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Higher education dropouts and the labour market. An exploration of parental education effects on early career trajectories in Austria

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ABSTRACT

Dropping out from higher education is thought to be problematic on an individual, institutional, and societal level. Research on dropouts' transition into the labour market is scarce and often falls short on incorporating the employment situation prior to leaving education. This study explores the education-employment patterns of individuals before and after dropping out. It applies sequence analysis and cluster analysis to high-quality register data to identify typical labour market trajectories. The results indicate that dropping out is linked to diverging labour market pathways. It can be embedded in long-term employment, be followed by fast labour market entry, or can be a junction in a volatile education-employment biography. Existing research suggests that parental education is a determinant of labour market trajectories. Our findings indicate that dropouts from an academic background do not largely occupy any trajectories in specific. However, they are more likely to be self-employed and less prone to certain risk scenarios.

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Higher education dropouts; labour market transition; parental education; sequence analysis

Introduction

Dropping out is a key issue in higher education research. With the ongoing expansion of higher education, the number of higher education dropouts rises just as the number of entrants and graduates does. On average in the OECD, around 47% of the population will enter higher education at some point in their lives (OECD 2023, 216), but roughly every 3rd male and every 4th female bachelor-level student did not graduate even 3 years after the theoretical programme duration has passed (OECD 2022, 199).

Dropping out is often framed as problematic at various levels: From the perspective of public finances, dropouts incur direct costs for their unfinished education and indirect opportunity costs through taxes not collected due to the shorter working lives and lower wages of dropouts compared to graduates (Pfeiffer and Stichnoth 2021). Where dropout rates are used as measures of higher education efficiency, institutions are evaluated on their ability to reduce dropout rates, often with financial consequences. At the individual

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level, dropping out is sometimes framed as an 'educational investment in vain', as higher education dropouts are found to have a more difficult labour market entry than graduates (Klein, Shweta, and Lars 2021). Retention and dropout causes are therefore one of the main research topics in higher education research (for reviews see e.g. Behr et al. 2020; Sarcletti and Müller 2011).

Considering this narrative, there is surprisingly little research on the labour market potential of higher education dropouts. One reason for this is that they are much more difficult to survey than graduates: In panel designs, the panel attrition of dropouts is high (e.g. in the German NEPS: Theune 2021, 26). In general population surveys, uncompleted education programmes are usually not covered, or the subsample sizes of the persons concerned are insufficient for detailed analysis.

We know, however, that post-secondary education overlaps with employment in different shapes and patterns. In most European countries, at least one-third of students works besides studying, with working hours often averaging above 20 hours (Masevičiūtė, Šaukeckienė, and Ozolinčiūtė 2018). Scholars have discussed that the links between education and employment (outcomes) are neither purely linear and consecutive, nor are effects exclusively pointing one-way from education to employment outcomes (Raffe 2003). Instead, newly proposed perspectives emphasise the parallelism and intertwinement of these domains (Fu 2023). For the Austrian context, descriptive research suggests that dropouts display vastly different extents of work before dropping out, which is also linked to their age (Thaler and Unger 2014). It also discusses the possibility of 'job-out', which is more related to work obligations than to academic overburden and was identified in other studies as well (Hovdhaugen 2013; Moulin et al. 2013).

We analyse the social dimension of this interaction between labour market activities and dropping out. Students from lower social backgrounds must overcome numerous barriers to enter and are found to be less likely to attend tertiary education. Even if they manage to enter higher education, they are less likely to succeed in higher education than those from more privileged social backgrounds (e.g. Müller and Klein 2023). However, in contrast to the situation for graduates of higher education (e.g. Friedman and Laurison 2020), evidence that these disadvantages persist in the labour market for dropouts is rare.

To account for the apparent diversity in how dropping out can interact with employment both before and after, we propose a longitudinal exploration of education-employment patterns by applying sequence analysis. Several researchers have used this method to describe labour market trajectories of (higher education) graduates (e.g. Brzinsky-Fay 2007; Duta, Wielgoszewska, and Iannelli 2021; Spexard et al. 2022); however, we are not aware of studies that do so for higher education dropouts.

By filling this gap, we seek to achieve novel contributions to the understanding of higher education dropout, but also the interplay of tertiary education and work, in three ways: First, by considering the employment status at multiple points over a total of 8 years before and after dropping out, we acknowledge the possibility of complex long-term interaction of education and employment. This enables us to identify heterogenous trajectories that do not necessarily lead from secondary to higher education to employment in a linear way (yet our approach does not rule out such 'traditional' pathways either). By clustering these sequences, secondly, we can explore typical patterns of dropping out without prejudice towards any arbitrary starting point or outcome. This compliments existing research, which usually either focusses on certain events leading up

to, or outcomes following dropout, but does not yet cover the continuous context overarching dropout. Thirdly, by performing logistic regressions of parental education on the cluster allocation, we assess social inequalities in the process of dropping out and analyse if and how parental education effects the labour market trajectories of higher education dropouts.

Literature review

Dropping out of higher education

We assume that dropping out is a process embedded in students' overall situation regarding education, employment, and other spheres of their lives (Heublein 2014). Therefore, different scenarios for dropping out with contrasting causes and implications are possible. Recent approaches in dropout research strive for exhaustive models to account for the manifold dynamics of dropout and retention (Heublein et al. 2017), seeing dropping out as a complex process which, in most cases, is the result of more than one reason (Theune 2021). A rough distinction can be drawn between

- *study-bound reasons* that are inherently linked to the study experience itself, such as performance during and interest in the chosen study programme (Glaesser, Kilian, and Kelava 2021), study field (Tieben 2020), study conditions (Theune 2021) and social and academic integration in the study programme or institution (Pape et al. 2021); and
- *preceding or accompanying reasons* that are not (necessarily) induced by the study experience, such as the personal and socio-economic background of students (Contini, Cugnata, and Scagni 2018), obligations and interests besides studying (Hovdhaugen 2013), mental and physical health (Baalmann et al. 2021), or the availability of other educational paths attractive to the student.

Although underscoring that usually different dropout motives come together, Theune argues that many of those can be linked to employment. This includes financing one's living (further related to having a family); the desire for more practical experience, or troubles to find sufficient time for studying (Theune 2021).

Dropout motives can also entail future employment perspectives: Dropping out because of an attractive job offer ('job out') could lead to more positive labour market outcomes (at least in the short term), while health problems or care responsibilities are labour market handicaps. Negative dropout experiences can lead to psychological burdens, such as low aspirations, negative self-evaluation, and distress, and could discourage former students (Hällsten 2017).

Most research on the labour market prospects of higher education dropouts has not focused on trajectories or on differences among dropouts, as is the case in this study. Instead, it has concentrated on comparisons of cross-sectional outcomes of graduates and never-entrants. Dropouts have worse outcomes than graduates in terms of employability, earnings, occupational state, and job satisfaction (e.g. Klein, Shweta, and Lars 2021), which may be the result of lower human capital (Becker 1993) and lack of credentials that give access to certain occupations and positions (Collins 2019).

