

Higher education graduates, vocational qualification, and income. Is higher education worthwhile for dual qualifiers?

Jessica Ordemann 

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Abstract This article explores the income of higher education graduates who have also completed vocational and educational training. I use data from a linked data set of the student cohort SC5 of the National Educational Panel Study (NEPS) and the Institute for Employment Research (IAB), NEPS-SC5-ADIAB. The sample contains 3483 direct qualifiers, 1002 dual qualifiers with and 213 without Abitur. Longitudinal and pooled Poisson regressions are estimated to explore the income trajectories within the careers of dual qualifiers and for comparison with direct qualifiers. The results are ambiguous—from an intragenerational perspective only dual qualifiers without Abitur and a master’s degree earn more after studying. Measured against direct qualifiers, however, dual qualifiers with a bachelor’s degree earn more. An important influencing factor remains the labor market and the jobs held there.

Keywords Dual qualifiers · Higher education · VET · Income

Availability of data and materials This paper uses data from the National Educational Panel Study (NEPS; see Blossfeld and Roßbach 2019). The NEPS is carried out by the Leibniz Institute for Educational Trajectories (LIfBi, Germany) in cooperation with a nationwide network. Access to the linked NEPS-ADIAB data was first provided on-site at the Research Data Center (FDZ) of the German Federal Employment Agency (BA) at the Institute for Employment Research (IAB) and subsequently via remote data processing.

✉ Dr. Jessica Ordemann
Deutsches Zentrum für Hochschul- und Wissenschaftsforschung (DZHW), Lange
Laube 12, 30159 Hannover, Germany
E-Mail: ordemann@dzhw.eu

Studium, Berufsausbildung und Einkommen: Lohnt sich ein Studium für beruflich Qualifizierte?

Zusammenfassung Dieser Artikel untersucht das Einkommen von Hochschulabsolventinnen und -absolventen, die dem Studium vorgelagert eine Berufsausbildung abgeschlossen haben. Ich verwende Daten aus einem verknüpften Datensatz der Studierendenkohorte SC5 des Nationalen Bildungspanels (NEPS) und des Instituts für Arbeitsmarkt- und Berufsforschung (IAB), NEPS-SC5-ADIAB. Die Analysestichprobe umfasst 3483 Direktqualifizierer, 1002 Doppelqualifizierer mit Abitur und 213 ohne Abitur. Es werden längsschnittliche und gepoolte Poisson-Regressionen geschätzt, um die Einkommensverläufe innerhalb der Karrieren der Doppelqualifizierer und zum Vergleich mit Direktqualifizierern zu untersuchen. Die Ergebnisse sind uneindeutig – über die Karriere verdienen Doppelqualifizierer ohne Abitur und mit Masterabschluss durch das Studium mehr. Gemessen an Direktqualifizierern verdienen sie jedoch bereits mit einem Bachelorabschluss mehr. Eine wichtige Einflussgröße verbleibt der Arbeitsmarkt und die dort ausgeübten Tätigkeiten.

Schlüsselwörter Mehrfachqualifizierer · Hochschule · Berufliche Ausbildung · Einkommen

1 Introduction

A tertiary degree promises the highest returns to education in the labor market and beyond (Authoring Group Educational Reporting 2018, 2020; Ordemann and Pfeiffer 2022). At the same time, less than a quarter of individuals in Germany have attained a tertiary degree and thus have access to these returns (Authoring Group Educational Reporting 2022). The low number of higher education graduates can be attributed to the highly stratified German educational system (Allmendinger 1989) and the distinct and socially very selective schism between the two pillars of vocational and academic education (Baethge and Wolter 2015; Powell and Solga 2011). Here, the educational pathways to higher education are separate from the vocational pathways. The chosen pathway into academia or vocational education and training (VET) is traditionally shaped by a person's family background: Children from academic families are more likely to enroll in higher education, while children from non-academic families are more often diverted to VET (Becker and Hecken 2009; Mayer et al. 2007; Müller and Pollak 2010).

In recent decades, reforms in education policy in Germany have led to more flexibility after the first educational pathway to correct educational decisions as a 'second chance' (Bernardi 2012). Most of these policies are bound to alternative educational pathways over VET, thus increasing the permeability between the vocational and academic pillars of the education system (Buchholz and Schier 2015; Schindler 2014; Wolter 2022). Consequently, these alternative pathways have established a group of higher education graduates with vocational qualifications: dual qualifiers who have attained a vocational training *and* a tertiary degree.

By taking the ‘second chance’ to upgrade their educational degree, dual qualifiers should be able to expect the same returns as graduates who took the direct educational pathway to higher education (direct qualifiers). However, a certain ‘endogenous causal relationship’ is inherent in the individual life course (Mayer and Blossfeld 1990), and the vocational experiences of dual qualifiers can influence later educational and occupational decisions, thereby lowering academic returns. This study explores whether pursuing higher education after VET is worthwhile. Higher education after previous vocational education and training is considered worthwhile when studying leads to an improved income growth for the individual.

To explore potential changes in income due to studying after VET and how income relates to known findings about direct qualifiers’ income, I use linked data from the National Educational Panel Study (NEPS) and the Institute for Employment Research (IAB). Based on its student cohort, the findings show that there is an intragenerational monetary benefit for dual qualifiers. Furthermore, during the first three years after graduation of bachelor graduates, these benefits exceed those of direct qualifiers. In the next section, theoretical considerations and findings on the income of dual and direct qualifiers are presented. The description of the data, its operationalization, and the research design follows before a section on the findings. The final section concludes.

2 Higher education, dual qualifications, and income

2.1 Considerations about higher education graduate income

Following human capital theory, individuals accumulate general human capital in the education system and specific human capital in the labor market (Becker 1964; Mincer 1974). They are remunerated at the level of their human capital. In Germany, higher education graduates invest the longest in their careers compared to graduates of other educational pathways. In line with human capital theory, they also earn more compared to other educational degrees (Ordemann and Pfeiffer 2022). Especially when they attain a master’s degree and increase the level of general human capital compared to a bachelor’s degree (Neugebauer and Weiss 2018; Trennt 2019).

It is the underlying view in most studies about income that students take direct educational pathways from pre-school to higher education and into the labor market (for standardized life course, see Kohli 1985). It follows the understanding of a direct educational pathway of receiving compulsory schooling until upper secondary school (‘gymnasiale Oberstufe’) in three different types of educational institution: high school (‘Gymnasium’), school type with three courses of education, or vocational high school. At graduation, students attain a formal higher education entrance certification (‘Abitur’).¹ A little more than 60% of all school leavers with Abitur go on to higher education directly (Ordemann et al. 2023).

¹ Pathways to attaining an Abitur are diverse as well. For findings regarding the labor market outcome of alternative pathways and certificates before attaining an Abitur, please refer to Becker et al. (2020); Schuchart and Rürup (2017); Schuchart and Schimke (2019).

