The role of geographic mobility in reducing education-job mismatches in the Netherlands[*]

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Abstract. In this paper we investigate the relationship between geographic mobility and education-job mismatch in the Netherlands. We focus on the role of geographic mobility in reducing the probability of graduates working (i) jobs below their education level; (ii) jobs outside their study field; (iii) part-time jobs; (iv) flexible jobs; or (v) jobs paid below the wage expected at the beginning of the career. For this purpose we use data on secondary and higher vocational education graduates in the period 1996–2001. We show that graduates who are mobile have higher probability of finding jobs at the acquired education level than those who are not. Moreover, mobile graduates have higher probability of finding full-time or permanent jobs. This suggests that mobility is sought to prevent not only having to take a job below the acquired education level, but also other education-job mismatches; graduates are spatially flexible particularly to ensure full-time jobs.

1 Introduction

The allocation of workers across jobs is rarely optimal due to labour market failures. Discrepancies between labour supply and demand can lead to unemployment or unfilled vacancies. However, to avoid unemployment, workers may also alter their job search behaviour and accept jobs that do not match their acquired skills (Wieling and Borghans 2001) or are less favourable than others (Kalleberg et al. 2000; McGovern et al. 2004). A considerable amount of research

has been done to explain education-job mismatches, particularly with respect to workers' education attainment level relative to job level (Clogg and Shockey 1984; Tsang and Levin 1985; Sicherman 1991; Battu et al. 1999; Borghans and De Grip 2000; Rubb 2003; Green and McIntosh 2007). In addition, various studies have related the probability of finding a suitable job with mobility behaviour (Frank 1978; Mincer 1978; Van Ham 2002; Büchel and Van Ham 2003; Gobillon et al. 2007). Regions differ in labour supply and demand, making it easier to find a job at the acquired level in some regions than others.[1] Thus, it is plausible that jobseekers have higher probability of finding suitable jobs if their geographic search area is enlarged.

In this paper we investigate graduates' education-job mismatches in view of geographic mobility. The central aim is to determine the extent to which more mobile graduates have better education-job matches than those who are less mobile. We focus on the following mismatches: jobs below the acquired education level, jobs outside the study field, flexible or part-time jobs, or jobs paid below the average wage when controlled for by other mismatches. Our analysis adds a potentially useful dimension to understanding graduates' job-search behaviour by examining the role of geographic mobility in avoiding education-job mismatches. For this purpose, we use data from large-scale surveys held annually from 1996 to 2001 among Dutch secondary and higher vocational education graduates. The analysis is conducted at a disaggregated spatial level to incorporate regional differences in graduate behaviour.

We show that, in general, the probability of education-job mismatch decreases if graduates are geographically mobile. It appears that more mobile graduates have higher probability of finding jobs at the acquired education level as well as permanent or full-time jobs than those who are less mobile. This suggests that graduates are willing to be more mobile to ensure that their job matches their education level and is permanent or full time. Furthermore, the relationship between geographic mobility and education-job mismatch differs for graduates with different education levels.

The next section provides background information on labour market mismatch, explores the extent to which it has been examined in economic literature, and sets out our main hypothesis. Section 3 discusses the data used in our empirical analyses, while section 4 provides the results. Our conclusions are presented in section 5.

2 Background and hypothesis

The match between education and job level has become an important issue for researchers given the increased education level of the workforce in the Netherlands (and other countries). While an upgrading of occupational level took place at the same time, this has not matched the educational expansion (Huijgen 1989; Asselberghs et al. 1998; Wolbers et al. 2001). As a consequence, more employees have had to accept jobs below their acquired education level; this phenomenon is known as overeducation.[2] Empirical results show that part-time (mostly female) and young graduates in particular are overeducated.

However, other education-job mismatch also occurs, such as people having jobs outside their study field or being engaged in nonstandard employment forms (part-time or temporary jobs). Research in this area has paid little attention to the match between study field and occupation (Witte and Kalleberg 1995; Van de Werfhorst 2001; Wolbers 2003), although Wolbers (2003)

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[1] Regions also differ in the distribution of schools and fields of education. This effect, however, is not incorporated in the analysis. The relevance of educational institutions' accessibility for higher education choice has been analyzed by Sa et al. (2006).
[2] See Groot and Maassen van den Brink (2000) and Rubb (2003) for an overview of overeducation literature. See Dolton and Vignoles (2000) and Battu et al. (1999) for two studies on overeducation among graduates who enter the labour market.

investigated the determinants of such mismatch and the resulting labour market effects. The results showed that lower educated and less occupation-specific trained graduates in particular experience mismatch between study field and current job. In addition, graduates with mismatched study fields and jobs have higher probability of being employed in lower-status jobs.