However, dropouts also experience a wide range of benefits from studying, with some of which, like occupational skills development, personal growth, or getting access to networks, are also helpful in the labour market (Cunninghame and Pitman 2020). Several studies (Giani, Attewell, and Walling 2019; Luckman and Harvey 2019; Matkovic and Kogan 2012; Payne 2023; Schnepf 2017)) conclude that incomplete higher education results in a more stable labour market entry than no higher education at all. Although objective labour market outcomes are similar in Germany for higher education dropouts and never-entrants, the former are less satisfied with their work and their life than the latter (Heigle and Pfeiffer 2020; Klein, Shweta, and Lars 2021). These results are in line with the assumptions of human capital theory of increasing labour market productivity through additional schooling (Becker 1993).

Nevertheless, Ghignoni, Croce, and d'Ambrosio (2019) demonstrated that individuals who have dropped out of university are at a greater risk of becoming NEET and of obtaining an unsatisfactory job compared to those who have never attended university in Italy. Furthermore, no effect on earnings was observed. Hällsten (2017) found similar scarring effects for university dropouts in Sweden. These results could indicate that dropout from higher education could be interpreted as a signal (Spence 1973) for lower productivity and employers could interpret it as a potential weakness in the hiring process (Hällsten 2017, 171).

The effect of parental education for dropouts' labour market outcomes

There is a substantial body of empirical evidence indicating that individuals from higher social origins tend to enjoy advantages in terms of occupational status and income, even among those with the same level of education (e.g. Bernardi and Ballarino 2016). A privileged social background is expected to correlate with a greater number of skills (Ford 2018), higher aspirations (Goldthorpe 2014), social capital (Macmillan, Tyler, and Vignoles 2015), and a habitus more suitable for academic labour markets (Bourdieu and Passeron 1990), which in turn should lead to better labour market prospects. While some scholars argue that these advantages diminish with higher levels of education (Torche 2011), others demonstrate that they persist for higher education graduates (e.g. Friedman and Laurison 2020). Duta, Wielgoszewska, and Iannelli (2021) indicate that graduates with a lower social class background tend to have more diverse and less stable trajectories, are less likely to enter top-level jobs and more likely to enter and remain in lower social classes in Britain. Jacob and Klein (2019, Britain), Spexard et al. (2022, Germany), and Binder (2024, Austria) found no significant differences by social origin in labour market trajectories of graduates.

To the best of our knowledge, no studies have primarily focused on investigating the impact of social background on the labour market prospects of individuals who have dropped out of higher education. However, social background variables were included as controls in some studies which compared higher education dropouts to never-entrants. In the US, dropouts from economically disadvantaged families receive a greater earnings benefit of attending some college than compared to non-disadvantaged students (Giani, Attewell, and Walling 2019; Payne 2023). Dropouts with at least one parent with higher education took longer to find their first stable job than first-generation students in

Germany (Scholten and Tieben 2017). However, as these are only ancillary findings in studies with a different focus, they need to be interpreted with caution.

Theoretically, the disadvantages of first-generation students should be greater for dropouts than for graduates. This is because social networks and discrimination are expected to have less or no impact in academic labour markets (Torche 2011) and because upper-class families would mobilise their social, cultural, and economic resources to avoid the downward mobility of their offspring (compensatory advantage model; Bernardi and Gil-Hernández 2021). Students from less affluent households have fewer resources to continue their studies after failing than students from better-off households, who are more likely to transfer to other study programmes (Herbaut 2021) instead of entering the labour market from a weak position. A lack of social integration is a crucial factor contributing to the dropout rate of first-generation students (Tinto 1975) and could impede these students from accessing information about potential employment opportunities (Granovetter 1973). Therefore, it can be anticipated that individuals who have dropped out of higher education and whose parents have attained higher levels of education will experience more favourable labour market outcomes than those whose parents have lower levels of formal education.

Furthermore, students from lower socioeconomic backgrounds tend to benefit less from the direct transmission of economic assets and are less able to rely on their parents to buffer mistakes to the same extent. Consequently, they are expected to choose safer and less ambitious career strategies (Hertel and Groh-Samberg 2019, 1100).

However, students from lower social origins tend to work more alongside their studies (e.g. Contini, Cugnata, and Scagni 2018). While working increases the risk of dropping out, work experience is an important asset at the labour market. Thus, we hypothesise that dropouts with lower parental education will benefit more from working while studying. In contrast to the argument put forth by Jacob, Gerth, and Weiss (2018), which suggests that individuals from lower social origins are less likely to occupy positions that enhance their career prospects, Masevičiūtė, Šaukeckienė, and Ozolinčiūtė (2018, 58) have demonstrated that parental education does not lead to differential opportunities to work in a study-related field.

Moreover, students with previous vocational qualifications in Germany (Tieben 2020) and Austria (Thaler and Unger 2014) are more likely to choose to leave higher education and less likely to transfer to another programme than students with no post-secondary education or training. One potential explanation for this phenomenon is that individuals with vocational qualifications encounter fewer difficulties in securing employment (Scholten and Tieben 2017) and achieve higher wages (Reisel 2013) than their counterparts without such qualifications. It is important to consider previous education when analysing data, especially in countries where vocational training is well established, such as Austria (see Section 3).

The Austrian context

In Austria, the completion rates for higher education are comparatively low. According to the OECD, 54% of men and 65% of women completed a bachelor's or equivalent degree in the theoretical duration plus three years (OECD-average: 61% and 73%; OECD (2022), 199). Even though Austria is no longer following a strict free higher education access

policy, highly competitive admission procedures are limited to a few programmes. Furthermore, most studies at public universities do not have any admission procedures. It is not expensive to matriculate and to remain enrolled. The maximum fee for European students in the public sectors is €363 per semester, with the majority of students paying nothing.

Despite the high percentage of first-generation students (57%; Zucha et al. 2024, 48) due to the low educational attainment of the parental generation, intergenerational reproduction of education is strong in Austria. The probability of enrolling in higher education is 2.7 times higher for individuals whose mother has at least a general qualification for university entrance than for those whose mother has a lower formal education (55).

The proportion of working students in Austria is comparable to the European average (51%), yet their working intensity (23 hours per week) is higher than in most Western countries but lower than in most Eastern European countries (Masevičiūtė, Šaukeckienė, and Ozolinčiūtė 2018, 15). Austria has one of the highest proportions of students who delay their entry into higher education by at least two years after completing their formal education (28%) (Hauschildt, Wartenbergh-Cras, and Schirmer 2021, 83f). Students with lower parental education are more likely to work longer hours (Zucha et al. 2024, 80) and are overrepresented in the group with delayed entry into higher education (59).

The Austrian labour market can be characterised as an occupational labour market. It is, like other Central European countries, credentialistic, with a strong link between many occupations and particular educational certificates (DiPrete et al. 2017): The apprenticeship system, which combines formal schooling with on-the-job-training, and specialised vocational high schools (which account for slightly over half of all graduates from secondary schools and in which students without academic background are overrepresented; Austria 2024, 41) are attractive. While vocational high schools end with a general university entrance qualification and many graduates from these vocational high schools subsequently enrol in further tertiary education, these degrees alone offer good labour market perspectives (OECD (2023), 91). From 2011 to 2020, the annual unemployment rates in Austria were relatively low, ranging from 4.3% to 5.8% in the age group 20–64 years old (Eurostat 2024). This compares favourably with other European countries, with the EU27 experiencing rates between 6.5% and 11.2%. Minimum wages are often guaranteed by collective agreements.

