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Smoothness of the School-to-Work Transition: General versus Vocational Upper-Secondary Education

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Abstract

This article analyses the effect of vocational education on school-to-work transitions for the 2006 cohort of Dutch graduates of upper-secondary education (ISCED Level 3). Using sequence analysis, it uncovers ideal-typical school-to-work transition trajectories representing the first 7 years in the labour market. It then analyses the effect of vocational education on trajectories and wages. Specific attention is paid to the moderating influence of vocational sector and type of programme: classroom-taught or workplace-based. The results indicate that, compared to entrants with general education, vocationally educated entrants are less likely to have problematic labour market entry trajectories. Vocational field has a moderating effect on the prevalence of particular trajectories. Those with a vocational education enjoy higher wages on labour market entry but are soon overtaken by their counterparts with a general education.

Introduction

The transition from school to working life has proved to be complicated and, for many, marked with unanticipated deviations and pitfalls (OECD, 2000). Youth unemployment rates are higher than overall rates and are more susceptible to fluctuations in the business cycle. Moreover, young people's careers are often characterized by high volatility and insecurity. Vocational education is often suggested as a way to establish a more direct link between education and the labour market (Ryan, 2001; OECD, 2010). For employers, it is argued, vocational education reduces uncertainty in hiring because vocational skills are directly applicable in the workplace. Others, however, stress the importance of general education in providing adaptive capability and general employability.

This debate is far from settled, which is reflected in a wide-ranging literature in both sociology and economics on the merits and weaknesses of vocational relative to general education. Studies show that vocational education is more advantageous in terms of employability rather than wages, and that this advantage is probably stronger early in the career as vocational skills are more likely to depreciate over time (Shavit and Müller, 2000; Iannelli and Raffe, 2007; Brunello, Rocco and Brunello, 2015; Hanushek, Schwerdt and Woessmann, 2017).

Despite the literature providing many important insights, several issues remain unresolved. In many countries, general and vocational programmes are not offered at the same level, making it difficult to isolate the effect of having undergone vocational education

from that of having a different level of educational attainment. Several authors have used difference-in-differences or instrumental variables approaches to probe ‘the vocational effect’ (the effect of vocational education on labour market outcomes), but analysis remains ultimately problematic (Ryan, 2001; Hanushek, Schwerdt and Woessmann, 2017). The diversity in vocational programmes is another important aspect that is seldom examined. Although it is standard practice to control for employment sector in studies on labour market outcomes, vocational education is generally treated as uniform. Moreover, the outcomes of vocational programmes are also likely to depend on type of instruction — classroom or workplace-based (Meer, 2007; Polidano and Tabasso, 2014). These issues have hitherto received little attention or been considered in isolation, but their combined influence needs to be considered to properly understand their role in creating and shaping the vocational effect.

In recent years, increasingly lengthy and more volatile school-to-work transitions have led to a body of literature that conceptualizes school-to-work transitions as periods rather than as single events. In these studies, micro-level sequences of labour market states are examined in their entirety, resulting in a deeper understanding of school-to-work transitions (Brzinsky-Fay, 2014). In comparison to cross-sectional or single-event study designs, conceptualizing school-to-work transitions as sequences fits better with their uncertainty, volatility, and sequential nature. Adopting a sequence approach allows one to measure differences in the smoothness of the school-to-work transition between generally and vocationally educated school-leavers (Jacob and Solga, 2015). The assumption that vocational education results in smoother school-to-work transitions resonates strongly among policymakers but has to our best knowledge not been tested directly (International Labour Office, 2010; Biavaschi *et al.*, 2013).

This article addresses the aforementioned issues by using longitudinally linked registry micro-data to identify, explore, and compare the school-to-work transition trajectories of a cohort of Dutch school-leavers with upper-secondary level diplomas. These data are used to answer a two-part research question: ‘What is the vocational effect on (a) smoothness of the school-to-work transition and (b) initial wages and wage growth?’ In addition, the article highlights the extent to which vocational sector and type of instruction weaken or enhance this effect. It employs sequence analysis (SA); a method that compares states in ordered spaces (sequences) and can combine similar sequences into clusters (patterns or trajectories). The clusters obtained from SA then form a

dependent variable in multinomial logistic regression. Finally, we test whether vocationally educated entrants have higher starting wages but enjoy slower wage growth than their generally educated counterparts, as would be expected if generally educated entrants are more adaptable and acquire new skills in the workplace more easily.

Background

Vocational Education and Labour Market Outcomes

Several, often contrasting, theories offer explanations for how vocational education influences early career labour market outcomes. The empirical literature shows that whether vocational education is successful in providing better labour market outcomes depends on the outcome measured and the timing of the measurement. Vocational education is more likely to have a positive influence on socio-economic status and employment probability than on occupational level or wages (Iannelli and Raffe, 2007). These effects are expected to level off over time (Hanushek, Schwerdt and Woessmann, 2017).

The rationale behind vocational education is that it provides students with occupation-specific skills that are directly applicable in the workplace. Although these skills could also be learnt in the workplace, many employers are unwilling to invest the time and money required to teach them (OECD, 2010). In general, vocational skills are assumed to be directly applicable in the workplace, and thus workers that possess them more productive. On this basis, human capital theory (Becker, 1962) predicts that entrants with vocational education will have an advantage over those with a general education and should therefore experience more stable school-to-work transitions and find better jobs.

The notion of the direct applicability of skills is important because the vocational effect depends heavily upon it. However, job competition and signalling theories (Spence, 1973; Thurow, 1975) question the extent to which directly applicable skills exist, or can be measured, and stress the importance of general aptitude. In Thurow’s (1975) labour queue model, trainability is key to workplace performance. When deciding which workers to hire, the model expects employers to assess the anticipated training costs of potential workers and rank them accordingly in the labour queue. The training costs for individuals with less ability or motivation are higher, and employers will therefore prefer applicants whose education signals greater aptitude (Spence, 1973). In many countries, vocational education is stigmatized as

being for those less able or less motivated (OECD, 2010). Hence, in this framework, those vocationally educated would face worse labour market outcomes.

