Middeldorp, M. M., A. A. Edzes, & J. van Dijk (2016)

Job access and the labor market entry and spatial mobility trajectories of higher education graduates in the Netherlands

in G. Ritschard & M. Studer (eds), Proceedings of the International Conference on Sequence Analysis and Related Methods, Lausanne, June 8-10, 2016, pp 607-630.

Job access and the spatial mobility trajectories of higher education graduates in the Netherlands

Marten M. Middeldorp, Arjen A. Edzes, Jouke van Dijk

Department of Economic Geography, Faculty of Spatial Sciences, University of Groningen

Abstract The successfulness of the transition from education into working life is closely related to further career success. Graduates with good access to jobs earn higher wages and have lower chances of being unemployed. Access to jobs at the start of the career is therefore an important determinant of early career success and of importance for the whole career. In this paper, we study the effect of job access on the mobility patterns of recent higher education graduates. We use a GIS to calculate a job accessibility index based on driving time and use sequence analysis to create spatial mobility histories for 13,621 recent graduates of higher education. We subsequently relate job access at the start of the career to spatial mobility histories to analyze whether a suboptimal starting location in terms of job access leads to differing spatial mobility trajectories. Finally, we analyze how job access and spatial mobility influence labor market outcomes.

1. Introduction

This paper studies the relation between access to jobs at the start of the career and spatial mobility and their combined effect on early career labor market success. Success of the transition from education into working life is of interest to graduates, employers and policymakers at both national and local levels of government. Generally, graduates will want to find a job matching their skill set in order to reap the full benefits of their education, whilst employers are interested in attracting the best graduates for their firms. Optimal allocation of human capital enables countries to enjoy sustained competitiveness in a globalizing world economy (OECD, 2012), whilst at a more local level attracting and retaining higher education graduates is associated with higher levels of economic growth (Berry & Glaeser, 2005; Faggian & McCann, 2006).

When local opportunities are insufficient, spatial flexibility (migrating for employment reasons or accepting a daily commute to a job at a distance) can benefit

graduates entering the labor market. Jobseekers are able to achieve better matches by extending their search radius beyond the local labor market (Van Ham, 2001). Migration and commuting are thus not only important for individual outcomes, but also for the functioning of the labor market as a whole (Haas & Osland, 2014; Zabel, 2012). Indeed, young workers and especially higher education graduates have long been known to be more mobile, both spatially (Venhorst, Van Dijk, & Van Wissen, 2011) and in terms of employment (Topel & Ward, 1992).

The decision to migrate or commute is tied to both regional and personal factors. Different theoretical frameworks and empirical approaches have been used to explain spatial mobility (Herzog Jr, Schlottmann, & Boehm, 1993; Venhorst & Cörvers, 2015). However, the general focus is on the effects of periods in and moves between certain locations on labor market outcomes (e.g. Ahlin, Andersson, & Thulin, 2014; van Ham, 2003; Venhorst et al., 2011). This approach ignores that mobility and local labor market circumstances may have different effects on labor market outcomes depending on their timing within the career start and their relation to other mobility. This paper uses sequence analysis to create ideal-typical spatial mobility histories and demonstrates how these typologies can uncover patterns that account for all states, and their relation to each other, in the period under study. This provides further insight into the effect of job access and spatial mobility on early career labor market outcomes. Moreover, it enables us to analyze timing within and simultaneousness of spatial mobility processes. The paper analyses whether job access at the start of the career influences how subsequent spatial mobility takes shape and to what extent effects of job access and spatial and job mobility on labor market outcomes differ, depending on spatial mobility trajectory.

The remainder of this paper is organized as follows. In the next section, the paper summarizes the relevant literature. Then, in Section 3, it presents the data and discusses the empirical strategy. Section 4 presents spatial mobility trajectories, followed by estimates of the influence of job access and various forms of mobility on wages. The final section discusses and concludes.

2. Literature

Jobs are increasingly more spatially concentrated than people, a phenomenon also known as spatial mismatch (Holzer, 1991; Kain, 1968). Access to jobs at the beginning of the career is an important determinant of early career success and career advancement throughout the life course (Van Ham, 2001; van Ham, 2003). Workers that live in areas that are spatially mismatched search less intensively for jobs, have longer unemployment spells, or are employed in lower quality jobs or jobs not matching their education (Détang-Dessendre & Gaigné, 2009; Gobillon, Selod, & Zenou, 2007; Hensen, de Vries, & Corvers, 2009). Finding and keeping suitable employment early in the career is important, because unemployment job mismatch and non-standard working arrangements hinder the accumulation of specific human capital, wage growth and are associated with lower levels of job security (Arulampalam, 2001; Kunze, 2002; Light & Ureta, 1995).

In neoclassical labor market theory, worker mobility balances regional labor markets as deficits in one region are supplemented by surpluses from another. However, in practice worker mobility is limited, thus limiting the effective size of labor markets and the extent to which imbalances can be equilibrated (Blau & Duncan, 1967; Phelps, 1969). For workers, the cost of covering distances between regional labor markets can be significant, both in monetary and psychological terms. In this sense, spatial mobility is a means for jobseekers to extend their reach onto other labor markets. Mobile workers are often compensated or rewarded for their effort by earning higher wages and tend to migrate to labor markets with better opportunities, higher economic growth and lower levels of unemployment (Herzog Jr et al., 1993). This implies that the decision to be mobile is a personal consideration of costs and benefits. Hence it is not surprising that young individuals with high levels of human capital (for instance, recent graduates of higher education) are known to be especially mobile (Faggian & Mccann, 2009; Venhorst & Cörvers, 2015; Venhorst et al., 2011). Both the costs of staying in an inferior location and benefits of moving toward a more opportunity-rich location are higher, and young individuals have more time to change the costs of a move into the benefits of a better job (Sjaastad, 1962). Furthermore, recent graduates have relatively weak ties to the place where they have studied, which makes them more prone to be mobile (Fischer & Malmberg, 2001).

Several studies have linked job access, spatial mobility and (early) career success; we discuss a number of studies regarding The Netherlands. Van Ham (2003) finds that job access at the start of the career is related to higher occupational status and that the effect of job access increases with age. He hypothesizes that access to jobs at the start of the career gives jobseekers a head start over other workers, so that they accumulate human capital more rapidly through job mobility. Accepting a job at a distance from the residence is also related to higher occupational achievement, indicating that spatial mobility is beneficial for careers. In a study among Dutch graduates, Hensen et al. (2009) find that spatial mobility leads

to a better matching and higher quality job. Venhorst & Cörvers (2015) find positive returns of spatial mobility on wages, but note that this effect disappears after controlling for self-selection. This indicates that it is the higher human capital individuals who are spatially mobile and that this is driven by necessity (no suitable job opportunities nearby).

