in July 2011 (end of grade 9).
Gender: male	Binary variable, set to 1 if male.
Migratory background	Binary variable, set to 1 if at least one parent is born outside of Germany. Reported by students, added by parent. Missings imputed with 0.
Mediocre/Bad health	Binary variable, set to 1 if self-reported health status is mediocre or worse. Missings imputed with mean of original categorical variable.
SES of father's occupation	Standardized socioeconomic status (ISEI-08 score) of father's occupation. Reported by parents, added by student. Missings imputed with mean.
SES of mother's occupation	Standardized socioeconomic status (ISEI-08 score) of mother's occupation. Reported by parents, added by student. Missings imputed with mean.
HH income < 2500 Euro	Binary variable, set to 1 if household income is below 2500 Euros. Reported by parent. Missings imputed with 0.
Own room at home	Binary variable, set to 1 if students has own room available at home. Missing imputed with 0.
<i>School grades</i>	
German grade 2011	Categorical variable ranging from 1 (very good) to 6 (deficient), the average of 4 (sufficient) is necessary to pass a class and grade. Final grade in German of grade 9. Missings imputed with mean.
Math grade 2011	Categorical variable ranging from 1 (very good) to 6 (deficient), the average of 4 (sufficient) is necessary to pass a class and grade. Final grade in Math of grade 9. Missings imputed with mean.
<i>Cognitive skills</i>	
Reading competence	Weighted maximum likelihood estimate of reading competence, with 0 as mean. Missing imputed with mean.
Reading speed	Standardized reading speed for full sample of starting cohort 4. Missing imputed with mean.
Vocabulary	Standardized vocabulary competence for full sample of starting cohort 4. Missing imputed with mean.
Math competence	Weighted maximum likelihood estimate of math competence, with 0 as mean. Missing imputed with mean.
Reasoning	Standardized reasoning competence for full sample of starting cohort 4. Missing imputed with mean.
Perceptual speed	Standardized perceptual speed for full sample of starting cohort 4. Missing imputed with mean.
<i>Non-Cognitive skills, personality traits</i>	

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Continuation of Table A.2

Variable	Description
Personality traits ‘Big Five’: openness, neuroticism, conscientiousness, agreeableness, extraversion	Five variables describing the Big Five personality traits. Ranging from 1 to 5 (variables are averages of two survey items). Missings imputed with mean.
Self concepts: German, Math, school	Self concept of abilities in school (overall), Math, and German specifically. Score 1 to 4, variables are average of three survey items. Missing imputed with mean.
SDQ prosocial behavior	Binary variable, set to 1 for noticeable prosocial behavior defined by the SDQ score (Strengths and Difficulties Questionnaire) (see Lohbeck et al., 2015). Missings of original variable imputed with mean.
SDQ problematic behavior	Binary variable, set to 1 for noticeable problematic behavior defined by the SDQ score (Strengths and Difficulties Questionnaire) (see Lohbeck et al., 2015). Missings of original variable imputed with mean.
level of life satisfaction	Categorical variable measuring the level of satisfaction with life using a Likert scale ranging from 1 (entirely dissatisfied) to 10 (entirely satisfied). Missings imputed with mean. Only included in model on level of satisfaction with vocational training.
<i>Career guidance activities, career planning, application behavior</i>	
Career planning: advanced	Binary variable, set to 1 if self-reported career planning is advanced. Missings imputed with 0.
SES of desired occupation	Socioeconomic status (ISEI-08 score) of reported desired occupation in grade 9 (wave 2, summer 2011). Missing imputed with mean.
Duration of work experience placements	Factor variables with categories: one week or less, two weeks, and three or more weeks (reference group). Missing imputed with mean.
Work experience placement helpful	Binary variable, set to 1 if work experience placement described as helpful for career planning. Missings imputed with 0.
JIC visit	Binary variable, set to 1 if job information center (JIC) of the employment agency was independently visited. Missings imputed with 0.
Counseling by employment agency	Binary variable, set to 1 if students took up at least once a counseling meeting with the employment agency. Missings imputed with 0.
Student job	Binary variable, set to 1 if student has a student job during grade 9. Missings imputed with 0.
Applied to 3 or more voc. training occupations	Binary variable, set to 1 if student sent out applications for 3 or more different vocational training occupations, including applications until apprenticeship start). Missing imputed with 0.
<i>Characteristics of State, local labor market, school, and class</i>	
Intensity of career guidance activities at school	Factor variable with categories: little, average (reference group), and a lot. Variable summarizes the offered career guidance activities reported by the school’s principal and aggregate over average number of activities. Missings imputed with mean.
School: Grade 10 available	Binary variable, set to 1 if school offers grade 10. Missings imputed with 0.
Class: High share migratory background	Binary variable, set to 1 if share of students with migratory background in class is reported to be 50 % or more (reported by students, if missing teacher’s information). Missing of original categorical variable imputed with mean.
Class: High share low social class	Binary variable, set to 1 if share of students of low social class in class is reported to be 50 % or more (reported by head teacher). Missing of original categorical variable imputed with mean.