A third perspective pictures vocational education as a safety net for individuals of less ability (Shavit and Müller, 2000) and indeed those following a vocational education enrol in higher education less often, resulting in lower final educational attainment. However, it provides lower ability students with an education that enhances their chances in the labour market. For these individuals, the possibility to obtain a vocational diploma reduces the likelihood of unemployment or precarious employment in jobs that are flexible, short-lived, or otherwise insecure (Kalleberg, Reskin and Hudson, 2000). In addition to being insecure, these jobs are often low-paying, offer limited opportunities for training and acquiring specific human capital (Scherer, 2004), and are frequently characterized as a 'trap' that workers are unable to escape from and advance to regular, more desirable employment positions (Barbieri and Scherer, 2009). Hence, according to this framework, the value of vocational education is that it prevents bad labour market outcomes rather than promotes better outcomes as such.

Clearly, these theories are inconsistent in the effects claimed of vocational education on labour market outcomes. Moreover, the mechanisms can operate simultaneously, influencing the outcomes to varying degrees (Iannelli and Raffe, 2007). Reviewing the literature, Iannelli and Raffe (2007) conclude that 'empirical studies of the vocational effect do not reach consistent conclusions about its size or even its direction' (p. 50), and that subtle differences in study design may influence the outcome of a study. Indeed, depending on the institutional setting, the comparison group, and outcome of interest, the effect can be positive or negative (Shavit and Müller, 2000; Vignoles *et al.*, 2002; Bishop and Mane, 2004). In the United States and Great Britain, for instance, the vocational effect is often small or negative, whereas in Germany and The Netherlands it is more often positive. Countries' education and labour market systems work and interact very differently and, as a result, vocational skills are valued differently. Vocational education is more likely to positively influence labour market outcomes if it has a prominent position in a country's educational system (Wolbers, 2007). In The Netherlands, where our study is situated, this is indeed the case: currently over 40 per cent of all students pass through vocational education. Previous studies on the vocational effect in The Netherlands have found vocational education to have a strongly positive effect on early career employment probabilities (Forster, Bol and van de Werfhorst, 2017).

A recent stream of literature states that any positive effect of vocational education on labour market outcomes is likely to be short-lived. Workers with general ('concept-based') skills are argued to be more flexible, and quicker to adopt new technologies (Krueger and Kumar, 2004). Based on their empirical findings, Hanushek, Schwerdt and Woessmann (2017) hypothesize that, in the long run, vocational education is a trade-off between early career benefits and faster skill obsolescence, especially in countries with well-established vocational systems. Other authors find support for parts of this hypothesis but are unable to unequivocally support all three components—i.e. early career benefits followed by faster skills obsolescence, accentuated by vocational system strength (Cörvers *et al.*, 2011; Brunello, Rocco and Brunello, 2015; Forster, Bol and van de Werfhorst, 2017). An important limitation of this literature is that it generally relies on cross-sectional data to infer whether and when vocational education becomes a disadvantage. Cörvers *et al.* (2011) use longitudinal data on individuals with general and vocational education from Germany, The Netherlands, and the United Kingdom. For Germany and for the United Kingdom, they find evidence that the starting wages of vocationally educated workers are higher, but that workers with general education have caught up within 6 years of labour market experience. For The Netherlands, the sample size was too small to come to a definite conclusion.

Based on the above, we expect vocational education to be beneficial in the school-to-work transition. In particular, we hypothesize that vocationally educated school-leavers are more likely to enter labour market trajectories that are dominated by full-time and part-time regular employment (*H1a*) and less likely to enter trajectories that are dominated by non-standard employment, unemployment, or inactivity (*H1b*). Wages of vocationally educated workers are expected to be higher initially (*H2*) but grow more slowly than those of workers with a general education (*H3*), due to their higher adaptability and learning capabilities.

Differentiation in the Vocational Effect

Vocational education is more heterogeneous, both in content and in how it is taught, than general education. For instance, programmes may differ in specificity (Vogtenhuber, 2014) or in the occupational sector they train for (Meer, 2007). Education that provides more specific skills sends clearer signals to potential employers about an entrant's abilities and can thus enhance labour market outcomes at the start of a career (Breen, 2005).

Some vocational fields are more likely to provide specific skills because of the jobs they train for: functions in sales and tourism (both ‘Business’ programmes) require a broader and more general skill-set than functions in ship-building and laboratories (which are examples of vocational education in the ‘Technical’ field). Likewise, the labour market prospects in one field may be significantly better than in another field. In The Netherlands, there has been a debate on so-called ‘fun studies’ in which more students enrol than the labour market requires (e.g. animal care and management and hairdressing). This debate has resulted in policy measures that aim to improve the match between school-leaver supply and labour market demand. Meer (2007) found that the incomes of those who opt for technical vocational education (which included healthcare, trade, and agriculture) were higher than the incomes of those who chose business education; an effect that persisted after controlling for self-selection. Van der Velden and Wolbers (2004) found large and persistent differences between vocational sectors: depending on year and sector, the percentage of entrants who were able to find work at the appropriate level ranges from 45 to 85 per cent and the wage gap between the lowest paying and highest paying sectors was 10 to 15 percentage points. As a consequence, lumping very different programmes together in a single ‘vocational’ category may obscure various heterogeneous effects on labour market outcomes.

Another factor to consider is the role of workplace learning in vocational education. According to the OECD (2010), workplace learning is beneficial in two ways: first, by developing skills that would have been hard to acquire in a classroom setting and, second, by connecting students with employers during their education—potentially giving early access to internal labour markets. Most of the evidence on the benefits of workplace training comes from studies that compare apprenticeships with general education (see Wolter and Ryan (2011) for a review). A general finding in this literature is that workplace learning has a positive effect. However, this positive effect may be as much due to having a vocational diploma as to workplace learning itself. It is thus necessary to also compare workplace training to traditional (classroom-taught) forms of vocational education. Recent empirical evidence suggests that even very small amounts of workplace training can increase the likelihood that students complete their education, increase their employment prospects at the start of their career, and lead to higher wages compared to classroom-taught programmes (Polidano and Tabasso, 2014; CBS, 2015).

We thus expect the vocational effect to depend on the field studied and the type of instruction followed.