An alternative literature stresses the importance of considering migration and commuting as alternatives or substitutes (e.g. Eliasson, Lindgren, & Westerlund, 2003; Reitsma & Vergoossen, 1988). For instance, women often earn lower wages or have to balance work and family roles, making them generally less likely to commute long distances (Clark, Huang, & Withers, 2003). Home-owners on the other hand lack the spatial flexibility to migrate and therefore may have longer daily commutes (van Ham & Hooimeijer, 2009) and dual-earner households show a preference for rural regions that provide access to multiple urban labor markets within commuting distance (Green, 1997). Furthermore, for some commuting may precede migration, whilst for others this may be the other way around (Haas & Osland, 2014). The reciprocal relation between migration and commuting has long been acknowledged (e.g. Hanson & Pratt, 1988; van Ommeren, Rietveld, & Nijkamp, 1997), whilst from the previous it is apparent that timing and order are important characteristics of spatial mobility decision-making processes.

Currently, the literature lacks an approach to spatial mobility that accounts for order, simultaneousness and timing of migration and commuting. Spatial mobility is often included as an "ever mobile" variable in models, conceptualized as mobility probability or simply included as the distance between two locations, for instance place of residence and workplace (e.g. Faggian, Corcoran, & McCann, 2013). However, the decision to be spatially mobile and the form it takes – migration or commuting– will be related with personal factors and local opportunities, but also with previous mobility choices and changes in other life course domains, for instance housing and family careers (cf. Mulder & Hooimeijer, 1999). Hence, we conceptualize spatial mobility as a process that unfolds in time. Sequence analysis, a combination of methods that allows to study trajectories as wholes instead of focusing on durations, risks and transitions, has been proposed as a way to extend our knowledge of such processes (Aisenbrey & Fasang, 2010).

Studies using sequence analysis to uncover career patterns are manifold (see Dlouhy & Biemann (2015) for an extensive chronological overview). Most early studies were descriptive – in the sense that creating and analyzing the typology was the main goal of the study (e.g. Abbott & Hrycak, 1990; Halpin & Chan, 1998). Later studies had a more comparative approach and related the trajectories to hypotheses stemming from the literature. For instance, Brzinsky-Fay (2007) attempts to find grounds for a theoretical typology by comparing school-to-work transition trajectories in European countries and Schoon et al. (2001) compare two birth cohorts to identify differences in the extent and direction of changes in school-to-work transitions. A number of studies use the trajectories in further analysis, in order to identify how trajectories are related to other factors. Anyadike-Danes & McVicar (2005) relate observable background characteristics of

young men at birth, age 10 and age 16 to the likelihood of following a certain career trajectory in order to identify factors that predict negative career pathways. They find educational achievement and school disciplinary record at age 16, health and learning progress at age 10 and region of birth to be the strongest predictors of career paths. Biemann et al. (2012) use a panel, spanning 20 years of employment data, to distinguish six career patterns that deviate from the traditional career path of employment within a single firm. They then use multinomial logistic regression to relate individual characteristics and occupational sector at the start of the career to the probability of having one of the 'new' career patterns. They find that women, young, singles and higher educated more often have career patterns that deviate from the traditional path. Kovalenko & Mortelmans (2014) confront two juxtaposing theories about the effect of 'transitional' career patterns on objective and subjective career success. After constructing a career typology through sequence analysis, they relate the career trajectories to objective (wage and home-ownership) and subjective (satisfaction and disappointment) measures of career success. They find that neither of the competing theories is able to completely explain career outcomes, but that a synthesis of the two perspectives would provide an understanding that better matches the outcomes observed in their study.

Application of the methodology on socio-spatial phenomena has been limited and to our knowledge, sequence analysis has not been used to create and analyze spatial mobility trajectories. Coulter & Van Ham (2013) analyze sequences of moving desire and behavior and distinguish between eight types of mobility biographies. The use of sequence data highlights the importance of heterogeneity in experiences. Although for some respondents moves are followed by (desire for) more mobility, for others it does not. Furthermore, it stresses the importance of adopting a life course approach when studying mobility biographies as the results suggest that the impact of states on personal well-being are better understood in a broader context.

Taken together, the previous indicates that a sequence approach to spatial mobility during labor market entry can be of value for our understanding of the manner in which job access and various forms of spatial mobility interact to influence early career labor market success.

Data & Methods

Data and sample

The study draws on longitudinally linked registry micro-data, provided by Centraal Bureau voor de Statistiek (CBS; Statistics Netherlands). The micro-data files contain information on labor market states, jobs (size and type of contract, sector, location, wage), education and personal and household characteristics (such as place of residence) of all inhabitants of the Netherlands for the period 2006-2013. Job accessibility was calculated at level of five digit postal codes (PC5) using the LISA dataset, a database of business establishments. As there are 32,000 PC5 areas in The Netherlands, this is a highly detailed spatial resolution. ESRI's 2008 StreetMap Premium road network dataset was used to calculate travel times for the GIS network analysis.

Our sample consists of all graduates of tertiary education and was refined to ensure that the selected persons have comparable career experience and did not leave education only for a very brief time. First, we selected all individuals between 20 and 30 years old that obtained a tertiary degree in the period May – August 2006 and were registered in the data as having the state 'Student' for at least five months between January and September 2006. The selection was then refined by excluding all graduates that were registered as 'Student' anytime between October 2006 and January 2007. We also exclude graduates from the sample who have missing values for labor market states, home locations or job information (when employed) during the period under study. It was unfeasible to exclude all graduates with missing job locations at any moment in the period under study, due to the way the job location is registered[1], as this would reduce our sample by 25 per cent. The final selection thus includes all graduates for whom we have complete information on labor market states, home locations and educational achievement, resulting in a sample of 13,621 graduates.

[1] Job locations are only available for jobs that exist in the month December of a certain year. Originally, this meant that only about 17 per cent of all job-months had locational information. We imputed the locations of jobs based on a number of criteria. First, we checked whether a job had a known location in the previous year. If so, that location was used as the location of the job. Then, we checked if more than 80 per cent of all workers in a firm worked in one location in a given year. If so, that location was used as the location of the job. This raised the number of job-months with known locational information to 73 per cent.

Analytical approach

Our analysis consists of three parts; network analysis using a GIS to calculate job access at the career start, sequence analysis to define ideal-typical spatial mobility histories, and regression modeling to estimate the effect of job access and personal factors on spatial mobility trajectories and of mobility and access on labor market success (measured as hourly wage).

First, the number of full-time jobs and working age population were aggregated at the PC5 level and then geocoded. We calculate job access as an index that takes the following basic form:

$$A_i = \sum_j \frac{\varphi J_{ji}}{\sum_k \varphi P_{kj}} \quad (1)$$

Where A_i is the job access index of a location i, J_{ji} the number of full-time jobs in locations j within reach of location i and P_{kj} the working age population in locations k that is able to reach job location j. The term φ is a factor that controls for declining commuting tolerance as distance increases (i.e. as commuting time increases, less people are willing to travel to a certain location) by only counting the number of jobs and population within reach for a certain percentage, see table 1. In a final step, we normalize the resulting access indexes by the (working population) weighted average of job access in The Netherlands, thus centering mean job access around 1.

Table 1. Commuting tolerance boundaries, reflecting the percentage of working persons traveling a certain amount of time to reach their job. Source: SCP (2007), own calculations.