Data, variables and analytic strategy

Data

The analysis is based on ATRACK ('*Absolvent:innen-Tracking*', integrated register data tracking Austrian Graduates) data provided by Statistics Austria, which combines different registries (Educational Statistics, Population Register, Public Employment Service Austria, Main Association of Austrian Social Security Institutions, Pay Slips, and data of the Statistical Business Register). The data covers information on higher education graduates and dropouts from Austrian public universities and universities of applied sciences ('Fachhochschulen') from 2009/10 to 2018/19 (Huber, Zehetgruber, and Einfalt 2022).[1]

Hence, the data includes information on higher education enrolment as well as labour market characteristics of individuals at several cut-off dates from 3 years before graduation or dropout until 5 years after. This is because the employment status is most volatile immediately after dropping out or graduating. We analyse dropouts from the 2013/14 academic year, as this is the most recent cohort that can be tracked for five years after leaving higher education.

Definitions of higher education dropout (and of related concepts such as attrition, withdrawal, non-completion) are inconsistent and diverse (Xavier and Meneses 2020). We consider a person as dropout who was enrolled in higher education and left without a degree in 2013/14, has not obtained another tertiary degree, and did not enrol in another formal education for the next five years (=as long as data is available). The analysis is limited to dropouts of first-degree programmes (Bachelor and Diploma). Pension holders and individuals who are presumed to be residing outside of Austria at the time of dropping out are excluded from the analysis. Furthermore, dropouts without Austrian social security at three or more of six measurement dates after dropping out are excluded from the analysis, as they are suspected to have left Austria.[2]

The data allows for a precise identification of higher education dropouts and a differentiation of early and late dropouts. Unlike many studies on dropouts (Xavier and Meneses 2020), this study can also take transfers to other institutions into account. Furthermore, unit non-response is no concern in this study and analysis can draw on enough dropouts. The register data contains detailed and reliable measures for employment and wages for several time points, including before dropping out. As a shortcoming, the data does not include any measure on dropout reasons, study activity or cognitive and non-cognitive skills. The latter have been demonstrated to be significant factors in explaining the labour market success of higher education dropouts (Hällsten 2017; Neugebauer and Daniel 2022; Schnepf 2014).

Measurements

The labour market trajectories were constructed using twelve employment states. These states result from combining the 44 different labour market status available in the data and information on inflation-adjusted monthly gross salary of full-time wage earners:

(1) self-employment,
(2) full-time employment with higher wages (≥€2500, as this is the median entry-level wage for bachelor graduates in our data; Huber, Zehetgruber, and Einfalt 2022, 44),
(3) full-time employment with lower wages (<€2500),
(4) part-time employment,
(5) parental leave (with current employment),
(6) other temporarily limited leave (with current employment; mainly educational leave),
(7) unemployment
(8) marginal employment (earning less than €461 in 2020),
(9) enrolled in higher education (without being employed)*,
(10) enrolled in another formal education (mainly school)*

(11) other out-of-work-labour market status (e.g. no labour market activity in Austria, leave without current employment), and
(12) moving abroad (without keeping a main residence in Austria).

* States 9 and 10 only occur before dropping out due to the exclusion of individuals in formal education after dropping out.

In order to solve the problem of overlap between different states, each person is assigned an unique labour market status at each reference date, with 'in work'-status at a high level and 'in education'-status at a low level of the hierarchy (Huber, Zehetgruber, and Einfalt 2022: 17ff). The numbering of the states corresponds to the top of the hierarchy, with two exceptions. First, if a person is both self-employed and employed, the employment with the higher income is counted (and not automatically the self-employment, as the numbering would suggest). Second, marginal employment is higher in the hierarchy than unemployment.

Our main independent variable of interest is parental education (higher education; general qualification for university entry; apprenticeship; compulsory schooling). As covariates, several socio-demographic variables are included in the analysis: sex, age when leaving higher education, maternity,[3] the exam that qualified dropouts for higher education (academic secondary school, technical school, business school, other vocational school, second chance route, and degrees from another country) and nationality (Austria, Germany, other EU-country, other country). Dropouts who were enrolled a year or less in their last study programme are defined as early dropouts, those who study longer than one year are late dropouts (40% of all dropouts, see Table A1). ISCED-Fields of study are included separately for public research universities and universities of applied science, resulting in 19 fields of study. Due to data protection policies, there is no information on higher education institution in the data. However, prestige differences between higher education institutions are rather low in Austria.

Analytic strategy

To identify typical labour market trajectories of higher education dropouts, several steps are needed. First, we conduct sequence analysis (Liao et al. 2022). This method has the advantage of analysing the transition into the labour market not as one discrete event, but as a process. The input for the sequence analysis is a sequence of employment states at 10 time points: 3, 2, and 1 year before dropout, at the dropout date, and 0.5, 1, 1.5, 2, 3 and 5 years after dropout. Because the time around the dropout date entails more short-term state changes, time periods between observations is shorter than longer after dropping out.

We use optimal matching (OM) to estimate the dissimilarity of sequences. OM computes the distance between two sequences as the number of steps (i.e. insertion, deletion, substitution) that must be performed to make the sequences equal. To compute the dissimilarities, we use the TRATE cost matrix implemented in the R-package TraMineR, which assigns different costs for each transition based on the empirically observed transition rates (Gabadinho et al. 2011, 26). For example, the highest costs are assigned for transforming from parental leave to moving abroad and the lowest costs are assigned

for transforming from working part-time to other temporary leaves (and vice versa). We choose the OM TRATE dissimilarity measure because it gives more weight to the duration of states than to the timing and the order of sequences (Studer and Ritschard 2016) and we consider duration to be the most important dimension to highlight the stability of labour market integration. In contrast, dissimilarity measures sensitive to timing (Hamming) and sequence (OM of spell and of transition sequences) may overemphasise small differences in when exactly dropouts experience a status change, at the expense of the overall trajectory structure. Correlations of OM TRATE with these dissimilarity measures are rather high, with only OM of transition sequences correlating low (Table A2). The average silhouette width (ASW) is equal or lower for the alternatives to OM TRATE, especially for OM of transition sequences (Table A3). However, in terms of content, seven cluster solutions are very similar regardless of the dissimilarity measure, indicating the robustness of our results.

The resulting dissimilarity matrix is used for conducting cluster analysis with the Partitioning Around Medoids (PAM) algorithm. To avoid computational problems, we used the WeightedCluster R-package (Studer 2013). To analyse the effect of parental education, we conduct a series of logistic regression models on cluster membership, first only with socio-demographic control variables and then with covariates of the educational biography.

The effects of social origin on labour market outcomes might differ by age (Kratz, Pettinger, and Grätz 2022). However, adding an interaction effect of parental education and age does not significantly improve our models. The interaction effects are very small and mostly insignificant, despite the large number of cases. We have therefore decided not to include this interaction effect in our final models.

Results

Higher education dropouts labour market trajectories

In total, we analyse 14,010 individuals who dropped out from a public university or a university of applied sciences in 2013/14 and continued living in Austria without being enrolled in any further formal education afterwards (descriptive statistics see Table A1).

The state distribution plot (first part of Figure 1) shows how the aggregated labour market states at each time point change over time. The frequency plot (second part of Figure 1) shows the ten most frequent sequences. The most frequent sequences are stable full-time employment with higher wages, stable part-time employment and self-employment. However, these most common sequences account for only 12.7% of all sequences of dropouts, indicating that the labour market paths of higher education graduates are quite diverse. On average, the trajectories entail four state changes over the ten time points observed (Table A4).