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Continuation of Table A.2

Variable	Description
State: high share general schooling	Binary variable, set to 1 if 67% of the students in the state or more continue general schooling. The share of students transition through a particular type of transition is highly correlated with the state as the state's education policy determines for example the availability of programs at vocational schools or grade 10 at lower track secondary schools.
Regional vocational training market type	Factor variable with 12 categories for different apprenticeship market types described by Kleinert and Kruppe (2012).
<i>Additional variables for robustness checks and effect mechanisms</i>	
Occupational sector of desired occupation	Categorical variable based on the KldB2010, dividing occupations in 5 occupational sectors: Occupations in production of goods (base category), in personal services, in business administration and other business related services, service occupations in the IT-sector and the natural sciences, and other occupations in commercial services. Missings imputed separately by gender with subgroup mean.
Upgrading of secondary school qualification	Binary variable, set to 1 if the individual's secondary school qualification at start of the vocational training is higher than a lower secondary school qualification, i.e. a qualifying lower secondary school qualification ("qualifizierender Hauptschulabschluss") or middle track secondary school qualification ("Mittlere Reife"). Missings of secondary school qualification imputed with mean by transition path.
Age at start of vocational training	categorical variable with categories "16 years and younger", "17 years", and "18 years and older".

Table A.3: Selection into Transition Path

Reference: direct transition	Pre-voc. training	Voc. school	General school
age in 2011	0.029*** (0.006)	-0.009 (0.007)	-0.031*** (0.006)
Gender: male	0.009 (0.011)	-0.047*** (0.012)	-0.027*** (0.011)
migratory background	0.024** (0.011)	0.005 (0.012)	0.013 (0.011)
Mediocre/Bad Health	0.013 (0.012)	0.007 (0.013)	-0.014 (0.011)
SES of father's occupation	-0.008 (0.006)	-0.006 (0.005)	0.008 (0.005)
SES of mother's occupation	0.004 (0.005)	0.001 (0.005)	0.005 (0.005)
HH income < 2500 Euro	0.025* (0.014)	0.010 (0.015)	-0.018 (0.014)
own room at home	0.021 (0.016)	-0.038** (0.016)	-0.003 (0.014)
German grade 2011	0.048*** (0.008)	-0.016* (0.008)	-0.003 (0.007)
Math grade 2011	0.020*** (0.006)	-0.035*** (0.007)	0.005 (0.006)
Comp: reading competence	-0.010 (0.006)	0.011* (0.006)	0.013** (0.005)
Comp: reasoning	0.010* (0.005)	-0.000 (0.006)	0.004 (0.005)
Comp: perceptual speed	0.000 (0.005)	0.001 (0.005)	0.000 (0.004)
Comp: reading speed	-0.003	-0.002	0.005

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Continuation of Table A.3

Reference: direct transition	Pre-voc. training	Voc. school	General school
	(0.006)	(0.006)	(0.005)
Comp: math	-0.021***	-0.020***	0.024***
	(0.007)	(0.008)	(0.007)
Comp: vocabulary	0.006	-0.001	0.004
	(0.007)	(0.007)	(0.006)
B5: openness	0.005	0.005	0.001
	(0.006)	(0.006)	(0.005)
B5: neuroticism	-0.005	-0.002	-0.001
	(0.006)	(0.006)	(0.006)
B5: conscientiousness	-0.006	-0.009	-0.007
	(0.006)	(0.006)	(0.006)
B5: agreeableness	0.003	-0.013	0.008
	(0.007)	(0.008)	(0.007)
B5: extraversion	-0.002	-0.005	-0.010*
	(0.006)	(0.006)	(0.005)
self concept: German	0.006	0.018*	0.007
	(0.009)	(0.010)	(0.009)
self concept: math	-0.003	-0.005	0.012**
	(0.007)	(0.007)	(0.006)
self concept: school	-0.037***	0.003	0.029***
	(0.010)	(0.011)	(0.010)
SDQ prosocial behavior, noticeable	-0.028	0.015	-0.037**
	(0.018)	(0.019)	(0.019)
SDQ problematic behavior, noticeable	0.021	-0.020	-0.007
	(0.014)	(0.016)	(0.015)
Career planning: advanced	-0.012	-0.042***	-0.004
	(0.011)	(0.013)	(0.011)
Work exp. duration, Reference: three or more weeks			
One week or less	-0.006	-0.029*	-0.005
	(0.015)	(0.015)	(0.015)
Two weeks	0.006	0.009	0.002
	(0.014)	(0.015)	(0.013)
Work Exp. helpful	-0.011	-0.012	-0.038***
	(0.012)	(0.013)	(0.011)
JIC visit	-0.002	0.010	-0.013
	(0.013)	(0.016)	(0.014)
Counseling Employ. Agency	0.022	0.012	-0.053***
	(0.014)	(0.016)	(0.013)
Student job	-0.021**	-0.001	-0.004
	(0.011)	(0.011)	(0.010)
School: Career guidance intensity, Reference: average			
Little	-0.001	-0.006	0.026**
	(0.013)	(0.014)	(0.013)
A lot	0.030**	-0.007	0.015
	(0.014)	(0.014)	(0.012)
School: Grade 10 avail.	-0.018	-0.017	0.060***
	(0.013)	(0.013)	(0.014)
Class: High share migratory background	0.008	0.006	-0.010
	(0.012)	(0.013)	(0.011)
Class: High share low social class	0.009	-0.031**	0.001
	(0.012)	(0.012)	(0.011)
State: high share general schooling	-0.019	-0.018	0.130***
	(0.014)	(0.016)	(0.012)
Regional vocational training market type			
Reference: Western G., rural, large secondary sector, high competition			
Eastern G: few stud., high unemploy., rural, large secondary sector	0.016	-0.049*	-0.144***
	(0.043)	(0.026)	(0.044)
Eastern G: few students, high unemploy., rural, av. market	0.167***	-0.095***	0.121*
	(0.063)	(0.011)	(0.063)
Eastern G: few students, high unemploy., fav. market	0.001	-0.075***	-0.046
	(0.047)	(0.023)	(0.030)
Dynamic large cities, fav. market, low competition	-0.037*	-0.015	-0.009
	(0.021)	(0.019)	(0.018)
Dynamic large cities, urban, strong large companies	-0.082***	0.051**	0.012
	(0.018)	(0.021)	(0.019)