Travel time (minutes)	%
< 15	100
15 – 30	71
30 – 45	38
45 – 60	18
60 – 75	10
75 – 90	5

Figure 1, below, shows that job access is not spread evenly across the country. Although peripheral regions have, generally, the lowest access to jobs, there are also areas close to central locations such as Amsterdam that have low levels of access. Corridors of higher access can be discerned around important highways, whilst peripheral locations have low levels of access. We have no access to detailed employment information in neighboring areas but did minimize border effects by also including the road network in Germany and Belgium. Since cross-

border mobility is still limited, we are certain that our results are not distorted too much by this limitation. Although the colleges and universities at which they studied are mostly located in the larger cities of the Netherlands which are often located in areas with high levels of access, 65% of all graduates start their careers in areas that have an access index in the range of 0.75–1.25; this range corresponds to approximately 1 standard deviation around the mean (see table A1 in the appendix for more sample statistics by level of access).

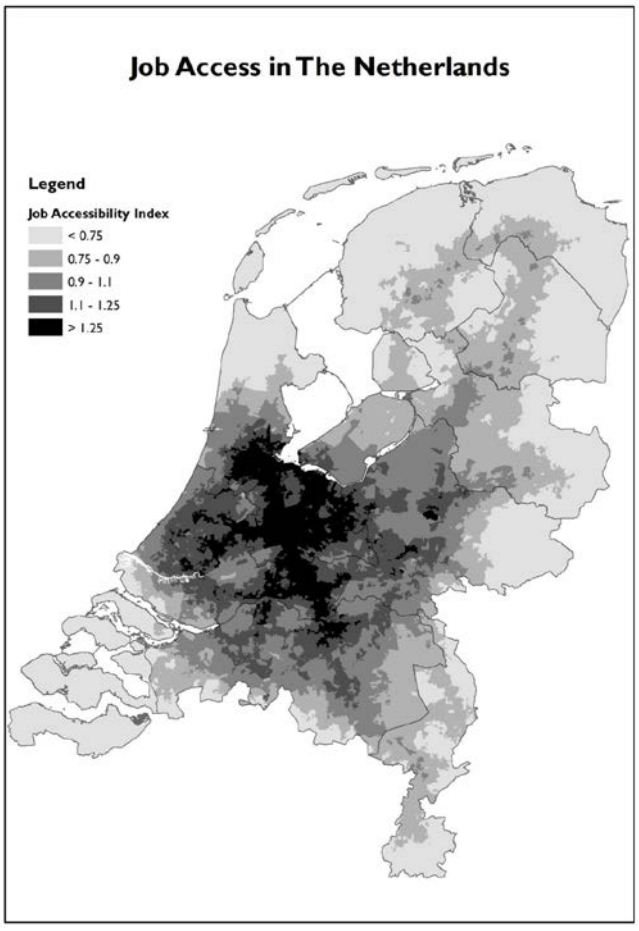


Fig. 1: Job access in The Netherlands, 2006. Source: own calculations.

We then use sequence analysis to create spatial mobility trajectories. Sequence analysis roughly consists of three steps: defining the sequence, measuring dissimilarity between sequences and grouping similar sequences together. For our analy-

sis of spatial mobility histories, we follow the graduates during the first five years of their careers, plus an additional half year (from April – September 2006) to account for potential pre-graduation mobility. For migration, we consider the number of moves across provincial borders (max. 6 during the period under study). For commuting, we use two levels of commuting (Short <= 30 min. and Long: > 30 min.), and two types of missing (Not employed and No data).

Both sequences were analyzed in R using TraMineR and WeightedCluster (Gabadinho, Ritschard, Müller, & Studer, 2011; Studer, 2013). We use OM_future as proposed in (Studer & Ritschard, 2016) to calculate the dissimilarity matrices, because it weighs the dissimilarity by the probability of ending up in a certain state. To test the sensitivity of our results to the chosen distance costs and algorithm, we also calculate dissimilarities using the optimal matching algorithm and both weighted (based on theoretical similarity of states, indel costs of 1.5) and unweighted costs (substitution costs of 2, indel costs of 1.5). The dissimilarities were clustered using Ward's (1963) clustering algorithm, which was shown to produce the best results for dissimilarity matrices (Dlouhy & Biemann, 2015). Although, according to the average silhouette width (Kaufman & Rousseeuw, 2005), a solution of two to three clusters would be preferred. However, these solutions only distinguish between the number of migrations across provincial borders (no migration, migration and, in the three cluster solution, multiple migration). We decide on using the six-cluster solution, as it also explains the dissimilarity matrix quite well and shows a trajectory that is defined by commuting.

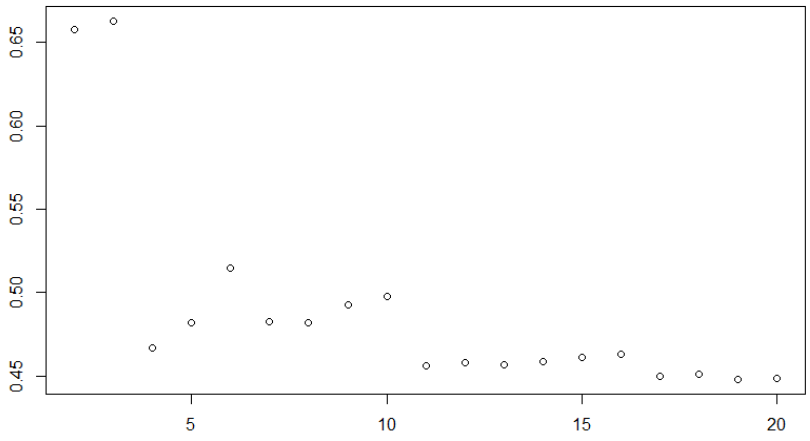
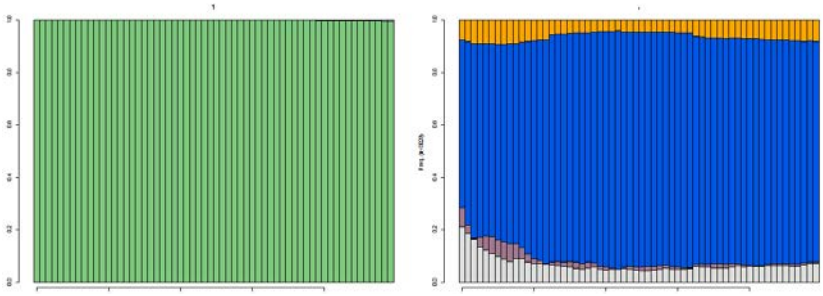


Fig. 2: Average silhouette width, by number of clusters. Source: CBS, own calculations.