Students who select this direct educational pathway primarily come from an academic family background (Lörz 2012; Schindler and Lörz 2012; Schindler and Reimer 2010). They mainly accumulate general human capital in the form of the ability to study. The study ability covers a more profound knowledge of general education, cognitive skills, and the propaedeutic of science (Köller 2014; Trautwein and Lüdke 2004). Until graduation from higher education, direct qualifiers do not accumulate specific human capital with the only exception of student work. Their main accumulation process starts after graduation and its dynamic is increased by counter-mobility to better positions in the labor market (Becker and Zimmermann 1995; Diewald et al. 2015).

2.2 Alternative postsecondary pathways to higher education

In recent decades, educational reforms have opened alternative routes through VET to higher education, establishing dual qualifications in VET and tertiary studies as part of German higher education. In 2017, 66,013 dual qualifiers graduated from university or a university of applied sciences (Brändle and Ordemann 2020; Dahm and Peter 2023). However, the pathways through VET to higher education are complex and dual qualifiers are not a homogeneous group (Dahm and Peter 2023). Their human capital mixture exceeds that of direct qualifiers by adding specific to the existing general human capital. In the following, I will explore the most common postsecondary pathway over VET to higher education and the human capital accumulated on this route.

Most dual qualifiers have attained a VET degree on a post-secondary pathway after the Abitur (Spangenberg 2015).² Especially in Germany, where VET is an attractive option with solid returns on the labor market, school leavers with Abitur from nonacademic family background are often diverted into VET (Büchel and Helberger 1995; Hillmert and Jacob 2003; Mayer et al. 2007; Shavit and Müller 2000). Furthermore, Germany has undergone a trend of educational upskilling over the last decades. Over its course, the Abitur became a necessary entry requirement for specific, and with regard to later employment chances attractive, VET subjects such as a banking or insurance (Konietzka and Hensel 2017). A little more than 9% of all school leavers with an Abitur take this pathway over VET into higher education (Ordemann et al. 2023).

Dual qualifiers *with* Abitur select the same educational pathway as direct qualifiers until the end of secondary education but take a detour to VET before entering higher education. At the beginning of their studies, their human capital is more diversified in comparison to that of direct qualifiers (Müller et al. 1998): In addition to the general human capital accumulated in secondary schooling, they gather additional theory-based general human capital for which Germany's 'knowledge-based' VET model is known (Brockmann et al. 2008). This part of their human capital is transferable between companies, similarly to their occupation-specific human capital attained in school. This is especially the case if they choose white collar VET subjects that contain a high amount of general human capital. In addition, dual qualifiers gain

² Dual qualifiers with Abitur can have attained their VET degree before or with the Abitur as well.

expertise that contains firm-specific human capital by on-the-job training. Firm-specific human capital contains skills that enhance the effectiveness of the individual on the job but is also bound to a company or institution (Mincer 1974). In Germany, VET on-the-job training is also bound to a structured curriculum defined by the regional chamber of commerce (Solga et al. 2014), thereby lessening its strong tie to a firm described by Mincer (1974). Dual qualifiers *with* Abitur that come from white collar professions such as banking have a higher propensity to study after VET (Ebner et al. 2019)—they qualify higher within their chosen occupational field (Jacob 2004). They often continue to work in their VET-based professions during their studies (Lewin et al. 1996). Remaining in the same field and working in their previous job will counteract a potential devaluation of their specific human capital during studies but might also divert dual qualifiers from a higher academic income, even if they have attained a similar degree as direct qualifiers.

Dual qualifiers *with* Abitur differ from direct qualifiers not only in terms of the accumulated human capital but also due to their sociodemographic characteristics and choices in higher education. More women than men decide to upgrade their educational degree (Jacob 2004; Spangenberg et al. 2017), dual qualifiers *with* Abitur are older when leaving higher education (Büchel and Helberger 1995), are more often in a partnership, or have formed a family (Lewin et al. 1996). They choose different subjects as direct qualifiers such as business administration, or engineering, and study more often at universities of applied sciences or take online rather than on-campus courses and graduate with a bachelor as highest degree (Jacob 2004; Lewin et al. 1996; Spangenberg 2019; Tieben 2020a, b). Research shows that these sociodemographic dimensions and educational choices are related to differences in income. For example, income can vary between women and men (Brandt 2016; Leuze and Strauß 2009), between women with and without families (Kühnhirt and Ludwig 2012), or between age groups (Hammer et al. 2021). Differences also occur between universities and universities of applied sciences (Satilmis and Reimer 2023) or study subjects (Francesconi and Parey 2018; Ordemann and Pfeiffer 2022).

In short, dual qualifiers *with* Abitur share some of the traits of direct qualifiers' general human capital. They add elements of specific human capital to their human capital mixture. As a result, their income should be higher directly after graduating from higher education. This should especially be the case if they have remained in the workforce during their studies and especially if they remain in the company in which they work. However, their sociodemographic characteristics and study choices should limit the length of their income and the increase over time should be less dynamic than that of direct qualifiers.

Previous research shows that studying after VET increases the income of dual qualifiers and that there are no differences compared to direct qualifiers. Büchel and Helberger (1995) show that dual qualifiers with Abitur cannot expect a significant difference in income directly after graduation compared to direct qualifiers. Lewin et al. (1996) confirm these findings. However, it should be noted that they do not report adjusted findings. Further analyses indicate no significant differences between over 15-year-old dual qualifiers *with* Abitur compared to direct qualifiers (Bellmann and Stephani 2012). There are no differences unless a subject change to VET occurs (Hammen 2009, 2011; Thomas 2013).

2.3 A special case: Dual qualifiers without Abitur

Having a VET degree is not only an attractive detour for school leavers with Abitur, but also an important access possibility for those who have not been able to attain an Abitur on the first pathway to an educational degree due to their non-academic family background.³ For dual qualifiers *without* Abitur, entry into higher education is based on their occupational qualifications. They can attain subject-specific access to higher education after three years of VET, related work experience, and an additional internal aptitude test or trial studies (Wolter and Kerst 2022). Those who have passed advanced professional training for a ‘Meister’ can study without restriction. Studying without Abitur has a long tradition in Germany dating to the postwar period (p.e. Dahrendorf 1959; Wolter 2022). This access route was implemented as a nationwide option in the laws governing higher education in 2009 (KMK 2009). Dual qualifying without Abitur remains a phenomenon in Western German states, where educational inequalities were more persistent (Ordemann 2022).

Dual qualifiers *without* Abitur have not attained the general human capital generally associated with the ability to study. This ‘lack’ of general human capital accumulated on the direct pathway to the Abitur is often discussed in the literature under the term deficit hypothesis (Wolter 2022). Underlying this discussion is the understanding that ‘the general university entrance qualification [...] is the ticket to university in Germany’ (Köller et al. 2004). Compared to graduates with Abitur, the general human capital of dual qualifiers *without* Abitur, especially their math and German competencies, remains lower; the same holds for their propaedeutic capabilities (Tieben and Knauf 2019). As a result of their educational pathways, dual qualifiers feel less prepared for their studies than direct qualifiers (Tieben 2020b). Some studies indicate that this leads to lower study success (Brändle and Lengfeld 2015, 2017), but grades improve over the course of study (Berg et al. 2014) and result in similar grades at graduation (Dahm and Kerst 2019; Jürgens 2018). Part of this development could be contributed to a higher risk of dropout of dual qualifiers without Abitur (Brändle and Lengfeld 2015; Dahm 2022a, b; Herrmann 2022).