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Continuation of Table A.3

Reference: direct transition	Pre-voc. training	Voc. school	General school
Western G, large companies, urban, av. market	-0.028 (0.021)	0.060*** (0.021)	-0.001 (0.017)
Western G, large companies, urban, low unemploy., high competition	-0.040** (0.017)	0.036** (0.016)	-0.001 (0.016)
Western G, large companies, urban, high unemploy.	-0.060 (0.053)	0.189** (0.082)	-0.025 (0.043)
Western G, low unemploy., good market, av. competition	-0.023 (0.017)	0.054*** (0.016)	0.003 (0.014)
Western G, rural, no large companies, low unemploy., high competition	-0.060** (0.024)	0.060** (0.028)	-0.089*** (0.026)
Observations	3730	3730	3730

Notes: Average marginal effects of multinomial logit estimation, controls for imputed variables included. Standard errors clustered by school in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.4: Selection into Transition Path (OLS)

	Pre-voc. training	Voc. school	General school	Direct transition
Age in 2011	0.046*** (0.008)	-0.002 (0.009)	-0.063*** (0.010)	0.019** (0.009)
Gender: male	0.017 (0.014)	-0.039*** (0.013)	-0.049*** (0.015)	0.071*** (0.016)
Migratory background	0.023* (0.012)	0.003 (0.012)	0.021 (0.016)	-0.046*** (0.014)
Mediocre/Bad Health	0.012 (0.013)	0.017 (0.017)	-0.029* (0.017)	-0.001 (0.016)
SES of father's occupation	-0.007 (0.005)	-0.007 (0.005)	0.010 (0.007)	0.004 (0.006)
SES of mother's occupation	0.005 (0.005)	0.000 (0.005)	0.004 (0.007)	-0.009 (0.006)
HH income <2500 Euro	0.040** (0.017)	0.014 (0.015)	-0.040* (0.021)	-0.014 (0.017)
Own room at home	0.027* (0.015)	-0.036** (0.018)	-0.019 (0.025)	0.028 (0.019)
German grade 2011	0.055*** (0.009)	-0.016* (0.009)	-0.016 (0.012)	-0.023** (0.009)
Math grade 2011	0.025*** (0.007)	-0.030*** (0.007)	-0.004 (0.009)	0.010 (0.007)
Comp: reading competence	-0.008 (0.006)	0.006 (0.007)	0.023*** (0.009)	-0.021*** (0.008)
Comp: reasoning	0.008 (0.006)	-0.002 (0.007)	0.017** (0.007)	-0.022*** (0.007)
Comp: perceptual speed	0.001 (0.005)	0.001 (0.006)	-0.002 (0.007)	-0.000 (0.006)
Comp: reading speed	-0.007 (0.007)	-0.011 (0.008)	0.029*** (0.009)	-0.012 (0.008)
Comp: math	-0.029*** (0.007)	-0.040*** (0.009)	0.075*** (0.011)	-0.006 (0.009)
Comp: vocabulary	0.008 (0.007)	0.001 (0.008)	-0.006 (0.009)	-0.002 (0.008)
B5: openness	0.002 (0.006)	0.004 (0.006)	0.008 (0.007)	-0.014** (0.007)
B5: neuroticism	-0.002 (0.005)	-0.003 (0.007)	-0.005 (0.009)	0.010 (0.007)
B5: conscientiousness	-0.011* (0.006)	-0.011 (0.006)	0.000 (0.008)	0.021*** (0.008)
B5: agreeableness	0.002 (0.008)	-0.013 (0.009)	0.013 (0.010)	-0.002 (0.009)
B5: extraversion	-0.000 (0.007)	-0.008 (0.007)	-0.008 (0.008)	0.016** (0.007)
Self concept: German	0.010	0.018	0.010	-0.038***