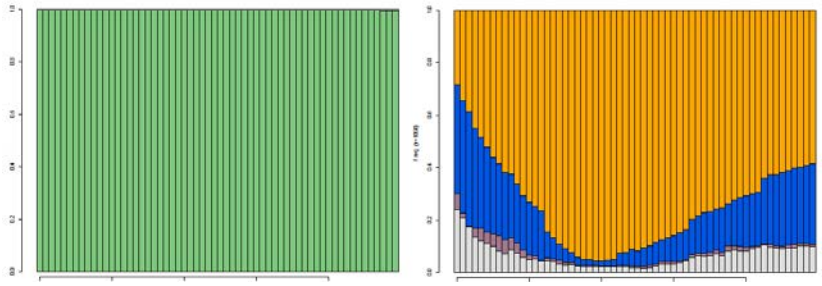
Results

Spatial mobility histories of higher education graduates

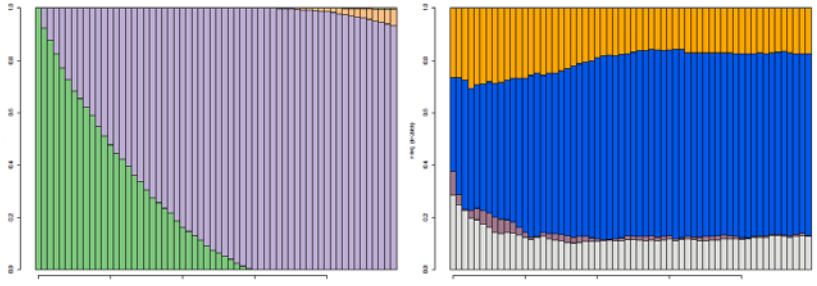
The trajectories resulting from our combined analysis of migration and commuting histories are presented below in figure 3a-f. The left panel of each graph describes the number of moves across provincial borders in the first five years after graduating, the right panel the commuting decisions during the same period.



a.



b.



c.

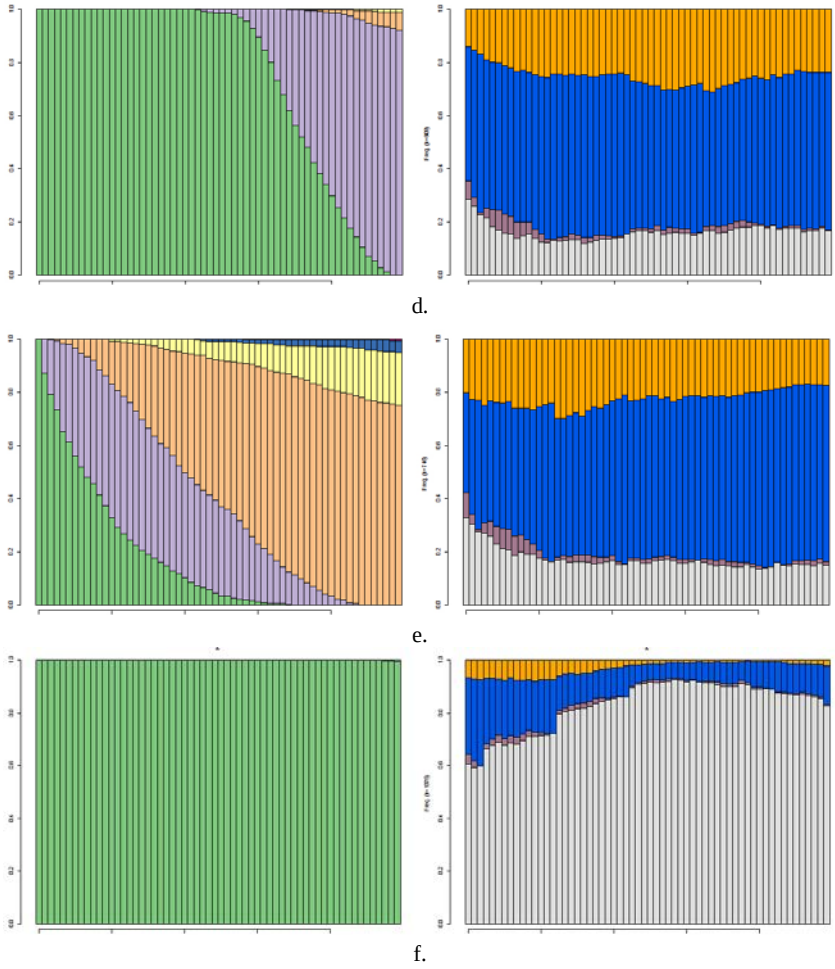


Fig. 3 a-f: Proportional transversal state distributions (x = time in months, y = cumulative state proportion), by trajectory. Left: migration across provincial borders; right: daily commuting distance. Source: CBS, own calculations.

The trajectory in figure 3a corresponds to the spatial mobility histories of approximately 60% of all graduates and is characterized by immobility. At any point in time, at most ten percent of all graduates are making long distance commutes to their job and moves across provincial borders are very rare and happen only in the last year, if at all. Graduates in the second trajectory (fig. 3b) are willing to commute long distances between home and the workplace, whilst moves across provincial borders happen rarely, if at all. At any moment in time, from one year after

graduating onwards, 75% of all currently working graduates in this trajectory travel more than thirty minutes during a single commute. The trajectories in figure 3c and 3d are best characterized by their differences in timing. In both trajectories, commuting is only a temporary phenomenon, and a single move is made, sometimes followed by a very late second move. In the third trajectory (fig. 3c), the move happens earlier (within the first two years after graduating) than in the fourth trajectory (fig. 3d). Graduates in the fifth trajectory (fig. 3e) make several moves, and the second move follows the first move very quickly (usually within 18 months). Finally, graduates in the sixth trajectory (fig. 3f) are distinguished more by their labor market states than their spatial mobility choices. This group, a little under ten percent of the total sample, is not employed during the most part of the period under study. This does not mean that the group is homogeneous or that their careers are by definition unsuccessful (e.g. many of the graduates in this trajectory become self-employed). Since this trajectory is best defined by our lack of information on the graduates in it, we will not further discuss the graduates in this trajectory in the remainder of this paper.

Table 2. Percentage of graduates per spatial mobility trajectory, by education level and field and level of job access, October 2006. Source: CBS, LISA; own calculations.

		Mobile				
	Immobile	Commuter	Early	Late	Multiple	Other
Education level						
> College (BSc)	61.9	9.6	7.5	6.9	3.3	10.8
> University (BSc)	50.6	6.3	10.2	6.6	6.3	20.1
> University (MSc)	53.8	10.9	13.1	10.6	5.6	6.0
Education field						
> Teaching	75.2	4.8	5.7	6.5	2.2	5.6
> Agriculture	46.0	15.3	13.7	10.9	5.9	8.2
> Natural sciences	59.1	12.3	8.0	8.0	5.2	7.4
> Engineering	56.5	13.1	9.7	7.3	3.6	9.8
> Healthcare	62.1	9.4	9.8	8.9	4.1	5.7
> Economics	58.9	11.6	9.4	8.4	5.1	6.6
> Law	55.6	6.9	16.4	11.1	6.2	3.7
> Behavioral & social	64.9	9.8	8.7	7.6	3.1	5.8
> Language & arts	39.5	6.4	10.0	8.0	4.6	31.4
Access						
> Low (< 0.75)	57.8	13.1	10.3	7.3	4.6	7.0
> Medium (0.75-1.25)	56.9	10.5	10.5	9.3	4.5	8.4
> High (>= 1.25)	60.7	7.9	8.4	7.9	3.7	11.5
Total	**59.0**	**9.9**	**9.4**	**8.1**	**4.1**	**9.5**