The selection process from the decision to enter higher education to remaining or dropping out leaves dual qualifiers *without* Abitur as a highly selective group of graduates (Freitag 2012; Ordemann 2019). Their distinguishing characteristic is the occupation and firm-specific human capital that they have gained before and during their studies (Wolter et al. 2014). They are highly successful in the labor market before they enter higher education, especially if they come from a non-academic family background (Ordemann 2019). Before entering higher education, they have experienced upward occupational mobility that pushes them into status positions that are related to academic education and not VET related jobs (ibid.). Despite their occupational success, dual qualifiers *without* Abitur more often than

³ Approximately a tenth of all dual qualifiers without Abitur comes from academic family background (Ordemann 2019). Their occupational status before and after studying is below that of dual qualifiers without Abitur from non-academic family background. Ordemann (2018) speculates that this group studies due to high parental aspirations but the factors that have diverted them from an Abitur also divert them from higher returns on the labor market.

direct qualifiers work in small companies or industries which are not beneficial for higher labor market returns; at the same time, they work longer hours that minimize their hourly income (Ordemann 2022). Furthermore, their sociodemographic characteristics differ more strongly from direct qualifiers than those of dual qualifiers with Abitur. They are oldest at the time of graduation or have more often formed a family (Ordemann 2019, 2022), potentially limiting future income. In addition, they continue to work during their studies, leading to a 'sticky bottom' effect of income based on VET (Ordemann 2019). And despite being motivated by the advancements of their careers to study, they choose low-prestige study subjects that do not yield high incomes.

In addition to their vocational experiences and decisions in higher education, dual qualifiers *without* Abitur can increase their income due to studying (Rzepka 2018). The analyses show that Western German dual qualifiers earn more than those who remain in their VET careers. The author shows that studying after VET comes with high opportunity costs, and dual qualifiers *without* Abitur only earn more than VET graduates without a tertiary degree ten years after finishing their apprenticeship. Furthermore, dual qualifiers earn more than direct qualifiers in the initial phase after attaining a degree, this advantage ceases throughout their careers (Ordemann 2019, 2022).

Summarizing the above findings: The human capital element that distinguishes dual qualifiers from direct qualifiers is anchored in their vocational experiences. This characteristic is especially pronounced for dual qualifiers *without* Abitur. While dual qualifiers *without* Abitur mainly accumulated specific capital before entering higher education, dual qualifiers *with* Abitur attained a mixture of specific and general human capital and direct qualifiers mainly general capital. All three groups add to their human capital mix upon entering higher education, again in different shades due to their educational decisions.

Current findings indicate that despite the different shades of human capital accumulated by dual and direct qualifiers, studying after VET is worthwhile for both groups of dual qualifiers, those *with* and *without* Abitur. Their income increases over the career due to studying, and there is no significant difference to direct qualifiers. In the case of dual qualifiers *without* Abitur, their income even exceeds that of direct qualifiers in the years after graduation. However, these findings are based on older data. They do not take into account the changes in higher education due to the Bologna reform or the subjects studied. Neither do they compare dual qualifiers with and without Abitur with direct qualifiers, thereby accounting for the whole range of human capital between all three groups. To explore the monetary returns on a tertiary degree for dual and direct qualifiers, I ask the following questions: *How do the income trajectories of dual qualifiers change with acquiring a tertiary degree? Is a tertiary degree as beneficial for dual qualifiers as for direct qualifiers?*

3 Empirical design

3.1 Data

I use data from the student start cohort 5 ‘Higher Education and Transition to Work’ of the National Educational Panel Study (NEPS) and its linked administrative data from the Institute for Employment Research (IAB), in short, NEPS-SC5-ADIAB (Bachbauer and Wolf 2021; Blossfeld and Roßbach 2019; NEPS-Network et al. 2022). The data contain the life histories of first-year students who began their bachelor, master, ‘Diplom’ or ‘Staatsexamen’ (state examination) studies at a German higher education institution in the winter semester 2010/2011. Until recently, it was difficult to assess differences in the income trajectories of dual and direct qualifiers in Germany because information on income data, vocational qualifications, the (lack of) university entrance qualification, and competencies was unavailable simultaneously. This situation has changed with data from the NEPS-ADIAB. Its longitudinal data are ideal for exploring research questions related to (alternative) higher education and career pathways. *First*, the data includes educational and occupational histories of the respondents. Therefore, longitudinal research questions related to the relevance of education over the life course can be analyzed, as the information is chronological and events can be precisely identified. *Second*, the data contain cross-sectional information on the socioeconomic background, competencies, decisions, and returns of undergraduates. This information can help identify the mechanisms behind the life courses of students. *Third*, the NEPS-SC5-ADIAB subsample provides longitudinal income data by its linkage it to the administrative data of the IAB (Bachbauer and Wolf 2021). It includes accurate and prepared income data and work biographies dating back to 1975. This data allows an encompassing view of dependent employees’ income and work trajectories preventing bias that occurs when data are collected retrospectively (Hannan and Tuma 1979). The information of 10,468 individuals from the statistical data was merged to the NEPS SC5 data, constituting 58.5% of the original sample. *Finally*, and most importantly for my research question, the student cohort is distinguished from other data by oversampling students without Abitur who entered higher education in the winter of 2010/2011 (Dahm 2014; Kerst 2022). Compared to other representative surveys, it therefore provides a concise analytical definition with sufficient cases of dual qualifiers without Abitur.

3.2 Analytic sample

The analytical sample is restricted to bachelor graduates who do not remain in higher education and master graduates who have completed a bachelor’s and a master’s degree. Graduates who studied a subject related to a Staatsexamen (medical doctors, lawyers, and teaching professionals) are excluded from the analysis. These professions have very specific conditions upon entry into the labor market (civil servant pay scale due to residency, traineeship for teachers, or legal clerkship) that could bias the estimation of income. Furthermore, the sample excludes doctoral students. I focus on workers aged 20 to 55 years.

In total, 4698 individuals attained a tertiary degree. 2374 individuals have graduated with a bachelor's degree or equivalent and left the education system, and 2324 individuals with a master's degree or diploma. In this sample, 1002 graduates attained dual qualifications, 213 of whom do not have an Abitur. Most graduates are female (53.7 vs. 46.3%). The same pattern holds for dual qualifiers with (53.4 vs. 46.6%) and without (52.1 vs. 47.9%) Abitur. However, statistical data show that more men than women study as dual qualifiers without Abitur (Kerst and Wolter 2022), indicating a potential selection bias that might lead to gender differences in the income of dual qualifiers.

3.3 Variables

The empirical analyses focus on dual qualifiers with and without Abitur and direct qualifiers. Using information from the educational history, the vocational qualification is coded as (1) if a vocational training was completed on a postsecondary pathway. The variable is assigned (0) if there is no vocational qualification. The criterion for identifying graduates who entered higher education without Abitur was based on the following question: 'How did you acquire your university entrance qualification?' Those who entered higher education via an occupational pathway and without Abitur are coded with (1). Spell data from educational trajectories are used to identify the completed study phases and the degree earned.