Continued on next page

Continuation of Table A.4

	Pre-voc. training	Voc. school	General school	Direct transition
	(0.010)	(0.012)	(0.013)	(0.012)
Self concept: math	0.005	-0.003	-0.001	-0.000
	(0.008)	(0.007)	(0.010)	(0.007)
Self concept: school	-0.040***	-0.004	0.043***	0.001
	(0.011)	(0.014)	(0.014)	(0.013)
SDQ prosocial behavior, noticeable	-0.029	0.019	-0.069***	0.079***
	(0.022)	(0.022)	(0.025)	(0.028)
SDQ problematic behavior, noticeable	0.032*	-0.022	-0.022	0.011
	(0.020)	(0.016)	(0.021)	(0.021)
Career planning: advanced	-0.008	-0.036***	-0.048***	0.091***
	(0.013)	(0.013)	(0.016)	(0.017)
Work exp. duration, Reference: three or more weeks				
One week or less	-0.001	-0.047*	0.000	0.048**
	(0.022)	(0.024)	(0.027)	(0.023)
Two weeks	0.014	0.012	0.010	-0.036*
	(0.016)	(0.021)	(0.026)	(0.019)
Work Exp. helpful	-0.000	0.000	-0.073***	0.073***
	(0.012)	(0.012)	(0.016)	(0.014)
JIC visit	0.002	0.004	0.001	-0.007
	(0.016)	(0.017)	(0.018)	(0.017)
Counseling Employ. Agency	0.053***	0.026*	-0.120***	0.041**
	(0.017)	(0.015)	(0.023)	(0.017)
Student job	-0.030***	0.000	-0.004	0.033**
	(0.011)	(0.013)	(0.013)	(0.014)
School: Career guidance intensity, Reference: average				
Little	-0.011	-0.015	0.045	-0.019
	(0.018)	(0.031)	(0.032)	(0.025)
A lot	0.022	-0.008	0.024	-0.038*
	(0.019)	(0.024)	(0.033)	(0.021)
School: Grade 10 avail.	-0.045**	-0.097***	0.300***	-0.159***
	(0.023)	(0.035)	(0.036)	(0.029)
Class: High share migratory background	-0.001	0.012	-0.010	0.000
	(0.014)	(0.016)	(0.021)	(0.015)
Class: High share low social class	0.018	-0.024	-0.033	0.039**
	(0.015)	(0.022)	(0.027)	(0.018)
State: high share general schooling	-0.105***	-0.120***	0.437***	-0.211***
	(0.016)	(0.025)	(0.031)	(0.021)
Regional vocational training market type				
Reference: Western G., rural, large secondary sector, high competition				
Eastern G: few stud., high unemploy.,	0.083	-0.019	-0.326***	0.263***
rural, large secondary sector	(0.051)	(0.057)	(0.061)	(0.051)
Eastern G: few students, high unemploy.,	-0.031	-0.013	0.061	-0.016
rural, av. market	(0.036)	(0.024)	(0.037)	(0.033)
Eastern G: few students, high unemploy.,	-0.024	-0.030	0.003	0.051
fav. market	(0.049)	(0.026)	(0.061)	(0.049)
Dynamic large cities, fav. market,	-0.007	-0.016	-0.024	0.047
low competition	(0.036)	(0.023)	(0.058)	(0.038)
Dynamic large cities, urban,	-0.054**	0.069*	-0.058	0.043
strong large companies	(0.022)	(0.038)	(0.044)	(0.036)
Western G, large companies, urban,	-0.007	0.055	-0.034	-0.013
av. market	(0.019)	(0.035)	(0.041)	(0.018)
Western G, large companies, urban,	0.004	0.063*	-0.112***	0.045
low unemploy., high competition	(0.025)	(0.036)	(0.036)	(0.032)
Western G, large companies, urban,	-0.054	0.067*	0.035	-0.048
high unemploy.	(0.037)	(0.039)	(0.079)	(0.030)
Western G, low unemploy., good market,	-0.007	0.045*	0.008	-0.047*
av. competition	(0.020)	(0.027)	(0.034)	(0.024)
Western G, rural, no large companies,	-0.007	0.089*	-0.215***	0.134***
low unemploy., high competition	(0.027)	(0.051)	(0.053)	(0.042)
Constant	-0.762***	0.495***	1.343***	-0.076
	(0.136)	(0.166)	(0.188)	(0.153)
Observations	3730	3730	3730	3730
R <sup>2</sup>	0.13	0.10	0.41	0.24

Notes: OLS estimations, controls for imputed variables included. Standard errors clustered by school in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$