Forty-six per cent of dropouts were already working more than a marginal job three years prior to dropping out: 16% full-time with wages of at least €2500, 10% full-time with lower wages, 17% in part-time and 3% self-employed. The proportion of individuals engaged in working more than a marginal job increases until the dropout point, after which it rises to 76% six months and 82% two years after the event. The rate of

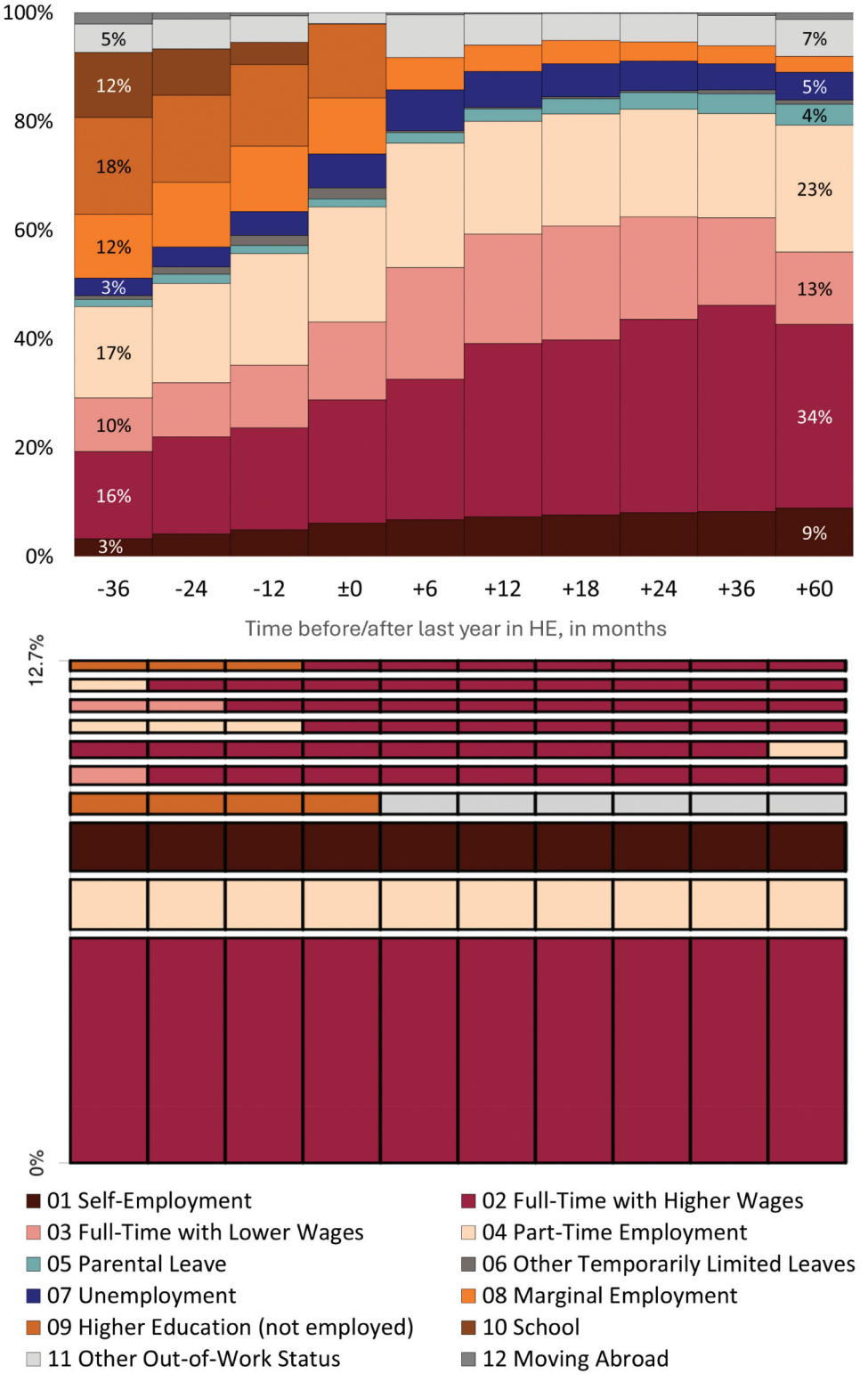

Figure 1. Labour market trajectories of dropouts: sequence index plot and state distribution. Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14. X-axis: months before or after the dropout date. N = 14010. Data: ATRACK (STATISTICS AUSTRIA).

unemployment after dropout declines from 8% six months to 5% two years after the event and remains stable thereafter. In contrast, the percentage of individuals who have dropped out and are on parental leave increases with the time elapsed after dropout. The proportion of individuals in marginal employment is declining continuously, and educational activity following dropout is zero by design.

We looked at various measures of partitioning quality statistics such as Average Silhouette Width (ASW), Hubert's C (HC), Point Biserial Correlation (PBC) and Pseudo-R^2 to decide which cluster solution to take (Table A3). Computationally, the best solutions are four or seven clusters. Taking theoretical considerations into account, we chose a seven-cluster solution because the four-cluster solution does obliterate relevant differentiations.

The state distribution plots provide a first overview of the characteristics of each cluster (Figure 2). Dropouts in the first cluster (20% of all dropouts) receive higher wages before and after dropout and experience 1.5 state changes on average (Table A4), indicating a comparatively high durability of the employment status despite dropping out. The frequency state plot (Figure A1) shows that around a third of cluster members are employed with higher wages at all time points. The second cluster (7% of dropouts) is mainly comprised of individuals who were self-employed. Approximately one-third of them were already self-employed three years before dropping out, and more than 90% one year after. The third cluster (19% of dropouts) combines dropouts who work part-time. The proportion of part-time employees is high before and after dropping out, with a maximum of nearly 80% one year after dropping out. On average, approximately 5% of individuals are on parental leave at each measurement point. The labour market status of the members of these three clusters is relatively stable, with small numbers of transitions from one stage to the next.

The trajectories of clusters 4, 5, and 6 are characterised by a proceeding integration in the labour market, primarily occurring around and following the dropout date. The fourth cluster (16%) portrays a fast integration with higher wages in the labour market. While only one out of three dropouts were employed in full-time or self-employment one year prior to leaving higher education, approximately 80% received comparable higher wages of over €2500 per month two years after dropout. The fifth cluster (fast integration with lower wages; 18%) demonstrates a comparable trajectory, albeit with lower average wages. Even three years after dropout 57% were employed full-time earning less than €2500 and only 22% were employed with higher wages. The sixth cluster (11%) is characterised by a slow and incomplete integration in the labour market. Most cluster members do not work or work only in marginal employment while studying. Following their departure from the educational institution, a considerable proportion of individuals remain in marginal employment or part-time employment for an extended period, undergoing numerous transitions in their labour market status (Figure A1 and Table A4). Even five years after dropout, only 45% are engaged in full-time or self-employment roles.

The seventh cluster (8%) is a heterogeneous group comprising individuals with unstable labour market biographies. These individuals experience periods of unemployment and other labour market states. However, most dropouts frequently change their state, with many phases of full-time employment at lower wages, part-time and marginal employment (Figure A1 and Table A4).