Dependent variables (1) Income: Information on the income of the graduates is provided by the IAB as a daily remuneration. Income is discounted to 2015 using the Consumer Price Index Germany (Destatis 2021). Employers only report the compulsory wage information up to a specific limit, which differs between Eastern and Western Germany, and within the Länder. At first glance, this poses a problem for the analysis, as it creates a top-coding at the upper earnings limit for statutory pension insurance. As highly educated graduates earn more than other educational groups, the sample should be strongly biased against higher wages. A pattern that also limits the right skewed distribution normally inherent in reported income. Dauth and Eppelsheimer (2020) found that 44% of highly educated workers in the IAB data are affected by top coating. Whereas the NEPS-ADIAB data are based on the administrative data of the IAB and therefore might be affected by not reported income, the analytic sample for the empirical exploration of the income differences between dual and direct qualifiers differs in one relevant point. Only data on income data of graduates who entered higher education in 2010 and graduated in the following years are provided. Consequently, the graduates in the sample are at the beginning of their careers, as academics do not yet earn high salaries that are top coated in the IAB data. In all, 5298 income observations in the analytic data set are censored. Robustness checks have been estimated with both censored and uncensored data. Furthermore, I run the estimations with income data trimmed at the 1% level. However, the different operationalizations of income did not change the overall trend of the income trajectories.

Time-invariant independent variables Sex is included as dichotomous variable coded for men (0) and women (1). Family background is an important factor for (self-)selecting to VET for individuals from less privileged families, shaping the composition of the dual qualifiers with and without Abitur and direct qualifiers. Family background is reported as the highest parental International Socio-Economic Index (HISEI). The HISEI ranges from 11 (non-educated workers) to 89 (judges). It enters the multivariate models as a categorical variable with up to 25% of the HISEI distribution (0), 25–75% of the HISEI distribution (1), and more than 75% (2). Finally, information on studying at university (1) versus university of applied sciences (0), the type of study on campus (0), studying beside working (1) or long distance (2), and study subjects are controlled in the analysis. The study subject is constructed from the information available in the NEPS data and is specified by the information available in the remote data set.⁴ The subject categories include language, culture, art, social sciences, STEM, health professionals, business administration, and other subjects.

Time-variant variables The following variables can change over the observation window. The family of graduates is reflected by (1) if there is a child under 14 years of age in the household or not (0) and the age of the respondent. Job characteristics are included as dichotomous variables: working in Western (0) or Eastern-Germany (1), working full-time (0) or part-time (1), and having a permanent (0) or fixed-term contract (1). Finally, the degree of job complexity is included: unskilled (0), skilled (1), complex (2), or highly complex activities (3).

An overview of the time-invariant and time-variant variables is given in Table A1 in the Online-Appendix.

3.4 Methods

I estimate Poisson regressions to provide a more detailed perspective on the income trajectories of dual qualifiers and their differences compared to direct qualifiers. Income analyses based on educational attainment and upskilling are prone to endogeneity problems (Gebel and Heineck 2019). Education can affect labor market decisions by means of (self-)selection processes, violating the exogeneity assumption of regression analysis, thereby leading to a problem of endogeneity. This is especially true for dual qualifiers diverted by family background from higher education to their first educational pathway into VET. Moreover, these first educational decisions affect later labor market decisions being made as higher education graduates, increasing potential endogeneity. As a result, the estimation may be biased. However, the following paper does not claim to be causal. Instead, the estimation method will explore differences in intragenerational income trajectories between the three different groups of graduates.

In labor market research, income is generally analyzed using logarithmized income, an approach based on the formal-mathematical derivation of the relationship between education and income by Mincer (1974). However, most authors interpret

⁴ I thank the LIfBi and IAB for providing the subject categories in the NEPS-ADIAB data for this analysis.

the log coefficient as a percentage change without retransforming. This leads to approximate, albeit false, interpretations. Gould (2011) has brought the spotlight back to estimating Poisson regression with the Huber/White/sandwich linearized estimator (for a detailed discussion: Santos Silva and Tenreiro 2006). This method can be used for every $y \geq 0$, such as income, and has the advantage that the estimation coefficients can be interpreted as a percentage change if a variable changes by one unit. Therefore, I proceed as follows. First, fixed-effects panel Poisson models are estimated for exploring within dual qualifiers differences in income over time.⁵ This step enables conclusions on how the income of the dual qualifiers with and without Abitur changes due to entering higher education and then attaining a degree. Only time-varying variables are included in the model. Changes in social or work context can therefore be analyzed in their relationship with income. However, while fixed-effects longitudinal Poisson regressions are robust in their estimations, this does not hold for random-effects longitudinal models. Second, I estimate pooled Poisson models for the income differentials of dual qualifiers with and without Abitur compared to direct qualifiers after graduation. This methodological approach allows for the exploration of potential income inequalities between the three groups.

4 Findings

4.1 Dual and direct qualifiers

Table 1 provides an overview of the highest degree that dual and direct qualifiers attained and their family background (HISEI). The analysis sample corresponds to the inequality patterns found in the literature (Kerst and Wolter 2022; Ordemann 2018, 2019; Wolter et al. 2015): Dual qualifiers more often come from families with low occupational status. The distribution by family background differs at the margins for dual and direct qualifiers. Dual qualifiers with Abitur (high: 20.3%, low: 30.2%) and without one (19.5%, 33.2%) come less frequently from a high HISEI family background and more often from a low family background compared to direct qualifiers (32.6%, 20.7%). The distribution of graduates from a middle HISEI family background is even.

Furthermore, Table 1 indicates that dual graduates who took the ‘second chance’ leave higher education more often after the first qualifying degree. Dual qualifiers without Abitur most often choose to exit higher education with a bachelor’s (70.9%) rather than a master’s degree (29.1%). This pattern is also visible for dual qualifiers with Abitur (67.7 vs. 32.3%). However, their pattern is not as pronounced. In contrast, more direct qualifiers attain a master’s degree than a bachelor’s (55.6 vs. 44.4%).

Next, I turn to the income of the graduates. Figure 1 is conditional on those who work and provides an overview of the average daily income for direct qualifiers

⁵ I have estimated fixed-effects panel regression models with the log of wages to check the robustness of my analysis. Their coefficients are similar in trend and significance to the Poisson fixed-effects panel regression.

Table 1 Overview of family background and highest degree of dual and direct qualifiers (absolute and in %)

	Total	Direct qualifiers	Dual qualifiers With Abitur	Without Abitur
<i>Family background</i>				
Low HISEI	1058	20.7	30.2	33.2
Middle HISEI	2152	46.8	49.5	47.3
High HISEI	1332	32.6	20.3	19.5
<i>Total</i>	4542	74.1	21.4	4.5
Bachelor's degree	2374	44.4	67.7	70.9
Master's degree	2324	55.6	32.3	29.1
<i>Total</i>	4698	74.1	21.3	4.5

Note: Total of family background is nested in the attained degree.