Table A.5: Effect of Transition Path on Type of Vocational Training – Full Model

	Match occup.	Drop- out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
<b>Type of transition</b> , reference: Direct transition							
Pre-vocational training	-0.26*** (0.04)	0.02 (0.03)	35.20*** (13.45)	-0.23 (0.57)	0.05 (0.69)	40.44 (37.53)	-0.96*** (0.14)
Vocational school	-0.25*** (0.04)	0.08** (0.04)	80.99*** (13.82)	1.85*** (0.55)	3.87*** (0.87)	214.41*** (44.28)	-0.77*** (0.14)
General school	-0.28*** (0.03)	0.03 (0.03)	78.11*** (9.57)	2.20*** (0.44)	4.10*** (0.55)	192.84*** (33.84)	-0.60*** (0.09)
Age in 2011	-0.04** (0.01)	0.03*** (0.01)	-5.35 (4.30)	-0.44** (0.20)	-0.03 (0.29)	-14.04 (14.78)	-0.07 (0.05)
Gender: male	-0.02 (0.02)	0.00 (0.02)	26.12*** (8.50)	-2.04*** (0.38)	-5.23*** (0.56)	635.77*** (25.99)	-0.09 (0.08)
Migratory background	-0.04* (0.02)	0.05** (0.02)	-9.83 (7.15)	0.38 (0.33)	0.64 (0.46)	57.83** (24.56)	0.04 (0.08)
Mediocre/Bad Health	-0.01 (0.02)	0.03 (0.02)	-0.46 (8.34)	-0.40 (0.38)	-0.33 (0.60)	9.83 (26.53)	-0.05 (0.09)
SES of father's occupation	-0.01 (0.01)	-0.00 (0.01)	-6.53* (3.61)	0.22 (0.15)	0.59** (0.25)	10.82 (11.51)	-0.06** (0.03)
SES of mother's occupation	0.02* (0.01)	-0.01 (0.01)	5.32 (3.54)	-0.12 (0.16)	0.35 (0.22)	14.86 (10.67)	0.01 (0.03)
Household income <2500 Euro	-0.02 (0.03)	0.04* (0.02)	4.42 (8.68)	0.11 (0.42)	-0.44 (0.61)	7.75 (27.70)	0.01 (0.10)
Own room at home	0.02 (0.03)	0.00 (0.03)	3.38 (10.11)	0.74* (0.44)	1.35** (0.64)	49.49 (36.99)	0.08 (0.12)
German grade 2011	0.00 (0.01)	-0.00 (0.01)	-8.92* (5.16)	-0.10 (0.23)	-0.49 (0.36)	-12.15 (16.56)	0.13** (0.05)
Math grade 2011	-0.01 (0.01)	0.02** (0.01)	-5.02 (4.00)	-0.60*** (0.18)	-0.46* (0.25)	-32.83*** (12.06)	-0.07* (0.04)
Comp: reading competence	0.02** (0.01)	0.02 (0.01)	3.13 (3.99)	0.17 (0.17)	0.42 (0.25)	5.47 (11.66)	-0.04 (0.04)
Comp: reasoning	-0.01 (0.01)	-0.00 (0.01)	-3.11 (3.80)	-0.11 (0.16)	0.18 (0.21)	11.04 (10.70)	-0.02 (0.04)
Comp: perceptual speed	-0.01 (0.01)	0.01 (0.01)	-2.59 (3.36)	0.15 (0.15)	0.02 (0.21)	2.49 (9.51)	0.02 (0.04)
Comp: reading speed	0.00 (0.01)	0.02** (0.01)	-3.80 (3.61)	-0.22 (0.18)	0.37 (0.24)	15.43 (12.05)	0.01 (0.04)
Comp: math	0.02 (0.01)	-0.02 (0.01)	2.42 (4.83)	0.39* (0.22)	0.16 (0.32)	27.69* (14.71)	-0.05 (0.05)
Comp: vocabulary	0.00 (0.01)	-0.02 (0.01)	-0.12 (4.62)	-0.22 (0.20)	-0.11 (0.28)	-21.23 (13.26)	0.07* (0.04)
B5: openness	0.00 (0.01)	0.01 (0.01)	-6.08* (3.62)	0.02 (0.17)	0.18 (0.24)	1.47 (10.41)	-0.05 (0.04)
B5: neuroticism	0.03** (0.01)	-0.01 (0.01)	-4.67 (4.04)	-0.08 (0.18)	0.29 (0.27)	-7.58 (11.85)	-0.01 (0.04)
B5: conscientiousness	0.02* (0.01)	-0.03*** (0.01)	3.30 (3.85)	0.22 (0.20)	-0.05 (0.26)	6.45 (12.06)	0.11** (0.04)
B5: agreeableness	0.02 (0.01)	0.01 (0.02)	4.14 (5.43)	-0.15 (0.21)	0.32 (0.30)	-1.54 (15.98)	0.18*** (0.06)
B5: extraversion	-0.01 (0.01)	0.00 (0.01)	-2.03 (3.82)	0.02 (0.20)	-0.11 (0.28)	7.88 (12.07)	-0.03 (0.04)
Self concept: German	0.00 (0.02)	0.03** (0.02)	1.97 (5.89)	0.54* (0.30)	0.95*** (0.36)	58.07*** (17.51)	0.10* (0.05)
Self concept: math	-0.00 (0.01)	0.00 (0.01)	7.36* (4.39)	0.06 (0.23)	0.33 (0.32)	-6.11 (15.33)	0.02 (0.04)
Self concept: school	0.01 (0.02)	0.00 (0.02)	4.36 (7.42)	-0.13 (0.31)	-0.03 (0.46)	4.54 (20.81)	0.12 (0.07)
SDQ prosocial behavior, noticeable	-0.09** (0.04)	0.04 (0.03)	14.72 (12.91)	0.10 (0.61)	-0.30 (0.74)	-52.62 (39.86)	-0.00 (0.14)
SDQ problematic behavior, noticeable	0.02 (0.03)	0.06** (0.03)	-17.62* (10.40)	-0.73 (0.46)	-0.78 (0.64)	0.44 (30.83)	0.15 (0.10)
Life satisfaction							0.08*** (0.02)
Career planning: advanced	0.05**	-0.00	-1.32	0.04	0.58	-19.88	0.06