Since the early 1980s, the Dutch labour market has become increasingly flexible (Visser and Hemerijck 1997; Schippers and Steijn 1999). The advantage of this is that employers may offer nonstandard contracts for temporary, on-call or part-time jobs; it also contributes to the fight against youth unemployment, which has since decreased steadily. At the same time, the number of workers with nonstandard contracts has risen (Muffels et al. 1999; De Beer 2001; Remery et al. 2002; Goudswaard 2003). Nonstandard jobs are often seen as less favourable than regular employment contracts (Kalleberg et al. 2000; McGovern et al. 2004) in terms of, for example, security, career prospects, salary development and training possibilities.

In addition, job search theory was introduced in the 1960s (Stigler 1961) and has since become popular among economists as a tool for understanding the labour market (Lippman and McCall 1976; Devine and Kiefer 1991). In general, it states that jobseekers have a critical (reservation) wage: the lowest wage level at which they are willing to accept an offer. Research related to job search theory mainly focuses on differences in the wages of job offers, with the exception of studies by Blau (1991); Van den Berg and Gorter (1997); and Rouwendal (1999). For instance, Blau introduced a more general search model based on wages and work hours; the results show that a significant proportion of job offers would be mistakenly predicted to be accepted or rejected under the restrictions implied by the reservation wage assumption. This study thus emphasizes the importance of nonwage job characteristics in understanding job-search behaviour.

The literature on education-job mismatch and search models can be related to the (spatial) mismatch hypothesis (Kain 1968; Holzer 1991), which argues that labour market outcomes such as unemployment for specific groups to some extent result from increasing spatial separation between place of residence and job. Restricted spatial flexibility thus enhances labour market mismatch. However, according to Büchel and Van Ham (2003), surprisingly little attention has been paid to the spatial aspects of overeducation. They suggest that most people only look for jobs on the local (regional) labour market. But regional labour markets differ in labour demand and supply; for jobseekers, the probability of finding a suitable job increases by broadening the search to the global market. Van Ham (2002) and Büchel and Van Ham (2003) show that workers' mobility decisions affect the probability of overeducation, while Büchel and Van Ham (2003) demonstrate that spatially flexible workers in Germany have reduced risk of overeducation. Those who have car access or increase their commuting time, for example, are less frequently overeducated.

However, jobseekers may receive several job offers with different job characteristics. The decision to accept a job is based on the combination of these characteristics. It may therefore be useful to investigate the extent to which characteristics other than the job level are influenced by mobility decisions. In this paper we expand the set of education-job mismatches to five: jobs below the education level, jobs outside the study field, flexible or part-time jobs, or those paid below the expected wage level. We determine the extent to which geographic mobility reduces each education-job mismatch. This analysis contributes to a better understanding of graduates' job-search behaviour and the role of geographic mobility in avoiding education-job mismatch.

In addition, we examine the relationship between geographic mobility and education-job mismatch for graduates at different education levels. Jobs for the highly educated are often only available in specific areas, whereas jobs for the lower educated exist almost everywhere (Blau and Duncan 1967; Greenwell and Bengtson 1997). As a consequence, higher educated graduates must broaden their search areas more often than lower educated graduates. We therefore expect job-search behaviour to vary between graduates with different education levels.

In this paper we make certain assumptions about graduates' job-search behaviour. First, the job's desirability depends on five dimensions in terms of match: (i) education level; (ii) study field; (iii) contract type; (iv) number of working hours; and (v) expected wage level. According to human capital theory, the accumulation of competences through education can be a human capital investment with certain labour market value (Becker 1964), and individuals strive to fully utilize this investment. Graduates with jobs below their education level run the risk of not being able to sufficiently utilize their acquired skills; therefore, we assume that graduates search for jobs matching their education level. Graduates with jobs outside their study field also cannot fully utilize their acquired skills, especially those from vocational education. We thus assume that graduates search for jobs that match their study field.[3] In addition, returns on human capital investments are maximized in full-time jobs (Blau 1991), and best assured in 'secure' jobs (Van Ophem 1991). We therefore assume that graduates search for permanent and full-time jobs. Finally, with respect to the average wage that graduates can expect given the other education-job mismatches, we assume that graduates search for jobs which pay at least the market wage.

Apart from these characteristics related to the quality of the match, graduates also desire jobs near their place of residence; they dislike commuting or migrating for jobs (see e.g. Van Ommeren and Rietveld 2007). The graduates in our study are paid employees and have already made the decision as to the trade-off between all possible combinations of job characteristics and geographic mobility.

In light of the above assumptions, we hypothesize that geographically mobile graduates have higher probability of reducing the education-job mismatch compared to those who are less mobile. With this, we assume geographic mobility to positively influence graduates' labour market positions. However, one may debate how far a positive relationship between geographic mobility and labour market position is an effect of the former or latter. For instance, more motivated graduates are likely to attain better labour market positions and are also more geographically mobile. However, commuting or migrating can be costly and is only worthwhile if the returns are sufficiently high. As mentioned above, graduates consider the trade-off between all possible combinations of job characteristics; this includes the cost of commuting or migrating. Geographic mobility, therefore, does not cause better labour market positions, but is an instrument that leads to it (see Van Ham 2001).