Source: NEPS-SC5-ADIAB (<https://doi.org/10.5164/IAB.FDZD.2112.en.v1>), author's own estimations

(short-dashed line), dual qualifiers with (dashed line) and without Abitur (solid line). The observation window starts six years (72 months) before, continues over the study time and ends five and a half (66 months) years after studying begins. The figure shows that the income of direct qualifiers increases more strongly before the study than dual qualifiers, although to a lower level with a slight dip before they enter higher education. Dual qualifiers with Abitur show more constant income over this time, and dual qualifiers without Abitur show a steady increase. During the study period, all three groups show an increase in income. The increase ends for direct and dual qualifiers with Abitur after two and a half years of their studies, which is approximately when they are about to finish their bachelor's degree. Only the incomes of dual qualifiers without Abitur steadily increase over time. However, the incomes of all three groups display an increased dynamic at the end of the observation window.

Turning to the differences between the different groups of graduates, Fig. 1 shows that direct qualifiers earn the least of all groups, followed by dual qualifiers with Abitur and dual qualifiers without Abitur. This stratification pattern is inverse to the one by family background, where dual qualifiers without Abitur come from family background with the lowest occupational status compared to dual qualifiers with Abitur and direct qualifiers (Table 1). These differences are significant between direct and dual qualifiers without Abitur until about two years before and from three years after entering higher education. The differences between dual qualifiers with and without Abitur remain significant about six months after starting their tertiary education. Dual qualifiers without Abitur lift off again in the last year under observation. While the descriptive results offer an overview of the income trajectories of dual qualifiers with and without Abitur, the following two sections will first explore in more depth the income trajectories of dual qualifiers with and without Abitur, and then the differences in comparison to direct qualifiers.

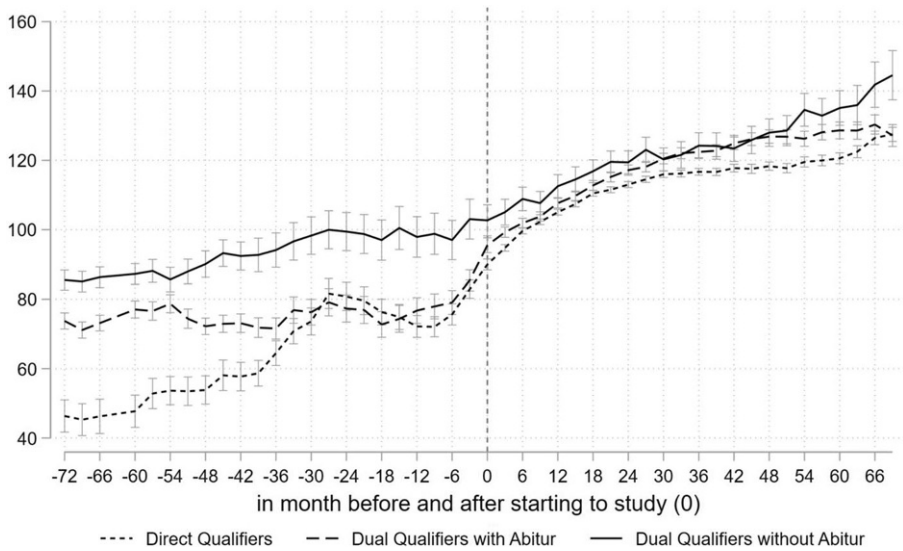


Fig. 1 Average daily income (in euros). (Note: Pooled average daily income with standard error of the mean. Source: NEPS-SC5-ADIAB (<https://doi.org/10.5164/IAB.FDZD.2112.en.v1>), author's own estimations)

4.2 How do the income trajectories of dual qualifiers change after acquiring a tertiary degree?

To explore the change in income due to a tertiary degree, Table 2 presents the regression coefficients of the longitudinal fixed-effects Poisson estimation separately for dual qualifiers with Abitur (left side) and without Abitur (right side). I focus on dual qualifiers with and without Abitur, as they were already integrated into the labor market with a qualifying degree before entering higher education and attaining a tertiary degree. The observation window starts six years before and ends four years after dual qualifiers enter higher education. The coefficients indicate the percentage change if the respective dimension changes by one unit.

Turning to dual qualifiers with Abitur the findings show that entering higher education decreases the income (M1). Neither a master's nor a bachelor's degree relate to significant changes in income. After considering the factors that vary over time, this pattern remains stable (M2). Instead, the income trajectories of dual qualifiers with Abitur are related to changes in working conditions over time. These follow the expected pattern: Moving to Eastern Germany for work (-0.089), entering part-time (-0.358), or a fixed-term contract (-0.092) reduces their income, or put differently, moving to Western Germany, entering full-time or signing a permanent contract increases their income. However, entering a job with more complex activities increases their income.

Dual qualifiers without Abitur show a different pattern in their income trajectories. Entering higher education does not relate to their income during the observation window and neither does graduating with a bachelor's degree (M1). However, attain-

Table 2 Estimation of daily income, six years before and four years after start of study (coef.; 95-%CI)

	Daily income of dual qualifiers			
	With Abitur		Without Abitur	
	M1	M2	M1	M2
Study Context				
<i>Transition into studies</i>	-0.142 [-0.263; -0.021]	-0.120 [-0.214; -0.026]	0.015 [-0.123; 0.152]	0.021 [-0.111; 0.153]
<i>Bachelor's degree</i>	0.056 [-0.739; 0.186]	0.010 [-0.091; 0.112]	0.069 [-0.085; 0.224]	0.071 [-0.072; 0.214]
<i>Master's degree</i>	0.136 [0.013; 0.286]	0.081 [-0.037; 0.199]	0.422 [0.230; 0.613]	0.305 [0.146; 0.464]
Social Context				
<i>Age</i>	–	0.000 [-0.005; 0.005]	–	-0.003 [-0.014; 0.008]
<i>Children under 14 years old</i>	–	0.048 [-0.132; 0.229]	–	0.043 [-0.121; 0.207]
Work Context				
<i>Working in Eastern Germany (ref. Western)</i>	–	-0.089 [-0.163; -0.015]	–	-0.094 [-0.237; 0.049]
<i>Part-time (ref. full-time)</i>	–	-0.358 [-0.412; -0.304]	–	-0.325 [-0.422; -0.228]
<i>Fixed-term contract (ref. permanent contract)</i>	–	-0.092 [-0.126; -0.059]	–	-0.056 [-0.123; 0.010]
<i>Degree of job complexity (ref. unskilled activities)</i>				
<i>Skilled activities</i>	–	0.256 [0.134; 0.377]	–	0.246 [-0.048; 0.540]
<i>Complex activities</i>	–	0.356 [0.231; 0.481]	–	0.305 [0.001; 0.610]
<i>Highly complex activities</i>	–	0.372 [0.248; 0.495]	–	0.358 [0.058; 0.658]
<i>Time in month</i>	0.006 [0.005; 0.008]	0.006 [0.005; 0.007]	0.004 [0.004; 0.005]	0.004 [0.003; 0.005]
<i>Time in month²</i>	0.000 [-0.000; 0.000]	0.000 [-0.000; 0.000]	0.000 [0.000; 0.000]	0.000 [0.000; 0.000]
<i>Wald chi2</i>	710.51	1171.43	221.74	295.01
<i>N(observations)</i>	38,576		10,940	
<i>N(graduates)</i>	931		196	

Note: The models include changes in the number of companies in which a person worked. For comparison, the regression coefficients for men and women can be found in the Online-Appendix in Table A2. The sample contains graduates who enter the labor market with a bachelor's degree or a master's degree as the highest degree attained.