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Continuation of Table A.5

	Match occup.	Drop- out	Wage	Prestige occup.	SES occup.	Av. wage occup.	Level of satisfact.
SES desired occupation	(0.02) -0.01***	(0.02) 0.00	(7.98) 0.48**	(0.37) 0.05***	(0.50) 0.17***	(23.60) 5.59***	(0.08) -0.00*
Work experience placements total duration, Reference: three or more weeks	(0.00)	(0.00)	(0.23)	(0.01)	(0.02)	(0.84)	(0.00)
One week or less	0.06* (0.03)	-0.04 (0.03)	13.42 (11.05)	0.68 (0.47)	0.69 (0.63)	10.32 (29.58)	0.18 (0.11)
Two weeks	0.01 (0.03)	-0.03 (0.02)	12.39 (10.37)	-0.30 (0.43)	-0.05 (0.57)	10.53 (27.11)	0.15 (0.10)
Work experience pl. helpful	0.06*** (0.02)	-0.00 (0.02)	10.93 (8.56)	0.07 (0.38)	0.99* (0.51)	-10.87 (24.73)	0.04 (0.09)
JIC visit	-0.02 (0.03)	0.01 (0.03)	-13.29 (9.95)	-0.90** (0.44)	-0.96 (0.62)	-86.91*** (32.34)	0.02 (0.09)
Counseling Employment Agency	-0.03 (0.03)	0.00 (0.03)	-3.32 (8.99)	-0.24 (0.41)	-0.22 (0.62)	19.04 (27.55)	-0.11 (0.10)
Student job	-0.01 (0.02)	0.01 (0.02)	-9.88 (6.47)	-0.63* (0.32)	-0.99** (0.45)	-61.04*** (19.90)	-0.01 (0.07)
Applied to 3 or more occupations	-0.10*** (0.03)	0.09*** (0.02)	16.09* (9.68)	1.17*** (0.42)	1.40** (0.69)	67.17** (28.74)	-0.09 (0.10)
School: Career guidance intensity, Reference: average							
Little	0.00 (0.02)	0.00 (0.02)	34.26*** (10.07)	0.41 (0.37)	0.85 (0.51)	84.24*** (27.42)	0.05 (0.09)
A lot	-0.03 (0.02)	-0.01 (0.02)	7.40 (8.78)	0.09 (0.38)	0.52 (0.55)	18.97 (23.66)	0.08 (0.10)
School: Grade 10 available	0.06** (0.03)	0.02 (0.03)	-14.94 (11.49)	0.05 (0.41)	0.79 (0.53)	-18.31 (28.43)	0.09 (0.10)
Class: High share migratory background	-0.00 (0.02)	0.02 (0.02)	22.11*** (7.83)	0.73** (0.34)	0.71 (0.53)	27.17 (24.23)	-0.06 (0.08)
Class: High share low social class	-0.01 (0.02)	0.03 (0.02)	-9.14 (8.05)	-1.00*** (0.32)	-1.13** (0.48)	-22.21 (23.17)	-0.04 (0.08)
State: high share general schooling	0.01 (0.03)	0.01 (0.02)	-20.54** (10.06)	-1.07** (0.44)	-1.30** (0.64)	-48.09* (28.15)	0.11 (0.10)
Regional vocational training market type, Reference: Western G, rural, large secondary sector, high competition							
Eastern G: few stud., high unemploy., rural, large secondary sector	-0.13** (0.05)	-0.02 (0.05)	-48.79 (35.10)	-2.92*** (1.11)	-3.05** (1.43)	-586.16*** (59.70)	-0.31 (0.24)
Eastern G: few students, high unemploy., rural, av. market	-0.05 (0.03)	0.08 (0.06)	-11.71 (18.78)	0.55 (1.22)	1.21 (1.84)	-597.11*** (47.18)	-0.04 (0.30)
Eastern G: few students, high unemploy., fav. market	-0.16*** (0.05)	-0.05 (0.04)	-66.81*** (21.82)	-1.60 (1.23)	-0.43 (1.72)	-556.04*** (88.60)	-0.70** (0.34)
Dynamic large cities, fav. market, low competition	-0.06 (0.04)	0.07** (0.03)	-2.18 (12.94)	-0.37 (0.81)	0.37 (1.04)	16.01 (43.19)	-0.17 (0.12)
Dynamic large cities, urban, strong large companies	-0.05 (0.04)	0.08** (0.04)	9.11 (12.79)	0.80 (0.63)	-0.02 (0.82)	87.78* (47.94)	-0.34** (0.13)
Western G, large companies, urban, av. market	-0.04 (0.03)	0.03 (0.03)	-6.33 (12.69)	0.05 (0.44)	0.04 (0.68)	-20.55 (33.66)	-0.16 (0.12)
Western G, large companies, urban, low unemploy., high competition	0.02 (0.03)	-0.01 (0.03)	7.38 (12.84)	0.16 (0.40)	0.46 (0.67)	46.44 (32.38)	-0.17 (0.12)
Western G, large companies, urban, high unemploy.	-0.07 (0.11)	0.11* (0.07)	21.03 (18.21)	-0.14 (1.27)	2.22 (1.39)	-64.87 (57.31)	-0.38* (0.23)
Western G, low unemploy., good market, av. competition	0.01 (0.03)	0.02 (0.03)	-5.99 (11.10)	0.12 (0.44)	-0.03 (0.67)	1.68 (31.93)	-0.04 (0.09)
Western G, rural, no large companies, low unemploy., high competition	-0.03 (0.04)	0.00 (0.04)	-7.47 (14.55)	1.01 (0.62)	1.28 (0.82)	76.92* (41.13)	-0.07 (0.19)
Constant			481.22*** (75.50)	45.52*** (3.58)	24.47*** (5.22)	2212.75*** (273.12)	7.66*** (0.93)
Observations	2190	2779	2165	2702	2702	2694	2303

Notes: Controls for imputed variables included. Average marginal effects of probit estimations for match of occupations and drop-out. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.6: Match Desired/Training Occupation – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.344*** (0.038)	-0.309*** (0.040)	-0.303*** (0.042)	-0.292*** (0.037)	-0.251*** (0.038)	-0.250*** (0.038)	-0.255*** (0.037)
Voc. school	-0.321*** (0.039)	-0.317*** (0.038)	-0.320*** (0.038)	-0.268*** (0.038)	-0.242*** (0.037)	-0.242*** (0.038)	-0.251*** (0.037)
Gen. school	-0.346*** (0.025)	-0.348*** (0.024)	-0.351*** (0.024)	-0.302*** (0.024)	-0.272*** (0.026)	-0.284*** (0.026)	-0.282*** (0.028)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2190	2190	2190	2190	2190	2190	2190

Notes: Average marginal effects of Probit estimations. See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.13: Selection into Vocational Training