13

The propensity to have a particular trajectory differs by job accessibility and both level and field of education, as is shown in Table 2 (above). For instance, the percentage of university graduates that have an immobility trajectory is lower than the percentage of college graduates with the same trajectory. Sector of studies also is related to the propensity to be mobile and the specific type of mobility. Those with teaching backgrounds are the least mobile, the commuter trajectory is more common among those with backgrounds in agriculture and those with law degrees are more likely to move quickly after graduation. Interestingly, low levels of access seem related to higher percentages of those with a commuting trajectory, which may seem counterintuitive. However, this can at least partly be explained by the fact that jobs that are more than 30 minutes away are discounted for a large part in the accessibility measure. Long commutes are necessary to reach these jobs, which is why lower levels of job access may be related to a higher propensity to commute. Figure 4 confirms that commuters have job access levels slightly below the average. It also depicts that, on average, graduates who move across provincial borders do so in the direction of locations with higher levels of job accessibility. Interestingly, it seems that this is only a characteristic of the first move; further moves do not further increase average levels of job access, as depicted in the graph for the fifth trajectory (the multiple movers).

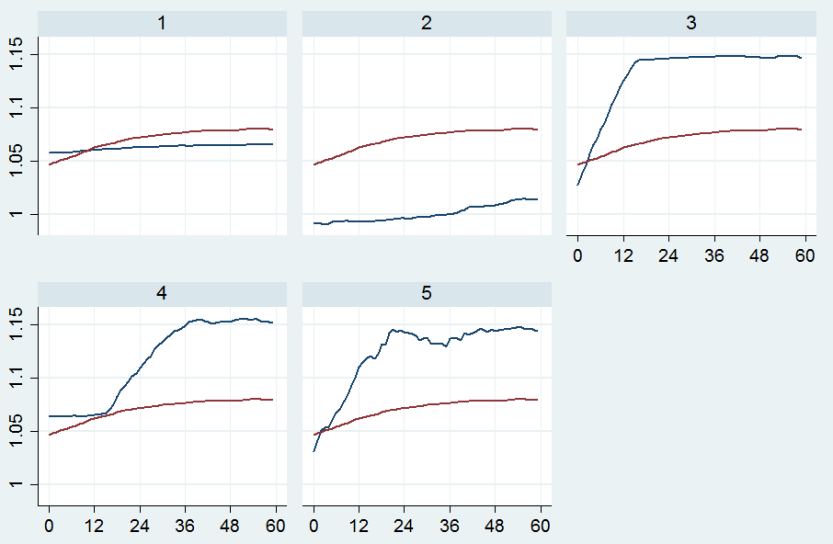


Fig. 4: Average versus trajectory levels of job access, in time (x = time in months, y = job access index), by trajectory. Red: average level of access in sample; Blue: level of access for graduates with trajectory. Source: CBS, LISA; own calculations.

Job access, spatial mobility and early career success

We use multinomial logistic regression to analyze how, net of other factors, level of job access and individual and education characteristics relate to the probability of following one of the spatial mobility trajectories. We test whether the trajectories can be seen as independent from each other, by executing the Small-Hsiao test of the IIA assumption and Wald tests for combining alternatives. Both indicate that the trajectories are suitable to be used as a dependent variable in multinomial logit analysis. Table 3 presents the average marginal effects derived from this model. Marginal effects have the benefit of allowing more straightforward interpretation of the effect of covariates on the probability of having a particular spatial mobility trajectory. In the case of categorical covariates, they are interpreted as the effect of a discrete change with respect to the base level. For job access and age, the only continuous variables in our model, the interpretation is as the effect of a one unit increase on the probability of belonging to a trajectory. We stress that since we cannot control for many factors, among which ability and ambition, the results should be interpreted carefully and in terms of association, not causation.

Although, in fact, a one unit increase (± 4 standard deviations) in job accessibility is very improbable, a ten percentage point higher level of access is related to a 2 percent higher probability of belonging to the immobility trajectory. This is reflected in particular in a negative correlation with the probability to become a commuter. University graduates are, indeed, more mobile than college graduates, although this relationship may be moderated by field of study as the differences between fields of study in their associations with trajectories are sometimes stronger than those between levels of education. For instance, a behavioral and social sciences college graduate has a higher probability to become a commuter than a university teaching graduate.

Although previous literature found higher propensities for women to be spatially mobile (e.g. Venhorst et al., 2011), we find a negative association with the probability of having the commuter trajectory and no statistically significant relationship with any of the three mobile trajectories. As expected, singles have a lower probability to be immobile, compared to graduates in other household situations. However, graduates with partners or still living with their parents seem more willing to accept a commute in order to bridge the distance between home and the workplace. The associations with other personal factors are small, if significant at all.

Table 3. Multinomial logistic regression results, average marginal effects; dependent variable: spatial mobility trajectory.

		Mobile			
	Immobile	Commuter	Early	Late	Multiple
Job access	.197***	-.101***	-.072***	.014	-.038***
Education level					
> College (BSc)	ref.	ref.	ref.	ref.	ref.
> University (BSc)	-.017	-.026	.021	-.006	.028*
> University (MSc)	-.101***	.022***	.032***	.031***	.015***
Education field					
> Teaching	.06***	-.057***	-.012	.009	.000
> Agriculture	-.171***	.050***	.057***	.039**	.025**
> Natural sciences	-.009	.013	-.022	-.003	.021*
> Engineering	-.05***	.02*	.017*	.005	.008
> Healthcare	-.059***	-.003	.023*	.024**	.015*
> Economics	-.074***	.009	.02**	.02**	.027***
> Law	-.047**	-.038***	.046***	.015	.024**
> Behavioral & social	ref.	ref.	ref.	ref.	ref.
> Language & arts	-.097***	-.001	.034***	.037***	.026***
Gender					
> female	.04***	-.033***	.001	-.004	-.004
Age	-.001	-.001	.006***	-.001	-.002**
Origin					
> Dutch	ref.	ref.	ref.	ref.	ref.
> Western	-.032*	.014	.005	-.004	.017*
> non-Western	.026	.004	-.023**	.002	-.009
Household status					
> single	ref.	ref.	ref.	ref.	ref.
> couple	.132***	.027***	-.091***	-.009	-.028***
> with parents	.123***	.021***	-.075***	-.015**	-.053***
> other	.076***	.017	-.064***	.007	-.036***
High earning parents	-.027***	-.002	.009	.011**	.008*
Chi^2 (df = 120)	1592.6***				
N (individuals)	11,839				

Figures 5 and 6 provide a naive idea of the effect of mobility trajectories on labor market outcomes. In figure 5, the percentage of graduates that are employed in 'normal' working arrangements (full-time or part-time jobs with fixed weekly hours) are depicted as deviations from the average. Overall, commuters have the highest levels of employment, but this may well be due to how commuters are defined (i.e. to be a commuter, one has to be employed). For the early movers, this percentage is decreasing over the course of the study period. Interestingly, the decreaese seems to set in just before or around the time of the first move, twelve months into the study period. In figure 6, the same is done for wages. The steepest slope can be found among the graduates who move multiple times during the study period. Over the course of five years, they go from earning around or slightly below the average towards around € 200,- more than average. The wages of those in the immobility trajectory lag in comparison.