Specifically, we hypothesize that the field of study influences the size and strength of the effect of having a vocational education compared to a general education (*H4*). That is, for some fields, the effect will be larger than it is for others, and for some field and outcome combinations there may simply not be a vocational effect. Previous research showed that, in The Netherlands, the labour market prospects for school-leavers with business or agricultural vocational diplomas were generally less than for those with care and well-being or technical education (Van der Velden and Wolbers, 2004). School-leavers with diplomas in the care and well-being field are likely to have careers in which part-time employment plays a large part because such employment contracts are particularly common in this field (Keuzenkamp *et al.*, 2009). With regard to type of instruction, we hypothesize that workplace learning increases the vocational effect on early career labour market outcomes (*H5*). Although the literature has hitherto focused on comparisons between apprenticeships and general education, there are substantial theoretical reasons, and some empirical evidence, that workplace learning is, in a way, even more vocational than ‘standard’ vocational education (Polidano and Tabasso, 2014).

A Sequence Approach to School-to-Work Transitions

Traditionally, the literature that has compared the early career labour market outcomes of generally and vocationally educated workers has focused on outcomes at a certain point in time. A number of more recent studies have considered the longer-term outcomes by comparing outcomes early and later in the career. Both scholars and policymakers often refer to the promise of smoother school-to-work transitions when discussing the benefits of vocational education. The main premise is that certified workplace skills will reduce turnover and unemployment during the first years of work because employers are more readily aware of potential employees’ skills. Moreover, early careers should see fewer reversals (such as a return to school or unemployment after an initial substantial job). However, we argue that this key assumption about the benefits of vocational education has yet to be directly tested. Our study, in taking a process-oriented approach, will provide insight into these aspects of the school-to-work transition (Brzinsky-Fay, 2014).

School-to-work transitions are becoming increasingly prolonged and dynamic (OECD, 2000), and it is argued that this complexity is insufficiently captured by focusing on isolated transitions or single points in time (Brzinsky-Fay, 2014). Various authors have employed

SA to analyse school-to-work transition as a process (Scherer, 2001; Brzinsky-Fay, 2007).

SA is a relatively new statistical technique that can capture the differences between individuals' trajectories by analysing the (dis)similarity between sequences of experienced states. As such, it provides a meaningful and holistic alternative to the more common approaches that use single transitions, outcomes at a certain point in time, or summaries of states over a certain period. SA often combines optimal matching, or another form of sequence alignment, and cluster analysis. It can be used in an explorative manner (to understand which patterns occur, and how they differ) as well as to test hypotheses (which factors increase the likelihood of a particular trajectory). In our study, SA is used for the latter. In practice, this limits the number of 'discoverable' patterns to a number that can also be used in confirmatory statistical methods such as multinomial logistic regression.

To our knowledge, there are no reported studies that have directly compared vocational and general education using SA. Quintini and Manfredi (2009) analysed school-to-work transitions in Europe and the United States and argued that the lack of vocational education options at the upper-secondary level in the United States is one of the causes of that country's employment instability during school-to-work transitions. Closer to our study in terms of design, Corrales-Herrero and Rodriguez-Prado (2012) examine the labour market pathways of Spanish school-leavers with lower-secondary vocational education. They uncover seven school-to-work transition trajectories, of which entry into full-time employment is the most common. Certain occupational fields are related to a higher probability of entering further education, or to an unemployment or inactivity dominated trajectory. No conclusions can be drawn about the overall vocational effect because there was no comparative group of school-leavers with general qualifications.

To sum up, we expect that taking a sequence approach to the school-to-work transition will reveal more about the staged nature of this process. It will allow us to look beyond first employment, or at particular points in time, and enable us to test differences in the main career patterns between generally and vocationally educated school-leavers during the first years after leaving upper-secondary education.

Data and Methods

This article investigates the effect of vocational education on the school-to-work transitions of a cohort of upper-secondary education graduates.¹ In this section,

we present our data and the strategy that was used to test the hypotheses presented in the previous section. Before doing so, we briefly outline the Dutch educational context, particularly at the upper-secondary level.

Data and Sample

The Dutch context

The Dutch educational system is strongly stratified while also offering ample opportunities to continue or upgrade education at each level. Figure A1 provides an overview of education levels in the Dutch context, and their ISCED-level equivalents (Hamersma, Edzes and Van Dijk, 2015). MBO ('Middelbaar beroepsonderwijs') is an intermediate vocational education that is offered at four levels that differ in the degree of skill and autonomy taught. The highest, MBO4, corresponds to ISCED Level 4. The other three levels all broadly correspond to ISCED Level 3 (higher secondary education). Of these, MBO3 is the closest to HAVO ('Hoger algemeen voorbereidend onderwijs') or higher general continued education and to VWO ('Voorbereidend wetenschappelijk onderwijs'), pre-university secondary education. Students who finish MBO3, HAVO, or VWO are generally of a similar age, and have access to higher education.

Sample selection

We use longitudinally linked registry micro-data files provided by Statistics Netherlands. The files contain information on socio-economic status, jobs, education, and personal characteristics of all inhabitants of The Netherlands, and we had access for the period 2006–2013.

We assume that school-leavers face three choices: continuing education elsewhere, temporarily leaving education before returning (e.g. taking a gap year) or entering the labour market. The focus is on the latter group. To reduce the potential impact of selection bias on our results, we defined a sample that consists of school-leavers of comparable age and educational levels who did not return to education after only a short period. To this end, the initial sample consisted of all individuals of age between 18 (minimum school leaving age) and 22 in October 2006 who were registered as a student (i.e. in education) for at least 6 months in the 2005–2006 educational year and who finished education at ISCED Level 3 with MBO3 (vocational), HAVO, or VWO (both forms of general education) qualifications. The selection was then refined by removing those who were registered as a 'student' in October 2006 or

Figure 1. Z-standardized results for cluster quality measures (ASW = average silhouette width; HC = Hubert's C; PBC = point-biserial correlation)

Source: Statistics Netherlands, own calculations.

October 2007 (i.e. those who had directly continued their education or re-enrolled 1 year later), and those for whom there were missing values for socio-economic status in the observation window. This resulted in a final sample of 5,759 school-leavers. Sample statistics can be found in Online Appendix 2.