	Full sample	Red. sample	Transition incl.
<b>Type of transition</b> , reference: General school			
Pre-voc. training			-0.100*** (0.032)
Voc. school			-0.170*** (0.032)
Age in 2011	-0.001 (0.011)	-0.007 (0.013)	0.000 (0.013)
Gender: male	0.015 (0.018)	0.001 (0.022)	0.002 (0.022)
Migratory background	-0.053*** (0.016)	-0.055*** (0.020)	-0.057*** (0.020)
Mediocre/Bad Health	0.006 (0.018)	0.009 (0.021)	0.011 (0.020)
SES father's occupation	-0.003 (0.007)	-0.006 (0.009)	-0.008 (0.009)
SES mother's occupation	-0.021*** (0.007)	-0.024*** (0.008)	-0.024*** (0.008)
HH income <2500 Euro	-0.058*** (0.022)	-0.063** (0.027)	-0.056** (0.026)
Own room at home	0.022 (0.021)	0.015 (0.026)	0.015 (0.026)
German grade 2011	-0.012 (0.011)	-0.006 (0.013)	-0.005 (0.013)
Math grade 2011	-0.002 (0.008)	-0.004 (0.010)	-0.006 (0.010)
Comp: reading competence	-0.016* (0.009)	-0.014 (0.010)	-0.015 (0.010)
Comp: reasoning	0.008 (0.007)	0.015* (0.009)	0.014 (0.009)
Comp: perceptual speed	-0.007 (0.007)	-0.011 (0.008)	-0.010 (0.008)
Comp: reading speed	-0.006	-0.004	-0.007

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Continuation of Table A.13

	Full sample	Red. sample	Transition incl.
	(0.009)	(0.011)	(0.011)
Comp: math	0.018	0.019	0.008
	(0.011)	(0.014)	(0.014)
Comp: vocabulary	0.015	0.019*	0.019*
	(0.010)	(0.012)	(0.012)
B5: openness	-0.018**	-0.022**	-0.021**
	(0.008)	(0.010)	(0.009)
B5: neuroticism	0.011	0.010	0.010
	(0.009)	(0.011)	(0.011)
B5: conscientiousness	0.034***	0.037***	0.036***
	(0.009)	(0.012)	(0.011)
B5: agreeableness	-0.009	-0.011	-0.014
	(0.011)	(0.013)	(0.013)
B5: extraversion	0.008	0.004	0.004
	(0.008)	(0.010)	(0.010)
Self concept: German	-0.028**	-0.023	-0.022
	(0.013)	(0.016)	(0.016)
Self concept: math	-0.012	-0.012	-0.013
	(0.009)	(0.011)	(0.011)
Self concept: school	0.017	0.019	0.013
	(0.014)	(0.018)	(0.018)
SDQ prosocial behavior, noticeable	-0.005	-0.041	-0.031
	(0.029)	(0.037)	(0.036)
SDQ problematic behavior, noticeable	-0.036*	-0.047*	-0.047*
	(0.021)	(0.027)	(0.027)
Career planning: advanced	0.033*	0.014	0.015
	(0.018)	(0.022)	(0.022)
Work exp. duration, Reference: three or more weeks			
One week or less	0.102***	0.127***	0.118***
	(0.021)	(0.026)	(0.026)
Two weeks	-0.011	0.002	0.001
	(0.020)	(0.023)	(0.023)
Work Exp. helpful	0.074***	0.074***	0.079***
	(0.016)	(0.018)	(0.018)
JIC visit	0.031	0.044*	0.044*
	(0.022)	(0.026)	(0.025)
Counseling Employ. Agency	0.001	0.001	0.013
	(0.022)	(0.027)	(0.027)
Student job	0.043***	0.042**	0.041**
	(0.015)	(0.018)	(0.018)
No. voc. training applications, Reference: no application			
1-3 applications	0.130***	0.052*	0.060**
	(0.022)	(0.030)	(0.029)
4-10 applications	0.124***	0.068**	0.075***
	(0.022)	(0.030)	(0.028)
11 or more applications	0.161***	0.107***	0.113***
	(0.019)	(0.026)	(0.026)
School: Career guidance intensity, Reference: average			
Little	0.034	0.050*	0.047*
	(0.022)	(0.026)	(0.025)
A lot	-0.011	-0.005	-0.005
	(0.021)	(0.023)	(0.023)
School: Grade 10 avail.	-0.021	0.033	-0.014
	(0.028)	(0.036)	(0.036)
Class: High share migratory background	-0.011	-0.013	-0.010
	(0.016)	(0.019)	(0.019)
Class: High share low social class	0.007	0.007	0.006
	(0.019)	(0.022)	(0.021)
State: high share general schooling	0.015	0.070***	0.019
	(0.021)	(0.025)	(0.027)
Regional vocational training market type			
Reference: Western G, rural, large secondary sector, high competition			
Eastern G: few stud., high unemploy.,	0.092*	0.071	0.094
rural, large secondary sector	(0.054)	(0.076)	(0.073)
Eastern G: few students, high unemploy.,	-0.009	-0.007	-0.009

Continued on next page

Continuation of Table A.13

	Full sample	Red. sample	Transition incl.
rural, av. market	(0.038)	(0.042)	(0.044)
Eastern G: few students, high unemploy., fav. market	-0.056 (0.063)	-0.076 (0.073)	-0.081 (0.073)
Dynamic large cities, fav. market, low competition	-0.098*** (0.033)	-0.121*** (0.039)	-0.126*** (0.039)
Dynamic large cities, urban, strong large companies	-0.064** (0.027)	-0.098*** (0.032)	-0.088*** (0.034)
Western G, large companies, urban, av. market	-0.051** (0.022)	-0.055** (0.025)	-0.047* (0.026)
Western G, large companies, urban, low unemploy., high competition	-0.026 (0.027)	-0.042 (0.033)	-0.027 (0.032)
Western G, large companies, urban, high unemploy.	-0.190*** (0.040)	-0.188*** (0.046)	-0.187*** (0.042)
Western G, low unemploy., good market, av. competition	-0.076*** (0.026)	-0.076*** (0.030)	-0.075** (0.029)
Western G, rural, no large companies, low unemploy., high competition	-0.029 (0.047)	-0.069 (0.061)	-0.041 (0.058)
Observations	3730	2980	2980