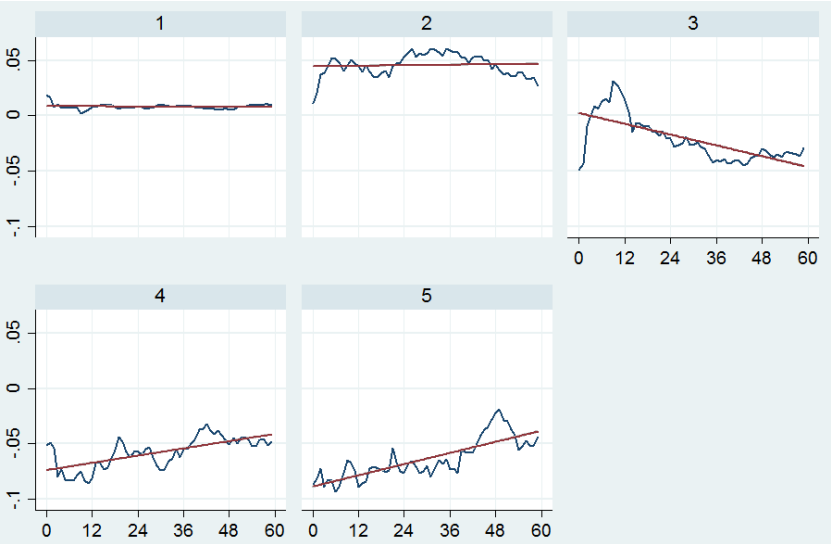


Fig. 5: Percentage in employment as deviations from the average, over time (x = time in months, y = deviation in percentage employed), by trajectory. Blue: deviation; Red: trend line. Source: CBS, own calculations.

17

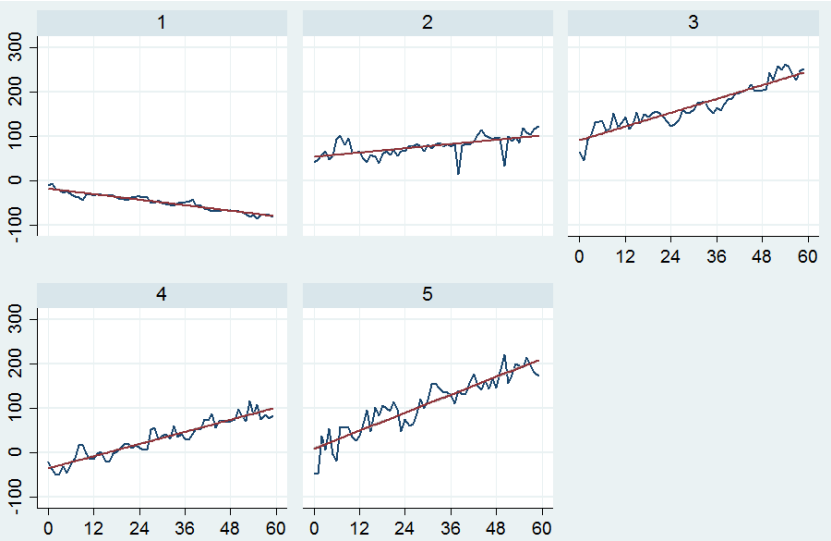


Fig. 6: Wage levels as deviations from the average, over time (x = time in months, y = deviation in hourly wage), by trajectory. Blue: deviation; Red: trend line. Source: CBS, own calculations.

Of course, these effects may be as much or more due to personal factors explaining the selection into specific trajectories as to the trajectory self. To further probe the effect of job access and spatial mobility on labor market outcomes, we employ a fixed effects regression model. A fixed effects regression model eliminates estimate bias due to time invariant factors at the individual level by only explaining within-person differences in the dependent variable by within-person changes in independent variables. In this model, we regress (log of) hourly wage in October 2006-2013 on job access, spatial and job mobility, tenure in full-time (> 35 hours), part-time (20-35 hours) and non-standard (< 20 or flexible hours) employment. We also control for job and firm characteristics[2] and include regional dummies. Table 4, on the next page, presents the results.

[2] Job characteristics: type of contract (permanent, temporary, other), job size (full-time, part-time, small)

Firm characteristics: firm size (very small, small, medium, large, very large), firm broad sector, dummy: firm location unknown

Table 4. Fixed effects regression results; dependent variable: (log of) hourly wage.

			Mobile			
	All	Immobile	Commuter	Early	Late	Multiple
Job access	.059***	.044**	.023	.113***	.04	.132***
Mobility						
> move	.032***	.009	.015	.052***	.045***	.048***
> + job change	.013*	.003	.008	.053***	.02	.011
> commute	.015***	-.004	.06***	.016***	.019**	.008
Job change	.028***	.032***	.016***	.012***	.027***	.021***
Tenure						
> full-time	.076***	.074***	.082***	.082***	.072***	.081***
> part-time	.051***	.051***	.061***	.048***	.043***	.034***
> non-standard	.053***	.054***	.06***	.049***	.038***	.034***
Controls						
> region	Y	Y	Y	Y	Y	Y
> job	Y	Y	Y	Y	Y	Y
> firm	Y	Y	Y	Y	Y	Y
R^2 (within)	.455	.518	.431	.518	.546	.474
N (obs)	88247	58460	9876	8738	7442	3731
N (individuals)	12291	8032	1355	1261	1090	553

In the first column, the results for all graduates are presented. Job access, spatial and employment mobility are all positively associated with wage level. The results show that living in areas with a ten percentage points higher job access level is associated with a 0.6% higher wage. The wage premium of a move across provincial borders (3.2%) is generally higher than that of long distance commuting (1.5%). Switching jobs can also be instrumental to career advancement (there is an associated wage gain of 2.8 %) and full-time jobs have higher hourly wages than part-time or non-standard employment.

However, we also find that the size of these effects can be quite different depending on spatial mobility trajectory. For those in the immobile trajectory, tenure effects are generally lower than for those in mobile trajectories, suggesting that they acquire less specific human capital in their jobs than graduates that are spatially mobile. However, the effects of job switching are more pronounced, which implies that some are able to achieve upward mobility by switching to other firms in their vicinity. For commuters, the effect of commuting is much higher than it is for other graduates and they also have high tenure premiums, whilst the benefit of switching jobs is relatively low. This may indicate that commuters are able to achieve good matches on the labor market relatively quickly and are aware of the value of their current position. Early movers have a high wage premium associated with a long distance move, especially when it is combined with taking up or switching jobs. The direction of the move is of importance too as there is a rela-

tively strong association with job accessibility. On average, early movers gain little over .15 points on the job access index during their first move, this leads to a wage premium between 1.5 and 2 %. For many late movers, the move may in the end be related to other life factors (e.g. family formation), since they are in many respects more similar to the immobile than to early movers. For late movers, there is no wage premium associated with higher levels of job access and the effect of tenure is also low. Finally, the association between job access and wage is strongest for multiple movers.