Analytical Approach

Sequence analysis

Conceptualizing school-to-work transitions as an unfolding sequence requires analysis techniques that account for all states in the period studied and their relationship with each other (Brzinsky-Fay, 2014). Recently, SA has received growing interest as a method to uncover patterns in longitudinal state data. Several studies have applied SA in the context of school-to-work transitions (Brzinsky-Fay, 2007; Quintini and Manfredi, 2009). The growing interest in SA as a methodology has resulted in several review studies (Aisenbrey and Fasang, 2010; Dlouhy and Biemann, 2015; Studer and Ritschard, 2016), and this article follows their recommendations. To conserve space, the remainder of this section focuses on the relevant settings used to arrive at the article's findings.

SA consists of three steps: defining the sequence, calculating dissimilarity between sequences, and clustering

similar sequences. The sequence of interest consists of 84 months (7 years) of socio-economic statuses (full-time employment, part-time employment, non-standard employment, self-employment, unemployment, and student, inactivity).² Optimal matching was used to calculate the dissimilarity between sequences, with substitution and indel costs based on the similarity between conditional state distributions 12 months ahead (the 'OM_future' measure; see Studer and Ritschard, 2016). In the third step, cluster analysis (Ward's distance) was used to group similar sequences into ideal-typical trajectories. Given that the clusters were to be used in further analysis, we limited the maximum number of 'discoverable' clusters to 10. There is no *a priori* 'right' number of clusters (Aisenbrey and Fasang, 2010), and so a combination of cluster quality measures was used to determine the optimal number of clusters. Each measure highlights different qualities (see Studer, 2013), and the black line in Figure 1 depicts the average of the z-scores for the point-biserial correlation, Hubert's C, and average silhouette width measures. The highest average score is found with a five-cluster solution. The resulting cluster solution was further improved by using the resulting cluster medoids as the starting point for the 'partitioning around medoids' algorithm (Studer, 2013).

Online Appendix 3 explores the sensitivity of the cluster partitioning to different cost specifications, and the influence of combining and splitting clusters. The

clusters that resulted from other cost specifications are all very similar in content, leading us to conclude that our clusters are robust to differences in cost specifications. Moreover, defining more or fewer clusters would either overcomplicate or limit our analysis. Opting for a four-cluster solution would merge two very dissimilar trajectories. A six-cluster solution would split the 'Failure' trajectory into one that contains mostly non-standard employment interspersed with unemployment and inactivity, and a trajectory dominated by inactivity. As those are both unfavourable trajectories, we deemed the five-cluster solution optimal not only on statistical but also on substantive grounds.

In the final step, cluster silhouettes were used to identify observations that are on the 'border' of their respective group. Silhouettes are calculated at the observation level and represent the average distance of an observation from the other members of its group compared to the average distance to the members of the adjacent group. Silhouettes can take values between -1 and 1 , with higher values indicating better classification and values below 0 indicating that observations would fit better in a different group. The assumptions inherent in multivariate analyses require that an individual's ideal-typical trajectory closely resembles their actual sequence (Studer, 2013). Therefore, observations that are close to the border of their cluster (and are poorly represented by the cluster's general trajectory) are ignored in subsequent analyses. Nevertheless, Online Appendix 4 shows that this does not substantially alter the results of the multivariate analyses.

Multivariate analysis

Multinomial logistic regression is used to measure the effects of general and vocational education on the probability of following a particular trajectory. The main factors of interest are education (general or one of four vocational fields) and type of instruction (classroom or workplace-based³). Further, controls for the effects of personal and regional characteristics at the start of the observation window are also included. Following this, a mixed linear model is used to test the hypothesis that vocationally educated school-leavers have higher starting wages but see lower wage growth than those with general qualifications.

Since education is not chosen randomly, it is necessary to be aware of the potential for selection bias, and to try to reduce its impact on results. Although our data limit our ability to address this issue, we have tried to assess this in various ways. We test the impact of including parental labour market attachment, education (available for about 16 per cent of households), and income (from employment) in the equations for school-leavers that

still live with their parents (89 per cent of the sample). Parental labour market attachment, education, and income can serve as a proxy for confounders such as ability, social origin, motivation, and support networks. If adding these variables has little impact on the results, this will strengthen our argument that the estimated effects would not change much if we were able to fully control for selection bias. If the impact is significant, it will at least give an indication of the strength and direction of the bias. Given that living with one's parents is in itself selective, we would argue that this is not appropriate as 'main' analysis of the vocational effect. We use a linear mixed model with random effects for individuals in our wage regressions. That is, we filter out the effect of unmeasured time-invariant individual heterogeneity on wages and wage growth. This should also limit the impact of any selection bias. Finally, we would argue that even if partly caused by selection rather than by general or vocational education itself, the results will still provide useful insights into the differences between the school-to-work transitions and early career wages of upper-secondary level school-leavers with vocational and with general diplomas.

Results

Descriptive Analysis

Typology of labour market entry trajectories

Using SA, we identified five ideal-typical labour market entry trajectories. Three trajectories relate to entries into more or less stable positions on the labour market, the fourth trajectory involves a return to education, and the fifth trajectory is best described as a failure to achieve a stable labour market position. Figure 2 presents the distribution of labour market states over time within each cluster. The x -axis represents time, and the y -axis depicts the proportional distribution over states. The graph labels represent short trajectory descriptions, and the socio-economic states are mapped onto different colours (see the legend). Table 1 summarizes the most important characteristics of the trajectories: the average percentage of time spent in the various states, the average number of distinct states and state spells, and the average number of jobs during the first 7 years after finishing education. Where relevant, other descriptive statistics are discussed in the text. Full tables of these statistics can be obtained from the authors.

In a sense, all the trajectories reflect a significant departure from the traditional trajectory of rapid entry into stable full-time employment. Over the course of 7

Figure 2. Proportional transversal state distributions by trajectory

Source: Statistics Netherlands, own calculations.

years, school-leavers averaged 5.5 spells in various socio-economic states and 4 job spells. School-leavers with vocational qualifications were employed 86 per cent of the period, whereas their counterparts with general education for only 60 per cent. The major reason for this difference is that the latter group more frequently re-entered the education system. On average, those with a general education spent 21 per cent of the 7-year period in education, compared with only 1 per cent for those with a vocational education.