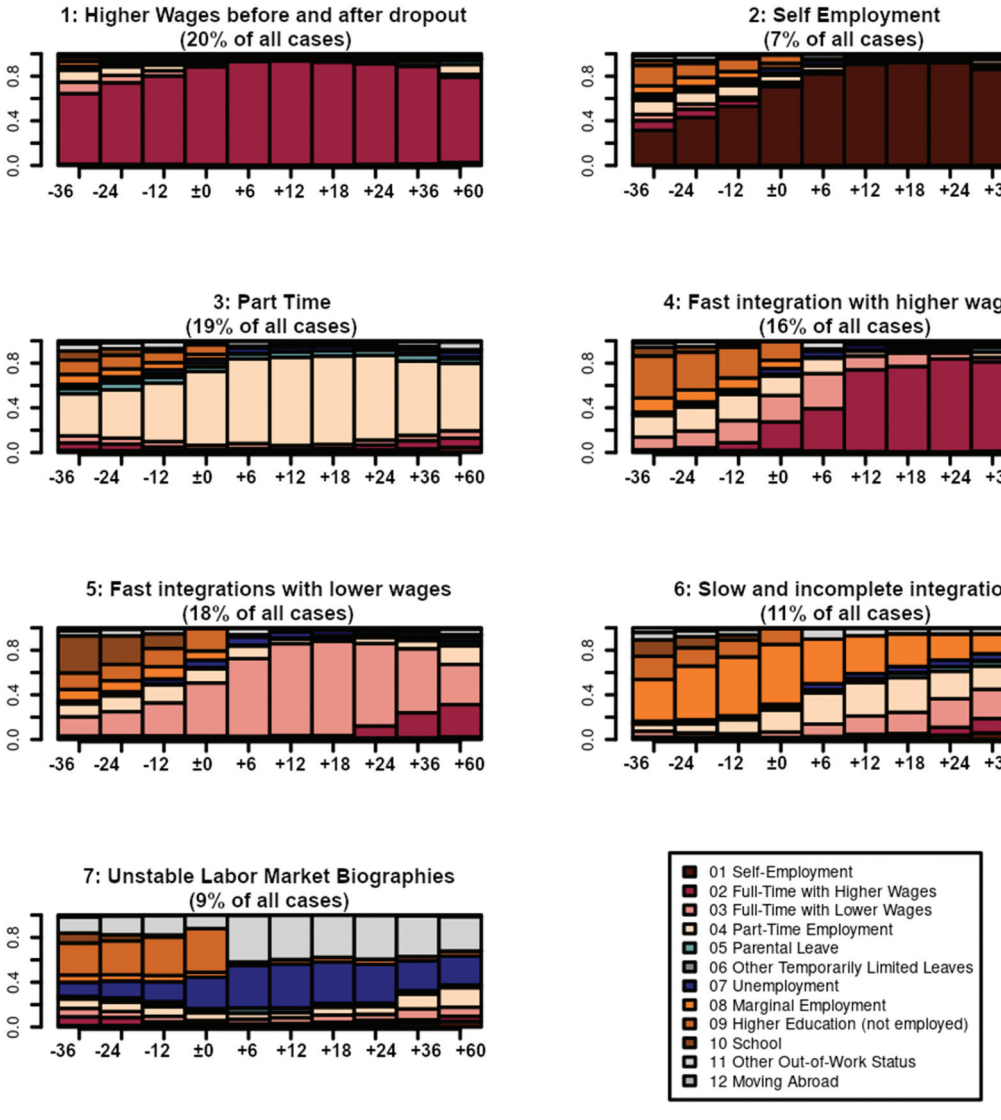

Figure 2. Dropouts' clusters of labour market trajectories: state distribution plots. Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14. X-axis: months before or after the dropout date. Data: ATRACK (STATISTICS AUSTRIA).

Social inequalities in dropouts' trajectories

The second research question of this paper is to ascertain how the composition of these clusters differs by parental education. The descriptive statistics pertaining to the correlation between cluster membership and sociodemographic characteristics can be located in Table A5 in the Appendix. The probability of belonging to each of the clusters is estimated by binary logistic (logit) regressions on cluster membership. Because we could not identify a natural reference cluster, we contrast those belonging to the respective cluster with those belonging to any other cluster. The average marginal effects (AMEs) of the

Table 1. Coefficients of parental education on cluster memberships: results of logistic regression (AME).

		1	2	3	4	5	6	7
	AME of Parental Education (Ref: Higher Education)	stable. higher wages	stable. self-empl.	stable. part-time	fast int. higher wages	fast int. lower wages	incompl. integr.	unstable LM biogr.
Socio-demographic model	Higher Secondary	0.02	−0.03***	−0.01	0.00	0.04***	−0.04***	0.01*
	Apprenticeship	0.05***	−0.04***	−0.03***	−0.01	0.07***	−0.06***	0.00
	Compulsory School	0.02	−0.03***	−0.01	0.00	0.04***	−0.04***	0.01*
	Nagelkerke's R^2	0.133	0.057	0.055	0.027	0.151	0.053	0.067
	N	11,937	11,937	11,937	11,937	11,937	11,937	11,937
Full model	Higher Secondary	0.01	−0.02***	−0.01	0.00	0.03**	−0.03***	0.02**
	Apprenticeship	0.03**	−0.03***	−0.02	0.00	0.05***	−0.04***	0.01
	Compulsory School	−0.01	−0.02*	−0.01	−0.02	0.03*	−0.02	0.03**
	Nagelkerke's R^2	0.193	0.080	0.085	0.052	0.176	0.081	0.085
	N	11,937	11,937	11,937	11,937	11,937	11,937	11,937

Sociodemographic model controlled for: age at dropout date. sex. motherhood. nationality.
Full model additionally controlled for: former schooling. field of study. study duration (Table A6).
Each cluster is contrasted with all other clusters. **p < 0.001; *p < 0.01; †p < 0.05.
Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14.
Data: ATRACK (STATISTICS AUSTRIA).

sociodemographic models (with only socio-demographic covariates) and the full models (also controlled for former schooling, field of study, and study duration) are presented in Table 1 (coefficients of full model see Table A6).[4] AMEs measure the average change in the dependent variable for a one-unit change in an independent variable, holding other variables constant. For example, a coefficient of 0.05 can be interpreted as an average 5% increase in the probability of being part of a cluster compared to the reference group. Controlling for educational career increases Nagelkerke's pseudo-R^2 in the model to a maximum of nearly 20% for clusters 1 and 5, while it remains relatively low for the other clusters (less than 10% in clusters 2, 4, and 6). However, including these covariates has only a slight effect on the average marginal effects of parental education. Therefore, differences in educational careers explain only a small proportion of the differences by parental education.

The impact of parental education on cluster membership is relatively modest, with average marginal effects not exceeding 0.07. Contrary to our theoretical assumptions, high parental education has no positive effect on belonging to the high-wage clusters 1 (higher wages before and after dropout) and 4 (fast integration with higher wages). The only group more likely to be found in a high-income cluster are dropouts with parents with an apprenticeship, who are more likely to be found in the stable high-income cluster.

However, lower parental education is associated with a reduced likelihood of belonging to cluster 2 (self-employment). This result is consistent with expectations, as self-employment entails a greater propensity for risk-taking, which is more likely to be undertaken by individuals with parents who can provide a buffer against the consequences of such decisions.