Source: NEPS-SC5-ADIAB (<https://doi.org/10.5164/IAB.FDZD.2112.en.v1>), author's own estimations

ing a master's degree increases their income significantly. Similar to dual qualifiers with Abitur, this pattern remains once the time-varying factors are controlled for (M2). However, changes in their work context are not as influential as for dual qualifiers with Abitur, neither in significance nor in extent. For example, moving to Eastern Germany or entering a job with skilled activities is non-significant. Only entering part-time work reduces their daily income and entering a more complex job activity increases their income. This pattern is not surprising when one looks at the population of dual qualifiers without Abitur. Their social context and integration on vocational career ladders can prevent occupational mobility, anchoring them in previous career trajectories (Ordemann 2019, 2022).

The findings of the fixed-effects Poisson regression indicate that dual qualifiers do not benefit from studying. The sole exemption is dual qualifiers *without* Abitur under the condition that they attain a master's degree. On the first educational pathway, they were the least likely to take the route to a tertiary degree (for negative selection hypothesis see Brand and Xie 2010); due to attaining a master's degree, they can expect an increase in income. More importantly than the direct impact of the degree, studying opens the access to more complex activities on the labor market which in turn increase the income of dual qualifiers with and without Abitur over time. Although the estimates presented in Table 2 give an overview of the changes within the income trajectories of dual qualifiers, they do not report the differences between the two groups of dual qualifiers compared to direct qualifiers. However, this perspective is necessary to assess whether the educational inequalities previously manifested in educational attainment transfer to the labor market. I will explore this perspective in the next step.

4.3 Is a tertiary degree as beneficial for dual qualifiers as for direct qualifiers?

Table 3 presents the findings of the pooled Poisson estimation every six months until four years after graduation for bachelor graduates to receive more insight into the income differences of dual and direct qualifiers. The most important finding for the question regarding the differences between dual and direct qualifiers in the backdrop of the social inequalities inherent in the educational pathways can be found in the first two rows of the table. Over the observation window, dual qualifiers with and without Abitur earn significantly *more* than direct qualifiers. A difference that ranges from four to six % above the income of direct qualifiers for dual qualifiers with Abitur and between nine and 15% above the income of dual qualifiers without Abitur. However, the income differences of dual qualifiers with Abitur at graduation and at the end of the observation window are insignificant. Furthermore, women earn less than men, showing the same pattern reflecting the gender pay gap known from the literature. Age only increases the income in the first one and a half years after graduation.

The study context only partially relates to income after graduation. The most important factor during the observation window is whether the graduates studied at a university or a university of applied sciences. Attending university reduces income up to 15%. The finding surprises, as the literature generally assumes that university graduates earn more than universities of applied sciences. However, the

Table 3 Income pooled regression, bachelor's degree (coef., [ci])

Graduation		6 months after	12 months after	18 months after	24 months after	30 months after	36 months after	42 months after	48 months after
Educational Pathway (ref. direct qualifiers)									
<i>Dual qualifiers with</i>	0.033	0.054	0.056	0.054	0.055	0.046	0.035	0.035	0.025
<i>Abitur</i>	[-0.039;0.106]	[0.017;0.091]	[0.020;0.091]	[0.018;0.090]	[0.022;0.087]	[0.013;0.078]	[0.003;0.068]	[0.001;0.069]	[-0.009;0.058]
<i>Dual qualifiers without Abitur</i>	0.101	0.145	0.126	0.132	0.120	0.089	0.099	0.103	0.086
	[0.006;0.195]	[0.079;0.211]	[0.067;0.185]	[0.068;0.196]	[0.059;0.182]	[4.206;4.705]	[0.029;0.169]	[0.039;0.166]	[0.025;0.146]
Social Context									
<i>Women (ref. men)</i>	-0.103	-0.056	-0.045	-0.058	-0.047	-0.044	-0.071	-0.083	-0.091
	[-0.173;-0.033]	[-0.095;-0.016]	[-0.083;-0.007]	[-0.093;-0.23]	[-0.081;-0.013]	[-0.077;-0.010]	[-0.104;-0.038]	[-0.115;-0.50]	[-0.122;-0.060]
<i>Age</i>	0.012	0.005	0.007	0.005	0.004	0.004	0.003	0.002	0.004
	[0.007;0.018]	[0.001;0.009]	[0.002;0.011]	[0.000;0.009]	[-0.000;0.008]	[-0.001;0.008]	[-0.001;0.008]	[-0.003;0.006]	[-0.000;0.009]
<i>Children under 14 years old</i>	-0.021	-0.032	-0.010	-0.034	-0.033	-0.038	-0.068	-0.096	-0.110
	[-0.090;0.049]	[-0.075;0.012]	[-0.050;0.030]	[-0.075;0.007]	[-0.071;0.005]	[-0.076;-0.000]	[-0.111;-0.025]	[-0.147;-0.045]	[-0.158;-0.062]
Family background (ref.: high)									
<i>Low</i>	-0.018	-0.041	-0.035	-0.021	-0.040	-0.055	-0.061	-0.042	-0.040
	[-0.118;0.081]	[-0.090;0.008]	[-0.081;0.011]	[-0.068;0.026]	[-0.083;0.002]	[-0.096;-0.015]	[-0.102;-0.020]	[-0.082;-0.001]	[-0.078;-0.001]
<i>Middle</i>	0.007	-0.001	0.007	0.009	-0.003	-0.023	-0.028	-0.023	-0.023
	[-0.084;0.097]	[-0.046;0.044]	[-0.035;0.049]	[-0.035;0.053]	[-0.041;0.035]	[-0.059;0.014]	[-0.065;0.009]	[-0.058;0.013]	[-0.058;0.012]

Table 3 (Continued)