Even in the first trajectory, which shows the highest stability (as measured by average turbulence (Elzinga and Liefbroer, 2007)) and is most strongly associated with full-time employment, entrants on average experienced 3.6 job spells and 2.6 distinct socio-economic states. There is considerable variation in the time it took to enter full-time employment, although most entrants had entered and would remain in full-time employment within 2 years of leaving education. Notably in the second half of the period, the number of entrants switching to other labour market states was growing. Table 2 shows considerable heterogeneity in the association between vocational field and the full-time employment trajectory. School-leavers with business or technical vocational diplomas were particularly likely to follow this trajectory, whereas

it was less common among school-leavers from the care and well-being field. Vocationally educated school-leavers with workplace training were also more likely to be in full-time employment.

The second trajectory corresponds to a part-time employment career. Compared to the full-time employment trajectory, instability is higher as reflected in the higher transition rate, the higher value for the turbulence measure, and the longer average time spent in non-standard employment. This trajectory also includes school-leavers that started working full-time but then switched to part-time employment; a pattern that is common among Dutch women following the birth of their first child. The high prevalence of part-time employment in the care and well-being field reflects specificities of this sector in The Netherlands (Keuzenkamp *et al.*, 2009). Part-time employment in The Netherlands does not necessarily come with the negative side effects, such as reduced training opportunities and job security, that are often cited in the Anglo-American literature. Taking this into account, the probability of entering an employment-dominated trajectory (whether full-time or part-time) was similar for all types of vocational education.

In the third trajectory, entrants gradually moved into self-employment. This trajectory's main state (self-

Table 1. Trajectory characteristics

	N	Per cent of months in state							State spells		Job spells	Turbulence
		FT	PT	NS	SE	UE	Edu	IA	Total	Distinct		
Primarily full-time employment	3,093	81	6	6	1	1	1	3	4.2	2.6	3.6	5.1
Primarily part-time employment	764	19	61	11	2	3	1	3	5.6	3.3	3.6	7.4
Moving towards self-employment	300	9	4	7	69	2	1	9	5.0	3.2	2.2	6.4
Return to education	710	10	4	16	1	2	54	13	8.3	4.0	4.8	9.5
Failure to reach a stable position	892	11	8	45	2	10	3	20	8.0	3.5	5.6	9.1
Total	5,759	50	13	14	5	3	8	7	5.5	3.1	4.0	6.5

Source: Statistics Netherlands, own calculations.

FT = full-time employment; PT = part-time employment; NS = non-standard employment; SE = self-employed; UE = unemployed; Edu = education; IA = inactivity.

Table 2. Association with labour market entry trajectories

	N	Trajectory (in per cent)				
		FT	PT	SE	Edu	Fail
Total	5,759	53.7	13.3	5.2	12.3	15.5
Education field						
>General	1,916	42.8	2.5	3.4	33.8	17.5
>Vocational—business	918	73.3	6.9	2.7	2.0	15.1
>Vocational—agrarian	542	64.2	6.5	13.7	2.0	13.7
>Vocational—technical	240	76.7	2.1	7.1	2.9	11.2
>Vocational—care and well-being	2,143	49.8	28.6	5.6	1.3	14.7
Diploma type						
>General	1,916	42.8	2.5	3.4	33.8	17.5
>Vocational—classroom-based	3,161	58.1	20.0	5.6	1.6	14.7
>Vocational—workplace-based	421	68.2	13.3	6.9	1.4	10.2
>Vocational—other	261	57.1	11.1	11.1	1.9	18.8

Source: Statistics Netherlands, own calculations.

FT: primarily full-time employment, PT: primarily part-time employment, SE: moving towards self-employment, Edu: return to education, Fail: failure to reach a stable position

employment) also covers other types of activity as discussed in Online Appendix 2 (including those registered as employed but for whom employment data are missing), but self-employment is by far the most common. The data indicate that once a transition into this state has been made that the further course of this trajectory becomes rather stable, and that is why we adopted the 'Towards self-employment' label. During the transition, which for many took up to 4 years, most were employed or inactive.

The fourth trajectory comprises those who return to education after a gap of at least 1 year. The most common activities during the gap year(s) were full-time employment, non-standard employment, and inactivity. Education enrolment peaked in 2010 and 2011, after

which re-entry into the labour market starts. This trajectory is made up almost entirely of school-leavers with a general education. Since the difference was very pronounced, we further inspected the original data for differences between school-leavers with vocational and with general diplomas in the likelihood of re-enrolment. This revealed that 91 per cent of all people graduating in 2006 with a general education (HAVO or VWO), but only 44 per cent of those with vocational diplomas (MBO3) were enrolled in further education in October 2006. Further, of all those not enrolled in October 2006, only 2 per cent of those with vocational diplomas were enrolled in education in October 2007, as against 66 per cent of those with a general education. This indicates that those who have followed general education

are much more likely to continue their education to a higher level and particularly so after a prolonged break. Unfortunately, the data do not allow us to see whether the later return to education was always intended, or a response to 'bad' labour market experiences.

The fifth trajectory represents a failure to achieve a stable position in the labour market. Not only does this cluster have the highest prevalence of non-standard employment, inactivity, and unemployment of all the clusters, but it also has the highest average number of employment spells. Nevertheless, on average, 64 per cent of the period is spent in some form of employment. As such, this trajectory closely resembles a 'precarious jobs carousel' (Barbieri and Scherer, 2009): a recurring cycle of short-term jobs, often interspersed with unemployment and inactivity. It is notable that the variation in time spent in the various states and the number of spells is higher than in any other cluster, reflecting the variation in sequences forming this cluster. A common factor, however, is their volatility and insecurity, and their undesirability from a policymaking perspective.

Multivariate Analysis

The literature review suggested several ways in which vocational education might influence school-to-work transition outcomes. Overall, we expected that vocational education would 'smooth' the school-to-work transition resulting in stable employment positions with low volatility. In addition, vocational skills were hypothesized to result in a higher starting wage but slower wage growth. These effects are expected to be mediated by characteristics of the vocational diploma, specifically the vocational field and type of instruction (classroom or workplace). In this section, these hypotheses are assessed using multivariate analysis.