First-generation students are more likely to be classified in cluster 5, which is characterised by transition into full-time employment with mostly lower wages around dropping out. They are more prone to remain in low-paid full-time roles. Conversely, they are

less likely to belong to cluster 6 (slow and incomplete integration) that is characterised by many state changes and high shares of marginal employment and part-time even after dropping out of education. First-generation students also exhibit a slightly elevated risk of belonging to the most problematic cluster 7 (unstable labour market biographies). This suggests that dropouts with higher educated parents do not experience the same degree of disadvantage as those with lower educated parents. Among those who do not work full-time and have unstable trajectories, those with higher parental education tend to remain inside the labour market, working only a few hours, while those with lower parental education experience more episodes of unemployment and other out-of-work status. Nevertheless, no effect of parental education on cluster 3 (part-time) was observed.

Discussion

Our results confirm that the labour market trajectories of higher education dropouts are quite diverse. A considerable share of dropouts is established in some form of employment long before dropping out, and most maintain or enhance their employment extent and wages after dropping out. For the biggest of our clusters (Cluster 1) we could not spot the bar marking the dropout date from the mere density plot if it were not for the labels. In clusters with relatively low labour market integration before dropping out, dropouts experience either a durable labour market entry around dropping out (cluster 4, 5) or recurring state changes (6, 7). This matches other findings highlighting the procedural and heterogenous character of dropping out (Heublein 2014; Theune 2021). Further research should more thoroughly consider that tertiary education and entry into the labour market often overlap biographically.

The impact of parental education on the labour market trajectories of higher education dropouts appears complex, as the effects observed are partly ambiguous. To exemplify, we observed effects on (not) belonging to the lower wages cluster, but not for the higher wage clusters. We also see clear effects on one, but not the other two of the rather stable clusters: the link of parental education with self-employment is clear and robust compared to all other backgrounds. This may be because academic parents can provide more economic backing (Hertel and Groh-Samberg 2019) for the risk of running an own business. Third, there are opposite effects regarding the two at-risk clusters: While an academic background leans more towards a slow integration through minor and part-time jobs, it makes individuals less prone to unstable biographies. It can be summarised that an academic background does not constitute a distinct group with entirely own ways of dropping out but helps to some degree in dodging uncertain and precarious routes. This tendency lines up with findings from similar studies on graduates (Duta, Wielgoszewska, and Iannelli 2021).

We cannot determine why the impact of parental education on the labour market trajectories of tertiary dropouts is relatively small in Austria. One potential explanation is the highly selective nature of the Austrian schooling system, due to which those children of non-academic parents who are most prone to uncertain trajectories may not even get higher education access in the first place. It is also possible that other indicators of social background, such as parental wealth or income, play a more significant role than education in mitigating the negative consequences of dropping out. Although not likely, as empirical evidence states that direct effects of

social origin decrease over the life course for the higher educated (Kratz, Pettinger, and Grätz 2022), it cannot be ruled out that these inequalities increase later in the life course.

Research in other countries is necessary to determine the transferability of our results to different education systems and labour markets. It would be particularly interesting to utilise international comparisons (building upon Schnepf 2017) to analyse the effects of characteristics of national education systems and labour markets (such as Matkovic and Kogan 2012 for a comparison of internal and external labour markets).

Future research could further investigate the role of working while studying, former schooling, and fields of study. Although we focused on parental education and did not discuss the covariates' effects, they suggest that those are important predictors of the labour market trajectories of dropouts (Table A6). While working while studying from the perspective of higher education institutions and systems is mostly seen negatively as a dropout-risk (e.g. Heublein et al. 2017; Zucha et al. 2024), it provides a foundation for a successful labour market entry not only for graduates (Passaretta and Triventi 2015), but also for higher education dropouts. It would be promising to explore how distinct types of working while studying (study related vs. non study related) and work-related reasons for dropping out (job as an attractive alternative, financial necessity to work fulltime, incompatibility of working hours with study hours) influence labour market success after dropping out. Furthermore, studies could focus on whether and how dropouts from higher and lower social backgrounds utilise their previously achieved skills and/or vocational education credentials in the labour market. In terms of policy, a targeted focus on groups at risk of unemployment or receiving lower wages may be more efficient than trying to decrease dropping out regardless of the dropout's overall situation.

Notes

1. These two sectors sum up for around 94% of students in Austrian higher education institutions in 2010/11 (Unger et al. 2012, 14). We do not have access to data of the dropouts of private universities and no information on parental education of dropouts from teacher education colleges. Some vocational schools are categorised as short-cycle tertiary education (ISCED 2011 Level 5), but not considered higher education institutions in the Austrian discourse.
2. This includes dropouts without a main residence in Austria and those with no activity in formal education or the labour market. We suspect most of them to have moved to another country without deregistering their main residence. Those who left Austria are comparably young and come from more privileged backgrounds – socio-demographic groups known for a tendency to continue studying after programme dropout and for studying abroad. This strengthens our suspicion that most of these dropouts are in fact programme dropouts and not part of our basic population.
3. Women who have been out on (obligatory) maternity leave before the reference date are considered of having a child. We have no information on fatherhood. However, unlike for women, having children has no negative effect on labour market outcome for Austrian men (Bock-Schappelwein et al. 2020, 63). Using maternity has an impact on the interpretation of the contrast of men and women. The coefficient compares men to childless women, and not to all women.
4. Average marginal effects of a model with only parental education as an independent variable are not reported. They are very similar to those of the socio-demographic model.

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No potential conflict of interest was reported by the author(s).

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Ethics declaration

As a secondary analysis of register data, the presented research is non-interventional. The scientific use of this administrative data underlies the Austrian data protection legislation and adherence to the GDPR. Access to the data was only available under an agreement predetermining the scientific purposes of the data usage with STATISTICS AUSTRIA. Output controls by STATISTICS AUSTRIA ensure that results cannot lead to de-anonymisation of individuals.

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Appendix

Table A1. Descriptive statistics.

		Proportion	N
Sex	Male	49%	6889
	Female	51%	7121
Time until dropout	1 year or less	40%	5561
	More than 1 year	60%	8449
Age	23y. and younger	23%	3157
	24-27y.	24%	3369
	28-34y.	28%	3859
	35y. and older	26%	3625
Nationality	Austria	88%	12,283
	Germany	3%	411
	Other EU-country	5%	671
	Other	5%	645
Former schooling	Academic secondary school	39%	5483
	Technical school	14%	1938
	Business school	14%	1893
	Other vocational school	11%	1550
	Second chance route	7%	1047
	Degree from another country	11%	1528
	No information on former schooling	4%	571
Parental education	Higher education	20%	2773
	General qualification for university entry	27%	3808
	Apprenticeship	32%	4529
	Compulsory schooling	6%	827
Maternity	No	89%	12,449
	Yes	11%	1561
Field of study	Education	11%	1605
	Humanities	14%	2017
	Arts	4%	549
	Social Sciences, Journalism, and Information	16%	2287
	Business and Administration	4%	503
	Law	16%	2222
	Biology and Environment	4%	586
	Natural Sciences	5%	642
	Information and Communication Technologies	5%	720
	Engineering and Manufacturing	5%	636
	Architecture and Construction	4%	580
	Health	1%	166
	Other	2%	213
	Business and Administration	3%	444
	Information and Communication Technologies	2%	232
	Engineering and Manufacturing (incl. Natural Sciences and Architecture and Construction)	3%	473
	Health	0%	55
	Other	0%	53
	Total	100%	14,010

Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14. Data: ATRACK (STATISTICS AUSTRIA).

Table A2. Correlations between dissimilarity measures.