Conclusion

This paper analyses how access to jobs at the start of the career influences the spatial mobility choices of graduates of higher education in The Netherlands. Although the reciprocal relationship between migration and commuting has been noted in previous research, this study is among the first to construct comprehensive trajectories based on migration and commuting histories. This paper focuses on a homogeneous group that is often considered highly mobile. Graduates of higher education embody high levels of human capital and suitable job opportunities are generally spread thin across the country. Graduates in areas with lower job accessibility thus can use spatial mobility as an instrument toward gaining a better job or accessing more advantageous labor markets.

Our study highlights a number of issues. First, although higher education graduates are usually depicted as highly mobile, only 35% is mobile during the first 5 years after graduating from college and only 15% is highly mobile (migrating several times or commuting long distances). This may not seem surprising and related to the study setting, as the Netherlands is a dense country and distances are relatively short. However, this is also reflected in our states: the average province is smaller than 3,000 km^2 and a thirty minute commute is considered short in many countries.

Second, access to jobs is negatively associated with spatial mobility and positively associated with early career success. Graduates in areas with better access to jobs are especially less likely to commute or migrate early. Graduates that live in areas with better access earn higher wages. This effect is stronger for graduates that move early or often than for immobile graduates. A statistically significant effect of access to jobs could not be found for late movers and commuters.

Finally, our study indicates that outcomes of mobility (in terms of wages) are heterogeneous toward the type and timing of mobility. Failure to account for different types of mobility and their timing may underestimate the effect of mobility on labor market outcomes. These results show that distinguishing between type and timing of mobility can be helpful in determining the value of mobility for graduates of higher education entering the labor market.

References

Abbott, A., & Hrycak, A. (1990). Measuring Resemblances in Sequence Data: An Optimal Matching ANalysis of Musicians' Careers. *American Journal of Sociology*, *96*(1), 144–185. http://doi.org/10.1086/229495

Ahlin, L., Andersson, M., & Thulin, P. (2014). Market Thickness and the Early Labour Market Career of University Graduates: An Urban Advantage? *Spatial Economic Analysis*, *9*(4), 396–419. http://doi.org/10.1080/17421772.2014.961534

Aisenbrey, S., & Fasang, A. E. (2010). New Life for Old Ideas: The "Second Wave" of Sequence Analysis Bringing the "Course" Back Into the Life Course. *Sociological Methods & Research*, *38*(3), 420–462. http://doi.org/10.1177/0049124109357532

Anyadike-Danes, M., & McVicar, D. (2005). You'll never walk alone: Childhood influences and male career path clusters. *European Association of Labour Economists 16th Annual Conference, Universidade Nova de Lisboa, Lisbon, 9th – 11th Sepetember, 2004*, *12*(4), 511–530. http://doi.org/http://dx.doi.org.proxy-ub.rug.nl/10.1016/j.labeco.2005.05.008

Arulampalam, W. (2001). Is Unemployment Really Scarring? Effects of Unemployment Experiences on Wages. *The Economic Journal*, *111*(475), 585–606. http://doi.org/10.1111/1468-0297.00664

Berry, C. R., & Glaeser, E. L. (2005). The divergence of human capital levels across cities. *Papers in Regional Science*, *84*(3), 407–444. http://doi.org/10.1111/j.1435-5957.2005.00047.x

Biemann, T., Zacher, H., & Feldman, D. C. (2012). Career patterns: A twenty-year panel study. *Journal of Vocational Behavior*, *81*(2), 159–170. http://doi.org/10.1016/j.jvb.2012.06.003

Blau, P. M., & Duncan, O. D. (1967). *The American Occupational Structure*. *The American Occupational Structure*. http://doi.org/10.2307/2092400

Brzinsky-Fay, C. (2007). Lost in Transition? Labour Market Entry Sequences of School Leavers in Europe. *European Sociological Review*, *23*(4), 409–422. http://doi.org/10.1093/esr/jcm011

Clark, W. A. V, Huang, Y. Q., & Withers, S. (2003). Does commuting distance matter? Commuting tolerance and residential change. *Regional Science and Urban Economics*, *33*(2), 199–221. http://doi.org/10.1016/S0166-0462(02)00012-1

Coulter, R., & van Ham, M. (2013). Following People Through Time: An Analysis of Individual Residential Mobility Biographies. *Housing Studies*, *28*(7), 1037–1055. http://doi.org/10.1080/02673037.2013.783903

Détang-Dessendre, C., & Gaigné, C. (2009). Unemployment duration, city size, and the tightness of the labor market. *Regional Science and Urban Economics*, *39*(3), 266–276. http://doi.org/http://dx.doi.org/10.1016/j.regsciurbeco.2009.01.003

Dlouhy, K., & Biemann, T. (2015). Optimal Matching Analysis in Career Research: A Review and Some Best-Practice Recommendations. *Journal of Vocational Behavior*, *90*(0), 163–173. http://doi.org/10.1016/j.jvb.2015.04.005

Eliasson, K., Lindgren, U., & Westerlund, O. (2003). Geographical Labour Mobility: Migration or Commuting? *Regional Studies*, *37*(8), 827–837. http://doi.org/10.1080/0034340032000128749

Faggian, A., Corcoran, J., & McCann, P. (2013). Modelling geographical graduate job search using circular statistics. *Papers in Regional Science*, *92*(2), 329–343. http://doi.org/10.1111/pirs.12026

Faggian, A., & McCann, P. (2006). Human capital flows and regional knowledge assets: A simultaneous equation approach. *Oxford Economic Papers*, *58*(3), 475–500. http://doi.org/10.1093/oep/gpl010

Faggian, A., & Mccann, P. (2009). Universities, agglomerations and graduate human capital mobility. *Tijdschrift Voor Economische En Sociale Geografie*. http://doi.org/10.1111/j.1467-9663.2009.00530.x

Fischer, P. A., & Malmberg, G. (2001). Settled people don't move: On life course and (Im-) mobility in Sweden. *International Journal of Population Geography*, *7*(5), 357–371. http://doi.org/10.1002/ijpg.230

Gabadinho, A., Ritschard, G., Müller, N. S., & Studer, M. (2011). Analyzing and Visualizing State Sequences in R with TraMineR. *Journal of Statistical Software*, *40*(4), 1–37. http://doi.org/10.18637/jss.v040.i04

Gobillon, L., Selod, H., & Zenou, Y. (2007). The Mechanisms of Spatial Mismatch. *Urban Studies*, *44*(12), 2401–2427. http://doi.org/10.1080/00420980701540937

Green, A. E. (1997). A question of compromise? Case study evidence on the location and mobility strategies of dual career households. *Regional Studies*, *31*(7), 641–657. http://doi.org/10.1080/00343409750130731

Haas, A., & Osland, L. (2014). Commuting, Migration, Housing and Labour Markets: Complex Interactions. *Urban Studies*, *51*(3), 463–476. http://doi.org/10.1177/0042098013498285

Halpin, B., & Chan, T. W. (1998). Class careers as sequences: An optimal matching analysis of work-life histories. *European Sociological Review*, *14*(2), 111–130.