Smoothness of the school-to-work transition

The five ideal-typical labour market entry trajectories uncovered in the SA described above show substantial differences in the smoothness of the school-to-work transition. To test whether vocational education is associated with smoother labour market entry, as suggested by the results in Table 2, we use multinomial logistic regression to estimate the conditional probability of entering each trajectory.

First, a smooth school-to-work transition is defined as a higher probability of entering the 'Full-time employment' (FT) or 'Part-time employment' (PT) trajectories combined with a lower probability of entering the 'Failure' (Fail) trajectory. Those returning to education (Edu) were not deemed to have made the transition to

work, and it was therefore not possible to classify their entry trajectory as either smooth or unsmooth. Those on the self-employed trajectory (SE) were also not placed in either category because the data do not allow one to disentangle opportunity-driven from more precarious forms of self-employment. The more precarious types of self-employment are more common among those with fewer skills who may become self-employed out of necessity because other forms of employment are unavailable to them (Van Stel and de Vries, 2015). As the data do not contain information on the motivation or income of self-employed individuals, it is not possible to identify the extent to which members of this relatively small group (5 per cent of the sample) are successful and, as such, further conclusions based on associations with this trajectory were deemed unwarranted. Nevertheless, as a check, we included this trajectory among the 'smooth' trajectories, but this did not alter the results substantially. As discussed in the methodology, all models were restricted to those who had positive silhouette values for their ideal-typical trajectory cluster.

The main explanatory factors we are interested in are education type (general or vocational), educational field, and type of instruction. Personal characteristics (sex, age, and origin) are included, as these are expected to influence both the choice of education and labour market outcomes. Life course factors (household composition and the presence of a child) are likely to influence early career outcomes and are added as control variables. Regional differences in opportunities, economic performance, and sectoral structure are controlled for by including provincial-level dummies. All such variables are determined at the start of the career to exclude issues of reverse causation. This means that life course-related changes occurring after the start of the career are ignored. For example, many women reduce their working hours around the birth of their first child. As these factors are often strongly correlated with other included variables (e.g. age and gender), the effects of these changes are likely to be absorbed by those variables. We are not aware of any life course-related changes that are strongly correlated with being generally or vocationally educated.

The trajectories, based on the Hausman–McFadden test for the IIA assumption (Hausman and McFadden, 1984), can be treated as independent. To conserve space, we only present our main model, in which vocational fields and type of instruction are distinguished. Additional auxiliary models are included in Online Appendix 4.

Table 3 shows that the various vocational educational options are associated with a 22–37 per cent higher

probability of entering the Full-time employment trajectory, a lower but still increased probability of entering the Part-time employment trajectory and a 9–11 per cent lower probability of entering the Failure trajectory. This confirms hypotheses *H1a* (Vocational education is associated with a greater probability of entering full-time or part-time employment dominated trajectories) and *H1b* (Vocational education is associated with a smaller probability of entering trajectories dominated by non-standard employment, unemployment, or inactivity). As expected, substantial differences exist between the vocational fields, and these differences are in line with what was anticipated in hypothesis *H4*. School-leavers with business and technical diplomas are far more likely (37–38 per cent) to enter the full-time employment dominated trajectory than their generally educated counterparts, and are also more likely to enter full-time employment than those with agrarian or care and well-being diplomas (22–28 per cent). Part-time employment is a more common career path among those with care and well-being diplomas than those who have had a general education (+17 per cent) or a vocational education in other fields (0–+4 per cent). This differentiation would have disappeared if vocational education had been treated as a black box (see Table A4.3 in the Online Appendix). Our results also indicate that not distinguishing between vocational fields would have overestimated the effect of gender on early career labour market outcomes. By including vocational field, we can control for preferences for particular fields, and this reduces the estimated effect of gender on the probability of entering the Full-time and Part-time employment trajectories by 4 percentage points. Contrary to what we argued in Hypothesis *H5*, workplace learning did not increase the vocational effect on early career labour market outcomes. In practice, it has a small negative effect on the probability of entering part-time employment that is not balanced by a statistically significant positive effect in any of the other trajectories. It thus slightly weakens the overall vocational effect with respect to labour market trajectories. As a note of caution, this finding might be due to the relatively small size of the effect combined with the low prevalence of workplace training.

Several additional models were estimated to test the validity and sensitivity of the results. First, by including individuals at the boundaries of their cluster, we tested whether our decision to exclude individuals with negative silhouette values substantially altered the results (see Table A4.4). In this model, workplace training is associated with a lower probability of entering the Failure trajectory, but other effects remain similar in both magnitude and direction.

Second, it could be argued that the findings are a result of school-leavers with general qualifications being more prone to return to education, thus resulting in general education being negatively associated with employment-dominated trajectories. Table A4.5 consequently presents the results of a model that excludes all entrants that returned to education. Although the magnitude of the positive association between vocational education and the two smooth employment trajectories is reduced, it remains strongly positive. Moreover, the negative association with the Failure trajectory becomes even stronger.

Third, it is possible that education choice and early career stability are influenced by unmeasured covariates such as ability and informal networking opportunities. If so, the estimates of the association between education variables and school-to-work transition trajectories would be biased. Here, Table A4.6 presents the main model, including extra controls for parental income (measured as log of 2006 household income from employment), education, and labour market attachment.⁴ The inclusion of parental controls as a proxy for inherited attributes and parental support (Black and Devereux, 2011) is an attempt to address this bias and at least to get an idea of the direction of any effect. We found that the effect of the variables (when significant) was small and did not change either the direction or the size of the estimates of the vocational effect substantially, which alleviates these concerns. We also used coarsened exact matching (Iacus, King and Porro, 2012) to match students who chose vocational education to students with similar backgrounds who chose general education. This also left our conclusions unaltered (see Table A4.7).

Initial wage and wage growth

Linear mixed models were fitted to hourly wages measured at quarterly intervals to estimate the vocational effect on starting wages and wage growth. To assess the true influence of labour market experience on wage growth, time was carefully specified by distinguishing between labour market experience and time since leaving education (both measured in years) in the fixed and random parts of the model. Several models were fitted with the aim of disentangling the effects of education, time and experience on initial wages, and wage growth, controlling for both their reciprocity and their potentially heterogeneous associations with outcomes. In each model, wage levels are controlled for the effects of time-invariant demographic factors and job characteristics.⁵ A summary of the main results is presented in Table 4, and the full models can be found in Online Appendix 4.