	Hamming	LCS	OM Trate	OM of spells sequences	OM of transition sequences
Hamming	1	0.82	0.84	0.76	0.48
LCS	0.82	1	0.996	0.89	0.45
OM Trate	0.84	0.996	1	0.88	0.45
OM of spells sequences	0.76	0.89	0.88	1	0.70
OM of transition sequences	0.48	0.45	0.45	0.70	1

All dissimilarity measures are calculated with default parameters in the R package TraMineR.

Table A3. Cluster quality measures of OM TRATE solution and ASW of alternative dissimilarity measures.

	OM TRATE: Cluster quality measures				Alternative dissimilarity measures: ASW			
	Average Silhouette Width (ASW)	Pseudo R^2	Hubert's C (HC)	Poinz Biserial Correlation (PBC)	ASW Hamming	ASW LCS	ASW OM of spells sequences	ASW OM of transition sequences
2 Cluster	0.26	0.17	0.22	0.44	0.18	0.23	0.17	0.11
3 Cluster	0.26	0.24	0.19	0.54	0.23	0.27	0.17	0.12
4 Cluster	0.31	0.31	0.13	0.63	0.28	0.31	0.22	0.14
5 Cluster	0.26	0.34	0.17	0.57	0.30	0.24	0.17	0.14
6 Cluster	0.28	0.38	0.13	0.61	0.25	0.27	0.17	0.15
7 Cluster	**0.28**	**0.41**	**0.10**	**0.63**	0.26	0.27	0.19	0.15
8 Cluster	0.26	0.42	0.10	0.61	0.24	0.26	0.17	0.14
9 Cluster	0.26	0.43	0.10	0.62	0.24	0.22	0.17	0.14
10Cluster	0.24	0.44	0.13	0.57	0.22	0.22	0.17	0.15

All dissimilarity measures are calculated with default parameters in the R package TraMineR.

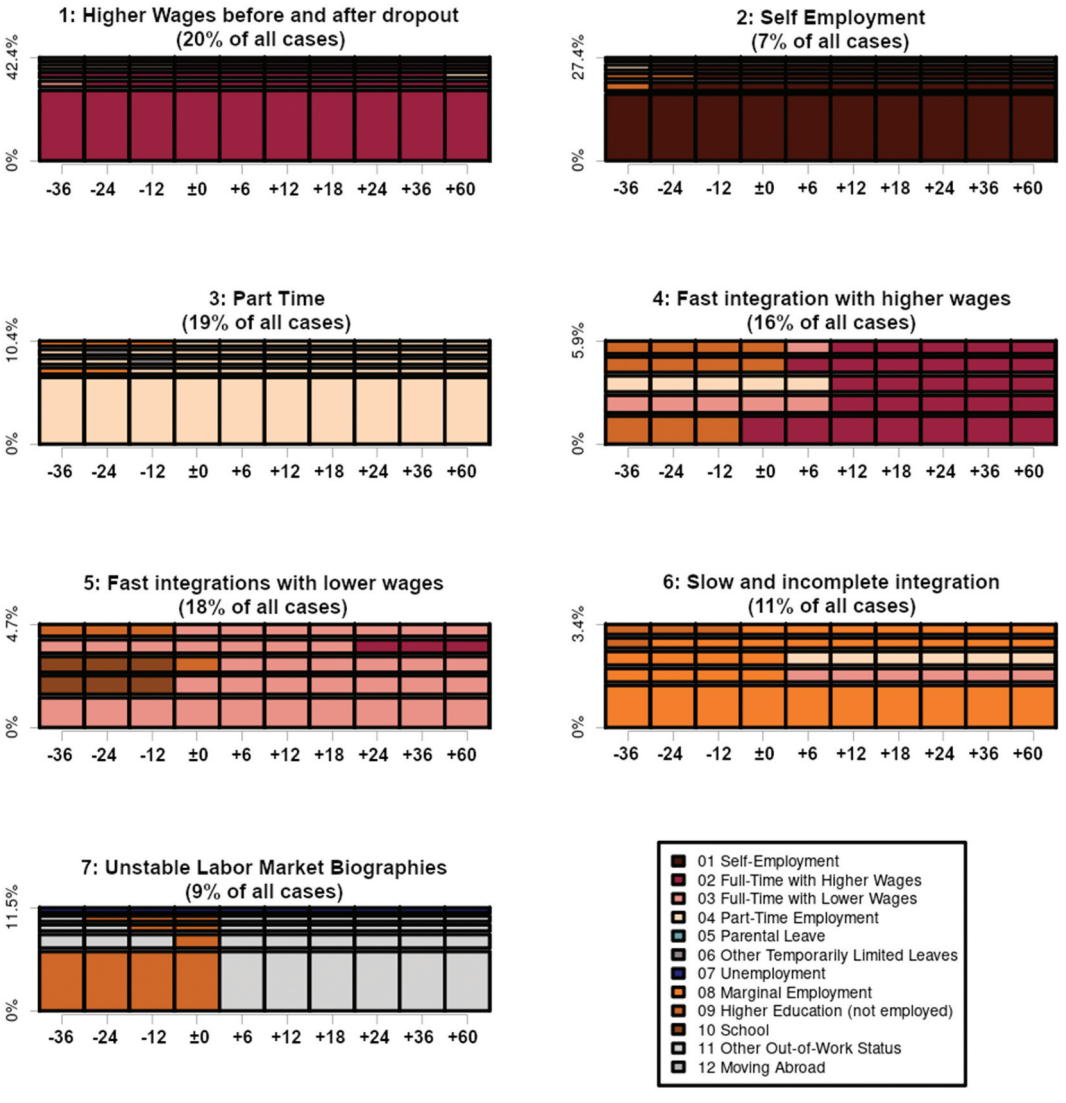

Figure A1. Dropouts' clusters of labou mrket trajectories: sequence frequency plots. Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14. X-axis: months before or after the dropout date. **Data**: ATRACK (STATISTICS AUSTRIA).

Table A4. Complexity measures of dropouts' clusters of labour market trajectories.

	Mean number of state transitions	Complexity index (mean)	N
1: Higher wages before and after dropout	1.49	0.17	2807
2: Self employment	2.09	0.25	985
3: Part-time	3.07	0.34	2673
4: Fast integration with higher wages	3.61	0.43	2268
5: Fast integration with lower wages	3.69	0.43	2559
6: Slow and incomplete integration	4.18	0.47	1566
7: Unstable labour market biographies	4.20	0.46	1152
Total	3.97	0.45	14,010

The complexity index is a measure that combines the number of transitions in the sequence with the longitudinal entropy (Gabadinho et al. 2011). **Data**: ATRACK.

Table A5. Descriptive statistics of cluster memberships (column percent).