Hanson, S., & Pratt, G. (1988). Reconceptualizing the Links between Home and Work in Urban Geography. *Economic Geography*, *64*(4), 299–321.

Hensen, M. M., de Vries, M. R., & Corvers, F. (2009). The role of geographic mobility in reducing education-job mismatches in the Netherlands. *Papers in Regional Science*, *88*(3), 667–682. http://doi.org/10.1111/j.1435-5957.2008.00189.x

Herzog Jr, H., Schlottmann, A., & Boehm, T. (1993). Migration as spatial job–search: a survey of empirical findings. *Regional Studies*, *27*(4), 327–340. http://doi.org/10.1080/00343409312331347595

Holzer, H. J. (1991). The Spatial Mismatch Hypothesis: What Has the Evidence

Shown? *Urban Studies*, *28*(1), 105–122. http://doi.org/10.1080/00420989120080071

Kain, J. F. (1968). Housing Segregation, Negro Employment, and Metropolitan Decentralization. *The Quarterly Journal of Economics*, *82*(2), 175. http://doi.org/10.2307/1885893

Kaufman, L., & Rousseeuw, P. J. (2005). *Finding Groups in Data: An Introduction to Cluster Analysis (Wiley Series in Probability and Statistics)*. *eepe.ethz.ch*.

Kovalenko, M., & Mortelmans, D. (2014). Does career type matter? Outcomes in traditional and transitional career patterns. *Journal of Vocational Behavior*, *85*(2), 238–249. http://doi.org/10.1016/j.jvb.2014.07.003

Kunze, A. (2002). *The Timing of Careers and Human Capital Depreciation*. *IZA Discussion Paper Series*. Retrieved from http://hdl.handle.net/10419/21432\nNutzungsbedingungen:

Light, A., & Ureta, M. (1995). Early-Career Work Experience and Gender Wage Differentials. *Journal of Labor Economics*, *13*(1), 121. http://doi.org/10.1086/298370

Mulder, C., & Hooimeijer, P. (1999). Residential Relocations in the Life Course. *Population Issues*, 159–186. http://doi.org/10.1007/978-94-011-4389-9_6

OECD. (2012). *OECD Economic Surveys: Netherlands 2012*. Paris.

Phelps, E. S. (1969). Introduction: The new microeconomics in employment and inflation theory. In E. S. Phelps (Ed.), *Microeconomic foundations of employment and inflation theory* (pp. 1–26). New York: Norton.

Reitsma, R. F., & Vergoossen, D. (1988). A causal typology of migration: the role of commuting. *Regional Studies*, *22*(4), 331–340. http://doi.org/10.1080/00343408812331345010

Schoon, I., McCulloch, A., Joshi, H. E., Wiggins, R. D., & Bynner, J. (2001). Transitions from school to work in a changing social context. *Young*, *9*(1), 4–22. http://doi.org/10.1177/110330880100900102

Sjaastad, L. A. (1962). The Costs and Returns of Human Migration. *Journal of Political EconomyJournal of Political Economy*, *70*(5), 80–93.

Studer, M. (2013). *WeightedCluster Library Manual: A Practical Guide to Creating Typologies of Trajectories in the Social Sciences with R* (LIVES Working Papers No. 24).

Studer, M., & Ritschard, G. (2016). What matters in differences between life trajectories: a comparative review of sequence dissimilarity measures. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *179*(2), 481–511. http://doi.org/10.1111/rssa.12125

Topel, R. H., & Ward, M. P. (1992). Job Mobility and the Careers of Young Men. *The Quarterly Journal of Economics*, *107*(2), 439–479. http://doi.org/10.2307/2118478

Van Ham, M. (2001). Workplace mobility and occupational achievement. *International Journal of Population Geography*, *7*(4), 295–306. http://doi.org/10.1002/ijpg.225

van Ham, M. (2003). Job access at labour market entry and occupational achievement in the life course. *International Journal of Population Geography*, *9*(5), 387–398. http://doi.org/10.1002/ijpg.295

van Ham, M., & Hooimeijer, P. (2009). Regional differences in spatial flexibility: Long commutes and job related migration intentions in The Netherlands. *Applied Spatial Analysis and Policy*, *2*, 129–146. http://doi.org/10.1007/s12061-008-9016-2

van Ommeren, J., Rietveld, P., & Nijkamp, P. (1997). Commuting: In Search of Jobs and Residences. *Journal of Urban Economics*, *42*(3), 402–421. http://doi.org/http://dx.doi.org/10.1006/juec.1996.2029

Venhorst, V. A., & Cörvers, F. (2015). Entry into working life: Spatial mobility and the job match quality of higher-educated graduates. Retrieved from http://pub.maastrichtuniversity.nl/974bb512-71c2-4a5a-a897-d1e265d50bd5

Venhorst, V. A., Van Dijk, J., & Van Wissen, L. (2011). An analysis of trends in spatial mobility of Dutch graduates. *Spatial Economic Analysis*, *6*(1), 57–82. http://doi.org/10.1080/17421772.2010.540033

Ward, J. H. J. (1963). Hierarchical Grouping to Optimize an Objective Function. *Journal of the American Statistical Association*, *58*(301), 236–244.

Zabel, J. E. (2012). Migration, Housing Market, and Labor Market Responses to Employment Shocks. *Journal of Urban Economics*, *72*(2-3), 267–284. http://doi.org/10.1016/j.jue.2012.05.006

Sample statistics

Table A1. Sample statistics, October 2006. Source: CBS, own calculations.

		Access		
	Total	Low (< 0.75)	Medium	High (>= 1.25)
Education level				
> College (BSc)	0.65	0.74	0.67	0.52
> University (BSc)	0.03	0.02	0.02	0.04
> University (MSc)	0.33	0.24	0.31	0.44
Education field				
> Teaching	0.11	0.16	0.11	0.06
> Agriculture	0.04	0.04	0.05	0.02
> Natural sciences	0.02	0.01	0.02	0.05
> Engineering	0.15	0.19	0.15	0.10
> Healthcare	0.07	0.07	0.07	0.07
> Economics	0.25	0.27	0.25	0.22
> Law	0.04	0.03	0.04	0.06
> Behavioral & social	0.21	0.17	0.20	0.24
> Language & arts	0.11	0.05	0.10	0.19
Gender				
> female	0.60	0.55	0.59	0.63
Age	23.99	23.67	23.92	24.44
Origin				
> Dutch	0.83	0.90	0.83	0.79
> Western	0.09	0.06	0.08	0.11
> non-Western	0.08	0.04	0.09	0.10
Household status				
> single	0.30	0.18	0.28	0.44
> couple	0.26	0.23	0.26	0.26
> with parents	0.40	0.56	0.42	0.23
> other	0.04	0.02	0.04	0.07
High earning parents	0.31	0.27	0.31	0.35
N	**13,621**	**1,916**	**8,859**	**2,846**
%	100	0.14	0.65	0.21