Table 3. Multinomial logistic regression results per career trajectory

	Trajectory				
	FT	PT	SE	Edu	Fail
Education field					
>General	ref.	ref.	ref.	ref.	ref.
>Vocational—business	0.372***	0.040***	−0.008	−0.315***	−0.089***
>Vocational—agrarian	0.281***	0.035**	0.088***	−0.312***	−0.092***
>Vocational—technical	0.376***	−0.002	0.019	−0.295***	−0.098***
>Vocational—care and well-being	0.220***	0.166***	0.051***	−0.323***	−0.113***
Vocational * instruction					
>Classroom-taught	ref.	ref.	ref.	ref.	ref.
>Workplace-based	0.057	−0.028*	0.024	−0.019	−0.033
>Other	−0.059	−0.029	0.060***	−0.002	0.029
Gender					
>Male	ref.	ref.	ref.	ref.	ref.
>Female	−0.140***	0.100***	−0.048***	0.038***	−0.050***
Age	−0.028**	0.015**	−0.000	−0.006	0.019**
Origin					
>Native	ref.	ref.	ref.	ref.	ref.
>Western migrant	−0.009	−0.063***	0.002	0.036*	0.034
>Non-western migrant	−0.094**	0.000	0.008	0.007	0.079**
Household composition					
>Single	−0.036	−0.006	−0.017	0.051*	−0.008
>Couple	−0.139***	0.056**	−0.010	−0.048	0.141***
>With parents	ref.	ref.	ref.	ref.	ref.
>Other	−0.050	−0.023	0.003	0.076*	−0.006
Presence of children	−0.173	−0.059	0.080	0.031	0.122
Regional dummies	Yes	Yes	Yes	Yes	Yes
Pseudo- R^2 (McFadden)	0.174				
Chi ²	2393.11***				
N	5,440				

Source: Statistics Netherlands, own calculations.

ref = primarily full-time employment trajectory (FT). Average marginal effects and their significance levels

*** $P < 0.001$.

** $P < 0.01$.

* $P < 0.05$.

The first two models present the association of vocational education with initial wages and wage growth, including random (within individual) effects for individuals and experience. There is no statistically significant evidence of a vocational effect on starting wages. However, vocationally educated school-leavers do display slower wage growth (as shown by the negative coefficient for the interaction between vocational education and experience). A male 18-year-old school-leaver of Dutch origin with no prior labour-market experience could expect an average hourly wage of € $e^{2.042} = 7.71$, regardless of educational background (women earned slightly less). For each year of additional labour market experience, this wage would increase by 14.6 per

cent for those with a general education but only by 11.2 per cent for those vocationally trained.

In Model B, we differentiate between vocational fields and include the interaction between having a vocational diploma and type of instruction. These results indicate that differentiating between vocational fields provides a more nuanced view on the influence of vocational skills on starting wages. Having a technical or a care and well-being diploma does have a positive effect on starting wages, whereas the other vocational fields have no statistically significant effect. The negative effect on wage growth remains: generally educated school-leavers are expected to catch up with their vocationally educated counterparts after 2 years of labour market experience.

Table 4. Linear mixed effects regression of log hourly wages; main results. Estimated effects and their *t*-values

	Model		
	A	B	C
<u>Initial wages</u>			
Intercept	2.042***	2.058***	1.998***
Education field			
>General	ref.	ref.	ref.
>Vocational	0.003		
>Vocational—business		−0.023	0.032*
>Vocational—agrarian		−0.027	0.024
>Vocational—technical		0.044*	0.094***
>Vocational—care and well-being		0.063***	0.130***
Vocational * instruction			
>Classroom-taught		ref.	ref.
>Workplace-based		−0.085***	−0.082***
>Other		0.016	−0.021
<u>Wage growth</u>			
Experience (years)	0.146***	0.144***	0.068***
Time since leaving (years)			0.065***
Education field * experience			
>General	ref.	ref.	ref.
>Vocational	−0.034***		
>Voc. —business		−0.030***	−0.023***
>Voc. —agrarian		−0.033***	−0.026***
>Voc. —technical		−0.033***	−0.025***
>Vocational—care and well-being		−0.045***	−0.038***
Vocational * instruction * experience			
>Classroom-taught		ref.	ref.
>Workplace-based		0.015***	0.015***
>Other		0.003	0.003
<u>Variance components</u>			
Person	0.053	0.052	0.048
>Experience (years)	0.003	0.003	0.028
>Time since leaving (years)			0.027
Residuals	0.039	0.039	0.037
<u>Goodness of fit</u>			
Deviance	−25,036	−25,190	−31,005
Δ Deviance		154.2***	5,814.9***
Pseudo- R^2 (y , $\hat{y}$)	0.724	0.724	0.741
N (observations)	121,848	121,848	121,848
N (persons)	5,296	5,296	5,296

Source: Statistics Netherlands, own calculations.

*** $|t| > 4$.

** $|t| > 3$.

* $|t| > 2$.

Our earlier analyses revealed that generally educated school-leavers have more volatile and fragmented career starts and are likely to be older before they settle into the labour market and start gathering continuous labour market experience. This later start might result in higher initial wages and faster wage growth compared to younger vocationally educated school-leavers and, if so, this would bias the true effect of vocational education and labour market experience on wages and wage growth. Our final Model, C, distinguishes between the effects of time since leaving education and of labour market experience. In addition to being conceptually stronger, the goodness of fit statistics indicate that this model is a significant improvement on the previous models (the deviance improves from −25,190 in Model B to −31,005 in Model C).

In this model, vocationally educated school-leavers, with the exception of those with an agrarian diploma, have higher average starting wages than those with a general education. The effect is stronger for those from technical and care and well-being programmes. As in Model B, workplace-based learning results in lower initial wages but softens the negative effect of vocational skills on wage growth. The latter finding is somewhat surprising and goes against our expectations. If workplace-based vocational education does, as has been suggested, result in closer connections with employers and a more specific (workplace-oriented) skill-set compared to classroom-taught vocational education, one might expect the initial effect of workplace training on wages to be positive, while the more specific skillset would have a negative effect on wage growth. This finding could perhaps be partly explained by the fact that two in three of those who received workplace training during their vocational education went on to work at the employer who provided their training. It may be that these employers are able to exert some downward pressure on starting wages.