Notes: Average marginal effects of Probit estimations, controls for imputed variables included. Standard errors clustered by school in parentheses \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.7: Drop-out of Vocational Training Within First Year – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	0.086*** (0.030)	0.055* (0.028)	0.051* (0.028)	0.046* (0.028)	0.022 (0.028)	0.022 (0.028)	0.021 (0.029)
Voc. school	0.088** (0.034)	0.087** (0.034)	0.096*** (0.034)	0.088*** (0.034)	0.070** (0.034)	0.076** (0.035)	0.075** (0.035)
Gen. school	0.050** (0.023)	0.061*** (0.021)	0.064*** (0.022)	0.059*** (0.023)	0.039 (0.024)	0.038 (0.024)	0.032 (0.026)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2779	2779	2779	2779	2779	2779	2779

Notes: Average marginal effects of Probit estimations. See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.8: Wage during Vocational Training – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	17.11 (12.79)	23.30* (12.67)	31.40** (12.58)	31.42** (12.86)	31.24** (13.77)	33.47** (13.33)	35.20*** (13.45)
Voc. school	80.72*** (13.21)	83.02*** (13.27)	80.45*** (13.50)	79.26*** (13.62)	78.42*** (13.75)	80.31*** (13.62)	80.99*** (13.82)
Gen. school	54.89*** (7.38)	55.21*** (7.42)	54.51*** (7.57)	52.16*** (8.04)	61.10*** (9.18)	67.10*** (8.99)	78.11*** (9.57)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2165	2165	2165	2165	2165	2165	2165
$R^2$	0.032	0.048	0.062	0.072	0.082	0.097	0.106

Notes: See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.9: Prestige of Voc. Training Occupation – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.43 (0.52)	-0.38 (0.52)	-0.01 (0.54)	-0.06 (0.54)	-0.28 (0.56)	-0.29 (0.57)	-0.23 (0.57)
Voc. school	2.96*** (0.56)	2.41*** (0.56)	2.26*** (0.54)	2.05*** (0.55)	2.03*** (0.57)	1.98*** (0.55)	1.85*** (0.55)
Gen. school	2.26*** (0.35)	1.92*** (0.36)	1.84*** (0.36)	1.56*** (0.37)	1.71*** (0.39)	1.78*** (0.41)	2.20*** (0.44)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2702	2702	2702	2702	2702	2702	2702
$R^2$	0.025	0.060	0.080	0.093	0.106	0.115	0.124

Notes: See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.10: SES of Voc. Training Occupation – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	0.00 (0.71)	-0.19 (0.67)	0.40 (0.69)	0.19 (0.65)	0.02 (0.68)	-0.04 (0.69)	0.05 (0.69)
Voc. school	6.35*** (0.92)	5.01*** (0.86)	4.67*** (0.84)	3.93*** (0.86)	3.94*** (0.88)	3.90*** (0.86)	3.87*** (0.87)
Gen. school	5.38*** (0.53)	4.53*** (0.50)	4.24*** (0.50)	3.40*** (0.50)	3.75*** (0.51)	3.66*** (0.52)	4.10*** (0.55)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2702	2702	2702	2702	2702	2702	2702
$R^2$	0.051	0.142	0.160	0.209	0.217	0.225	0.229

Notes: See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.11: Average Wage of Voc. Training Occupation – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-11.26 (43.70)	18.14 (37.23)	49.55 (37.24)	41.40 (36.43)	28.78 (38.27)	35.15 (38.54)	40.44 (37.53)
Voc. school	167.97*** (48.30)	280.09*** (47.48)	270.58*** (47.08)	239.66*** (46.79)	237.72*** (47.41)	237.57*** (45.29)	214.41*** (44.28)
Gen. school	102.11*** (32.79)	161.44*** (29.75)	150.71*** (29.03)	115.22*** (29.91)	122.47*** (32.37)	144.93*** (34.69)	192.84*** (33.84)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2694	2694	2694	2694	2694	2694	2694
$R^2$	0.009	0.238	0.258	0.279	0.287	0.298	0.353

Notes: See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table A.12: Level of Satisfaction with Voc. Training – Stepwise Addition of Covariates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Type of transition</b> , reference: Direct transition							
Pre-voc. training	-0.99*** (0.14)	-0.95*** (0.14)	-0.96*** (0.14)	-0.93*** (0.14)	-0.91*** (0.14)	-0.93*** (0.14)	-0.96*** (0.14)
Voc. school	-0.81*** (0.13)	-0.81*** (0.13)	-0.81*** (0.13)	-0.76*** (0.13)	-0.74*** (0.14)	-0.75*** (0.14)	-0.77*** (0.14)
Gen. school	-0.57*** (0.07)	-0.57*** (0.07)	-0.57*** (0.07)	-0.54*** (0.07)	-0.52*** (0.08)	-0.55*** (0.08)	-0.60*** (0.09)
Personal and family characteristics	no	yes	yes	yes	yes	yes	yes
grades and cognitive skills	no	no	yes	yes	yes	yes	yes
non-cognitive skills	no	no	no	yes	yes	yes	yes
career planning	no	no	no	no	yes	yes	yes
school and class characteristics	no	no	no	no	no	yes	yes
local labor market	no	no	no	no	no	no	yes
Observations	2303	2303	2303	2303	2303	2303	2303
$R^2$	0.042	0.053	0.059	0.104	0.107	0.099	0.114

Notes: See models in Table A.5 for complete list of control variables. Standard errors in parentheses clustered by school, \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$





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