Graduation		6 months after	12 months after	18 months after	24 months after	30 months after	36 months after	42 months after	48 months after
Study Context									
<i>University (ref. UAS)</i>	-0.149 [-0.232; -0.067]	-0.079 [-0.122; -0.036]	-0.048 [-0.086; -0.010]	-0.078 [-0.116; -0.039]	-0.086 [-0.123; -0.050]	-0.076 [-0.111; -0.042]	-0.064 [-0.097; -0.032]	-0.66 [-0.098; -0.034]	-0.066 [-0.096; -0.035]
Type of study (ref. long distance)									
On campus	0.008 [-0.141; 0.156]	-0.031 [-0.159; 0.097]	-0.033 [-0.162; 0.095]	-0.034 [-0.156; 0.088]	-0.026 [-0.142; 0.091]	-0.006 [-0.135; 0.124]	-0.022 [-0.140; 0.096]	-0.041 [-0.180; 0.099]	-0.019 [-0.163; 0.126]
Part-time	0.103 [-0.042; 0.248]	0.107 [-0.022; 0.237]	0.086 [-0.044; 0.216]	0.034 [-0.091; 0.159]	0.066 [-0.053; 0.185]	0.097 [-0.036; 0.230]	0.070 [-0.054; 0.194]	0.053 [-0.091; 0.196]	0.050 [-0.099; 0.200]
Study Subject									
Social sciences	0.048 [-0.057; 0.153]	0.086 [0.021; 0.151]	0.066 [0.009; 0.124]	0.030 [-0.030; 0.090]	0.019 [-0.033; 0.072]	0.056 [0.002; 0.111]	0.056 [0.000; 0.111]	0.043 [-0.015; 0.101]	-0.008 [-0.065; 0.050]
Economics	0.135 [0.025; 0.246]	0.176 [0.021; 0.151]	0.171 [0.114; 0.229]	0.155 [0.098; 0.212]	0.137 [0.085; 0.189]	0.148 [0.096; 0.200]	0.155 [0.103; 0.208]	0.172 [0.120; 0.224]	0.159 [0.107; 0.211]
STEM	0.096 [-0.016; 0.209]	0.209 [0.142; 0.277]	0.225 [0.163; 0.286]	0.192 [0.133; 0.251]	0.173 [0.118; 0.229]	0.188 [0.134; 0.243]	0.188 [0.134; 0.241]	0.179 [0.126; 0.232]	0.166 [0.114; 0.217]
Health sciences	-0.123 [-0.297; 0.051]	-0.071 [-0.193; 0.050]	-0.060 [-0.175; 0.059]	-0.097 [-0.219; 0.026]	-0.079 [-0.187; 0.030]	-0.038 [-0.132; 0.055]	-0.056 [-0.176; 0.064]	-0.103 [-0.242; 0.007]	-0.127 [-0.251; -0.003]
Sport and others	0.004 [-0.163; 0.172]	-0.048 [-0.141; 0.046]	-0.058 [-0.152; 0.035]	-0.035 [-0.119; 0.048]	-0.057 [-0.126; 0.013]	-0.028 [-0.095; 0.040]	-0.026 [-0.094; 0.041]	-0.075 [-0.157; 0.007]	-0.027 [-0.104; 0.050]

Table 3 (Continued)

	Graduation	6 months after	12 months after	18 months after	24 months after	30 months after	36 months after	42 months after	48 months after
Work Context									
<i>Working in Eastern Germany (ref. Western)</i>									
<i>Part-time (ref. full-time)</i>									
<i>Fixed-term contract (ref. permanent)</i>									
<i>Degree of job complexity (ref. unskilled activities)</i>									
Skilled activities	0.217 [0.055; 0.380]	0.220 [0.098; 0.343]	0.265 [0.119; 0.411]	0.245 [0.093; 0.398]	0.169 [0.006; 0.332]	0.135 [-0.21; 0.291]	0.208 [0.043; 0.373]	0.106 [-0.043; 0.256]	0.146 [-0.005; 0.296]
Complex activities	0.273 [0.106; 0.440]	0.290 [0.167; 0.413]	0.360 [0.214; 0.506]	0.326 [0.176; 0.477]	0.271 [0.109; 0.434]	0.233 [0.077; 0.388]	0.287 [0.123; 0.451]	0.185 [0.036; 0.333]	0.209 [0.060; 0.358]
Highly complex activities	0.348 [0.189; 0.506]	0.318 [0.197; 0.439]	0.370 [0.225; 0.515]	0.333 [0.183; 0.483]	0.270 [0.108; 0.432]	0.224 [0.069; 0.378]	0.286 [0.122; 0.449]	0.215 [0.067; 0.362]	0.248 [0.100; 0.396]
<i>_cons</i>	4.026	4.191	4.108	4.260	4.393	4.455	4.459	4.640	4.569
<i>Pseudo R²</i>	0.367	0.339	0.326	0.298	0.310	0.302	0.303	0.300	0.328
<i>N</i>	531	1157	1267	1306	1351	1416	1486	1516	1467

Note: Pooled Poisson estimations with robust standard errors. Significant coefficients are marked in bold; if the confidence intervals include 0, the coefficients are significant. The notation UAS refers to university of applied sciences; STEM refers to science, technology, engineering, and math. The sample consists only of bachelor's graduates who enter the labor market after attaining their degree.

Source: NEPS-SC5-ADIAB (<https://doi.org/10.5164/IAB.FDZD.2112.en.v1>), author's own estimations

short time frame, the bachelor's degree as the highest degree attained, and the vocational orientation of dual qualifiers might be the reason for this unusual pattern (similar finding: Satilmis and Reimer 2023). Similarly to the findings in the literature, studying a STEM subject or economics leads to a higher income.

For income, the work context remains the most critical influence. Its pattern follows the same as in the above fixed-effects longitudinal Poisson estimations: working in Eastern Germany lowers income by between 11 and 16%, working part-time by between 36 and 38%, and having a fixed-term contract by between 9 and 22%. Compared to working in a job with unskilled activities, other, more skilled and complex activities increase income. However, over the last year, working in a job with skilled activities has lost significance. I take this as an indication that graduates move on to positions reflecting their new education level.

Table A3 in the Online-Appendix provides an overview of the findings of the pooled Poisson estimations for master's degree holders. During the first two years after graduation, no differences are apparent between the three groups of graduates.⁶ I take this as the first indication that dual qualifiers who attain a master's degree manage to break with their previous career and start to benefit on the same level as direct qualifiers. However, the gender pay gap remains significant. Women earn a daily income between 7.4 and 8.7% lower than that of men. Age seems ambiguous in its effect, and having children under 14 years old in the household only lowers the income at the end of the observation window as more graduates start a family. Turning to the findings about the study context, studying only part-time significantly increases the income of master's graduates. Compared to graduates with a degree in languages, almost all other study subjects lead to an increase in income. In particular, a degree in economics or STEM increases income by a minimum of 15%. Differences that can be attributed to the work context follow the same pattern as for bachelor's graduates: Working in Eastern Germany, part-time work, and a fixed-term contract all reduce the income of graduates. At the same time, jobs with more complex activities lead to a higher income compared to unskilled jobs.

The presented findings of the pooled Poisson regression offer an overview of the differences between dual qualifiers with and without Abitur and direct qualifiers. However, the analyses do not show how all these findings interrelate to enhance or diminish overall differences. Therefore, I will conclude by exploring the income differences between dual qualifiers with and without Abitur and direct qualifiers when all other time-varying and time-constant factors are at the mean. Figure 2 presents these differences between graduates with a bachelor's degree who left the education system (left) and graduates who entered the labor market with a master's degree (right). Over 48 months after graduation, the composition of dual qualifiers *with* and *without* Abitur and direct qualifiers changes, and the income increases steadily. The observed stratification pattern of average income remains consistent: Dual qualifiers *without* Abitur earn more than dual qualifiers *with* Abitur, and direct qualifiers. Significant differences only remain between dual qualifiers *without* Abitur

⁶ Robustness checks with hierarchical models have shown that the exclusion of the family background variable does not change the trend and significance of the differences between dual and direct qualifiers.