Sensitivity tests indicated that these findings are unlikely to be a consequence of specification errors or improbable assumptions—specifically that values are missing at random (MAR) (Singer and Willet, 2003). Table A4.7, reflecting a model in which we controlled for the school-to-work transition trajectory, does not significantly alter the results, and neither did a model in which we used a stricter subsample including only those school-leavers who were in the full-time or part-time employment trajectories or with fewer than 12 instances of non-employment states. Further, past and future employment status and wages are strongly correlated with

current outcomes. Overall, this suggests that the MAR assumption is tenable.

Conclusions

This article describes and analyses the school-to-work transitions of a 2006 cohort of Dutch school-leavers with upper-secondary general and vocational qualifications (ISCED Level 3). By adopting a longitudinal perspective through the use of SA, we have been able to integrate recent ideas about school-to-work transitions into an analysis of the effect of vocational education on labour market outcomes. Although school-to-work transitions are often assumed to be smoother for vocationally educated school-leavers, this hypothesis had not been rigorously tested. We have rectified this and, moreover, we have opened up the black box of vocational education by distinguishing between four vocational fields and between classroom and workplace instruction.

Our results provide support for the hypothesis that vocational education leads to smoother labour market trajectories. We operationalized this as a higher conditional probability of entering full-time or part-time employment dominated trajectories, combined with a lower conditional probability of entering trajectories characterized by non-standard employment, unemployment, or inactivity. We also found that the strength of this association depends on the vocational field: business and technical programmes are more strongly associated with full-time employment, whereas part-time employment is more common among those with care and well-being diplomas. These differences probably reflect characteristics of the jobs that are available for school-leavers in each field. The effect of type of instruction was found to be small or non-significant, although this may be due to sample size limitations. School-leavers with general education have a higher probability of ending up in a trajectory that is dominated by non-standard employment, unemployment, and inactivity. This trajectory was also characterized by high volatility and thus may resemble a 'precarious jobs carousel' (Barbieri and Scherer, 2009) or a longer job matching process.

We further demonstrate that although the wages of those vocationally educated are higher initially, generally educated workers soon catch up. This process was previously thought to take place over one's entire career, but our findings suggest that the wage benefits of vocational education may be very short-lived: within 2–5 years, those generally educated typically earn as much as those with vocational diplomas. Further, the extent to which starting wages for those vocationally educated are higher, and remain higher for longer, depends on vocational field.

Given that workplace learning is in many ways 'more vocational', we had expected that both the benefits and the penalties would be larger than for those with classroom-based vocational education. However, we found that workplace learning in fact reduces the differences between vocationally and generally educated school-leavers terms of both starting wages and wage growth. We suspect that this is in part due to the fact that a majority of those workplace-trained remain with the employer where they received their training, although this cannot explain this effect in full.

Our results imply that, at least in The Netherlands, vocationally educated upper-secondary level school-leavers are better prepared to enter the labour market than their generally educated counterparts. We infer this from the higher probability of entering successful transition trajectories and the lower probability of returning to education. This indicates that, at least to a certain degree, vocational education provides a signal to employers that school-leavers possess certain skills that are immediately usable in the workplace. This outcome also reflects societal norms regarding general education. General diplomas are deemed as adequate to enter the labour market, but students are 'expected' to continue to post-secondary education. As such, it is perhaps not surprising that generally educated school-leavers who opt to enter the labour market at this stage often face several years of 'settling in', or may fail to gain a stable foothold in the labour market and end up in a precarious cycle of insecure jobs and unemployment. Nevertheless, school-leavers with general diplomas that do remain in the labour market are soon paid similar or better wages than those with a vocational education. Given this rather rapid catching up, the human capital value added by a vocational diploma seems limited. More research is needed to establish whether this finding applies to other cohorts and different institutional settings.

This research has shown that taking a longitudinal perspective on school-to-work transitions more realistically fits current labour market experiences of entrants than other approaches, and is also able to test hypotheses that often remain implicit assumptions. More importantly, using SA has allowed us to look beyond single points in time. The literature often reports positive effects of vocational education in one's early career, and our results indicate that these effects may be the consequence of smoother transitions, rather than reflecting human capital differences between vocationally and generally educated school-leavers. If we had applied a transversal design with our sample, we could have, depending on which vocational field, type of instruction, or number of post-education years we had focussed upon, found positive, negative, or

no vocational effects on employment and wages. However, due to using SA and its focus on trajectories, we were able to show clear distinctions in the school-to-work transitions of generally and vocationally educated school-leavers. A smooth transition into working life is in itself valuable and can have a lasting effect on careers. If, as our results seem to indicate, vocational education facilitates the transition but does not lead to substantial advantages in terms of (remunerable) skills, the challenge for policymakers lies in increasing the latter without losing the benefits of the former.

Notes

- 1 An entire literature stream is dedicated to the effect of institutional contexts on school-to-work transitions (Gangl, 2002; Brzinsky-Fay, 2007). Several authors have provided descriptions of the specificities of the institutional context in The Netherlands (Iannelli and Raffè, 2007; Cörvers *et al.*, 2011).
- 2 Online Appendix 2 provides an overview of the data and explains how socio-economic statuses were established by combining data files.
- 3 Vocational education is offered in both classroom-taught and workplace-based forms at all levels in The Netherlands. General education is only taught in traditional (classroom) settings. The distinction between workplace or classroom types of instruction is thus only made as an interaction with vocational education.
- 4 The problems that hamper interpreting the success of self-employment careers also apply here. Moreover, we only have information on parental characteristics for the persons who live with their parents (which in itself is a self-selected subgroup). The available data do not contain incomes from sources other than employment nor education levels for the complete population. This inhibits a thorough analysis of the effect of inherited attributes and parental support.
- 5 Although data on household situation and the presence of children are only available up to 2011, the models restricted to this period yield similar results regardless of whether these factors are included (see Online Appendix 4). This suggests that this is not an important factor.
- 6 Unfortunately, lme4 does not report *P*-values, since these are difficult to derive from linear mixed models (Bates *et al.*, 2015).

Supplementary Data

Supplementary data are available at ESR online.

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