		1	2	3	4	5	6	7
		stable. high wages	stable. self-empl.	stable. part-time	fast int. high wages	fast int. low wages	incompl. Integr.	unstable biogr.
Parental education	Higher education	19%	32%	26%	24%	18%	31%	21%
	General qualification for university entry	29%	31%	32%	33%	33%	32%	33%
	Apprenticeship	44%	30%	36%	37%	42%	31%	36%
	Compulsory schooling	8%	7%	7%	6%	6%	6%	11%
Gender	Male	64%	70%	34%	53%	44%	43%	44%
	Female	36%	30%	66%	47%	56%	57%	56%
Maternity	No maternity	94%	90%	75%	96%	96%	91%	75%
	Maternity	6%	10%	25%	4%	4%	9%	25%
Age	23y. and younger	4%	11%	16%	22%	50%	34%	16%
	24-27y.	16%	20%	21%	39%	23%	29%	19%
	28-34y.	36%	30%	30%	29%	17%	25%	23%
	35y. and older	44%	40%	32%	9%	9%	13%	41%
Nationality	Austria	94%	86%	86%	89%	87%	82%	85%
	Germany	2%	3%	4%	4%	3%	4%	2%
	Other EU-country	2%	6%	6%	4%	5%	6%	6%
	Other	2%	6%	4%	4%	5%	9%	7%
Former schooling	Academic secondary school)	36%	41%	44%	39%	31%	46%	40%
	Technical school	22%	15%	8%	19%	12%	7%	9%
	Business school	14%	11%	11%	13%	20%	10%	11%
	Other vocational school	6%	8%	13%	10%	18%	11%	8%
	Second chance route	9%	9%	7%	6%	6%	6%	11%
	Degree from another country	6%	14%	12%	9%	10%	16%	15%
	No information on former schooling	7%	4%	4%	4%	2%	3%	5%
Study duration	One year or less	35%	31%	37%	38%	53%	38%	41%
	More than one year	65%	69%	63%	62%	47%	62%	59%

(*Continued*)

Table A5. (Continued).

		1	2	3	4	5	6	7
Field of study	Education	7%	8%	16%	10%	13%	13%	11%
	Humanities	10%	13%	18%	11%	13%	17%	22%
	Arts	2%	7%	5%	2%	3%	5%	6%
	Social Sciences. Journalism & Information	16%	17%	19%	16%	14%	15%	17%
	Business & Administration	3%	4%	3%	4%	4%	3%	2%
	Law	23%	14%	11%	17%	16%	14%	10%
	Biology & Environment	2%	4%	5%	4%	5%	6%	5%
	Natural Sciences	4%	4%	4%	6%	5%	5%	5%
	ICT	7%	7%	3%	6%	4%	4%	4%
	Engineering & Manufacturing	6%	4%	2%	8%	3%	4%	3%
	Architecture & Construction	4%	6%	4%	4%	4%	5%	5%
	Health	1%	2%	1%	1%	1%	2%	2%
	Other	1%	4%	2%	2%	1%	2%	1%
	Arts & Humanities (UAS)	0%	0%	0%	0%	0%	0%	0%
	Business & Administration (UAS)	4%	2%	3%	3%	5%	2%	2%
	ICT (UAS)	3%	1%	1%	2%	2%	1%	1%
	Engineering & Manufacturing (UAS)	6%	3%	2%	3%	3%	2%	3%
	Health (UAS)	0%	0%	0%	0%	1%	0%	1%
	Other (UAS)	0%	0%	1%	0%	0%	0%	0%

Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14. **Data**:ATRACK (STATISTICS AUSTRIA).

Table A6. Determinants of cluster memberships: results of logistic regression (AME).

AME for assignment to cluster number:	1	2	3	4	5	6	7
Cluster description	stable. high wages	stable. self-empl.	stable. part-time	fast int. high wages	fast int. low wages	incompl. Integr.	unstable biogr.
Parental education (Ref: higher education)							
General qualification for university entry	0.008	−0.022**	−0.006	−0.000	0.028*	−0.026**	0.018*
Apprenticeship	0.028*	−0.032**	−0.016	−0.003	0.047**	−0.035**	0.007
Compulsory schooling	−0.005	−0.024†	−0.010	−0.015	0.032†	−0.020	0.031*
Female (Ref: male)	−0.059**	−0.058**	0.049**	−0.006	0.030**	0.014†	−0.011
Maternity (Ref: no maternity)	−0.010	0.003	0.084**	0.003	−0.081**	−0.026*	0.058**
Age	0.010**	0.002**	0.002**	−0.007**	−0.018**	−0.007**	0.003**
Nationality (Ref: Austria)							
Germany	−0.040	−0.014	0.057†	0.047	0.004	−0.008	−0.019
Other EU-country	−0.077**	0.025	0.046†	−0.039†	0.030	−0.009	0.010
Other	−0.089**	0.007	−0.027	−0.042†	0.061*	0.061*	0.022

(*Continued*)

Table A6. (Continued).

AME for assignment to cluster number:	1	2	3	4	5	6	7
Former schooling (Ref: academic secondary school)							
Technical school	0.071**	−0.004	−0.060**	0.042**	0.009	−0.070**	−0.022*
Business school	0.022†	−0.005	−0.060**	−0.020	0.101**	−0.045**	−0.006
Other vocational school	−0.014	0.009	−0.012	−0.040**	0.072**	−0.030*	−0.017†
Second chance route	−0.000	0.008	−0.022	−0.029†	0.046*	−0.020	0.025†
Degree from another country	−0.023	0.008	−0.033	−0.017	0.032	0.019	0.020
No information on former schooling	0.106**	−0.014	−0.032	−0.004	−0.030	−0.044*	0.007
Study duration: more than one year	0.007	0.015**	0.015†	0.033**	−0.044**	0.022**	−0.007
Field of study (Ref: Education)							
Humanities	0.022	0.001	−0.014	−0.019	−0.006	−0.004	0.024†
Arts	0.000	0.075**	−0.025	−0.052*	−0.027	0.017	0.022
Social Sciences. Journalism & Information	0.066**	0.013	−0.036†	0.021	−0.011	−0.025†	−0.005
Business & Administration	0.082**	0.025	−0.096**	0.042	0.031	−0.036†	−0.016
Law	0.152**	−0.004	−0.110**	0.037*	0.000	−0.034*	−0.024*
Biology & Environment	−0.019	0.006	−0.027	−0.017	0.012	0.016	0.026
Natural Sciences	0.070**	−0.010	−0.070**	0.035	−0.021	−0.004	0.017
ICT	0.137**	0.008	−0.090**	0.051*	−0.034	−0.050**	−0.011
Engineering & Manufacturing	0.105**	−0.017	−0.130**	0.106**	−0.051*	−0.007	−0.008
Architecture & Construction	0.042†	0.005	−0.057*	0.011	0.003	0.003	0.032†
Health	0.006	0.023	−0.076†	−0.027	−0.001	0.052	0.014
Other	−0.047†	0.103**	−0.051	0.034	−0.030	−0.003	0.006
Arts & Humanities (UAS)	−0.021	0.016	−0.140†	−0.006	0.038	−0.000	0.085
Business & Administration (UAS)	0.143**	−0.007	−0.065*	−0.023	0.033	−0.066**	−0.015
ICT (UAS)	0.161**	−0.022	−0.160**	0.011	0.043	−0.050†	−0.006
Engineering & Manufacturing (UAS)	0.201**	−0.013	−0.116**	−0.026	−0.010	−0.050*	0.006
Health (UAS)	−0.020	−0.001	−0.071	−0.104*	0.104	−0.007	0.052
Other (UAS)	0.054	0.003	0.122	−0.111*	0.028	−0.105**	−0.019
Nagelkerke R^2	0.193	0.080	0.085	0.052	0.176	0.081	0.085
N	11.937	11.937	11.937	11.937	11.937	11.937	11.937

Each cluster is contrasted with all other clusters. **p < 0.001; *p < 0.01; †p < 0.05. Dropouts of first-degree programmes at public universities and universities of applied sciences in the academic year 2013/14. **Data**:ATRACK (STATISTICS AUSTRIA).