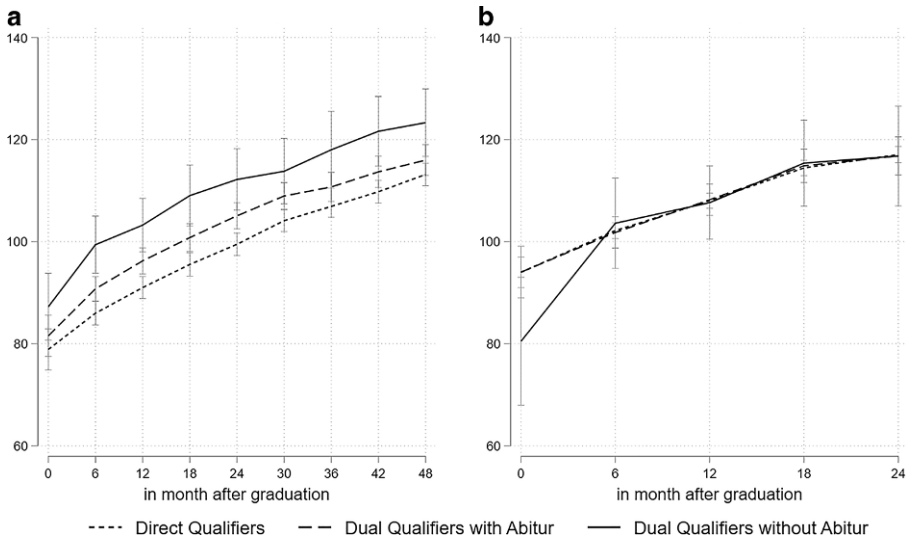


Fig. 2 Estimated daily income, **a** bachelor's and **b** master's degrees (in euros; 95%-CI). (Note: Pooled estimated daily income with a 95%-confidence interval. Please note that the graph for graduates with a master's degree includes dual and direct qualifiers, however, the curves of dual qualifiers with and without Abitur almost overlap (for estimates see Table A4 in the Online-Appendix). Source: NEPS-SC5-ADIAB (<https://doi.org/10.5164/IAB.FDZD.2112.en.v1>), author's own estimations)

and direct qualifiers. In each time point under observation, the latter earn less than the former.

Turning to the income differences for graduates with a master's degree, on the right side of Fig. 2, two visual differences become immediately apparent compared to the pattern on the left side. First, graduates in the data have only entered the workforce. Therefore, the observation window is reduced to 24 months after graduation, visible in the shorter x-axis. This observation window only gives a first indication of income differences but cannot account for efforts at counter-mobility normally present in the mobility patterns of direct qualifiers. Second, there are no differences in income between dual qualifiers *with* and *without* Abitur and direct qualifiers.

The findings of the pooled Poisson regressions indicate that leaving higher education with a bachelor's degree is most beneficial for dual qualifiers *without* Abitur followed by dual qualifiers *with* Abitur and direct qualifiers. While the social context only begins to relate to the income towards the end of the observation window, the study and the work context are significantly related to bachelor's income. However, attaining a master's degree is as beneficial for dual qualifiers as for direct qualifiers. Again, the study and work context are the most important for income.

5 Conclusion

The present contribution explores income differences between dual and direct qualifiers, using NEPS-SC5-ADIAB data. A special focus is placed on the differentiation

between dual qualifiers who have attained an Abitur and are therefore directly eligible to study but choose to enter VET beforehand and those who did not attain an Abitur on their first educational pathway. The findings of this study add to the current literature on monetary returns on alternative pathways to higher education by focusing on the differences in income from an intragenerational perspective of dual qualifiers *with* and *without* Abitur and by comparing them with direct qualifiers.

I find that the decision to enter and complete higher education only partially relates to the income trajectory of dual qualifiers *with* and *without* Abitur. First, dual qualifiers *with* Abitur experience a reduction in income once they start to study and if they continue working. Second, dual qualifiers *without* Abitur increase their income if they attain a master's degree. They, who were least likely to enter college and then go on to get a second-cycle degree, also profit most. This finding also suggests that dual qualifiers without Abitur can break away from the 'sticky bottom' of their previous career. However, for the other groups under observation it is not the degree itself, but the opportunities that it opens in the labor market, that relate to the income trajectories. A tertiary degree enables dual qualifiers to move on to jobs with more complex activities associated with a tertiary degree, increasing their income. This pattern is more prominent for dual qualifiers *with* Abitur than for dual qualifiers *without* Abitur.

Changing to an inequality perspective on the income of dual and direct qualifiers, the findings show that dual qualifiers cannot catch up to the income returns known for higher education graduates. Instead, with a bachelor's degree, dual qualifiers with and without Abitur lead the income hierarchy. This privilege is lost for master's graduates, but not to the degree that dual qualifiers are disadvantaged. Over the short time I observed graduates in the labor market after graduation, dual qualifiers with and without Abitur, and direct qualifiers can expect the same income. Over the observed, albeit short, time, previous inequalities could therefore be minimized.

The longitudinal data of the NEPS-SC5/SC6-ADIAB remains the ideal data set for exploring research questions related to (alternative) pathways to a tertiary degree and its related returns on the labor market. However, despite the data, this study has several limitations that open questions for further research: First, and despite the oversampling of dual qualifiers without Abitur, the observations in this study are limited, which could bias the findings. Similarly, the endogeneity inherent in the study of alternative educational pathways and their returns on the labor market limits the impact of this study. Whether machine learning in combination with matching approaches can help overcome these problems is a question for further research. Finally, while I argue theoretically that dual and direct qualifiers accumulate different degrees of general and specific human capital due to their educational pathways, it might be worthwhile to look at how these differences relate to labor market returns.

Dual qualifiers are known to divert from a direct path into higher education. Although there are a limited number of studies on how these detours reduce educational inequalities, there is still much to learn about previous inequalities and whether they are transferred to the labor market due to a 'sticky bottom' effect of the previous occupational career and when these effects manifest themselves. It seems that the Bologna reform with the separation of tertiary degrees into bachelor's and master's degree could help this previously disadvantaged group of graduates to study, obtain

a degree, and be successful in the labor market. However, this opportunity might also hold this group back from the higher returns of a master's degree. Despite the shortcomings discussed, the current study adds to the literature on how alternative pathways to higher education are related to income and life chances of those who are diverted in school or thereafter. Taking the 'second chance' to attain a university degree allows previous VET graduates to close the gap between the income returns of tertiary graduates as dual qualifiers with and without Abitur. A detour through VET can provide downstream life chances for individuals from non-academic family backgrounds. However, the short observation window after graduation only partially allows for an exploration of the income trajectories over later phases in the life course. With the ripening of the data, the observed inequality patterns may change as direct qualifiers gather valuable specific human capital over their career and dual qualifiers, who graduate at an older age, become less attractive for future employers. Nevertheless, despite potential future inequalities, it is vital for VET graduates to know that upgrading with tertiary degree opens access to better opportunities in the labor market and is therefore worthwhile for their life chances.

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