Earlier research has also found geographic mobility to positively influence workers' labour market positions (Rouwendal 1999; Van Ham 2001; Büchel and Battu 2003; Büchel and Van Ham 2003). For example, Van Ham's (2001) use of longitudinal data on job changes shows that workers who accept jobs farther away experience more career advancement than those who accept jobs closer to their place of residence.

3 Data

We use data from two large-scale graduate surveys held annually in the Netherlands by the Research Centre for Education and the Labour Market (ROA): RUBS (Registration of Outflow and Destination of Graduates) and the HBO-Monitor. RUBS participants are graduates of pre-secondary vocational (VMBO), upper general secondary (HAVO), pre-university (VWO) and secondary vocational (MBO, or BOL/BBL) education; HBO-Monitor participants are higher vocational education (HBO) graduates. The surveys take place 18 months after graduation and focus on aspects of the education-to-work transition, such as the nature of the

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[3] However, the interpretation of mismatch between study field and current job is less clear than that between education and job level. It seems that in this period, an increasing proportion of graduates worked outside their occupational domain. This does not point to a worsening labour market position *per se*, but may be due to the rising importance of general competences (Van Eijs and Ramaekers 2002).

employment contract (flexible, part-time) and job characteristics (required education level, study field and wages). We use those conducted between 1996 and 2001, which refer to the 1994/1995 to 1999/2000 graduate cohorts, and have selected graduates in paid employment.[4] To minimize the effects of other mobility decisions our selection is restricted to graduates between the ages of 16 and 30 who participated in full-time education.[5] Graduates from upper general secondary (HAVO) and pre-university (VWO) education are excluded because their number entering the labour market is too low. A sample of 83,355 graduates remained.

Geographic mobility is measured as follows: The RUBS and HBO-Monitor contain information about the municipal location of education; respondents were further asked to indicate the location of their current job. Geographic mobility is measured as the straight line distance[6] between these two locations (in kilometres).[7] By using the municipalities' x and y co-ordinates (eastern/western longitude), the Euclidean distance between the education and the current job locations can easily by determined by a simple equation. Four categories are established (0–10 km, 11–30 km, 31–70 km and more than 70 km), referring to the difference between commuting and migrating. Graduates with jobs less than 30 km from their place of residence can commute. Those who live more than 30 km away, however, may have to migrate; a residential move such as this is far more costly than commuting.

To measure the match between education level and current job, we used an employee self-rating method in which respondents were asked to indicate the education level required by the employer. By comparing this to the graduates' acquired education levels, a division is made between (1) graduates with jobs at or above the acquired education level; and (2) graduates with jobs below this level. Respondents were also asked to indicate the study field required for the job using the following response categories: (i) exclusively my own field; (ii) my own or a related field; (iii) a completely different field; and (iv) no particular field. To measure the match between study field and current job, a division is made between: (1) graduates with jobs within their own field, i.e., categories (i) and (ii); and (2) graduates with jobs outside their field, i.e., categories (iii) and (iv).

Next, we distinguish between graduates with flexible and permanent jobs. Flexible jobs consist of on-call or temporary employment, often arranged via employment agencies, with no prospect of a permanent contract. Permanent jobs encompass all those that, in principle, are long lasting. Finally, we distinguish between graduates with part-time (less then 32 hours per week) and full-time jobs.

We use information on respondents' gross monthly wages to estimate the relationship between remaining mismatches (i.e. those not mentioned above) and geographic mobility. Since a relatively low wage can indicate education-job mismatch, we distinguish between jobs paid above and below the average wage level for all graduates. It is worth noting, however, that the education-job mismatches mentioned above do in fact also relate to wages. Empirical

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[4] As no information is available about education-job mismatches and mobility of unemployed graduates, this group is excluded from the sample.

[5] Graduates can also be spatially flexible for family formation. 96% of the graduates in our data set are between the ages of 16 and 30.

[6] The straight line distance undercuts the road network distance (see e.g. Love and Morris, 1979). Further research is required to determine the extent of this in the Netherlands and to correct for measurement errors (see also Rodriguez-Bachiller 1983). Moreover, if the education and work municipalities are identical, the distance ('self distance') is set to zero. We do not consider this a problem, since the smallest category of geographic mobility is 0–10 km. For most graduates who work in the municipality in which they graduated, it is unlikely that geographic mobility is larger than 10 km given that the average surface area of Dutch municipalities (excluding water surface) was 61.4 km^2 in 1998.

[7] We assume that the place of residence is close to the education location. Many Dutch students from secondary and higher vocational education live near their schools. Although higher vocational education students have higher commuting tolerance than secondary students, they also more often live in lodgings close to the education location. Thus the measurement error in the distance between residence and school may differ for different groups of students, which may bias the results to some extent. However, note that in our analysis the distance has been indicated by distinguishing between four broad categories of geographic mobility.

analyses show that individuals with jobs corresponding to their education level have higher wages than those with jobs below their education (Allen and Van der Velden 2001), and those working standard jobs earn more than those with nonstandard jobs (Kalleberg et al. 2000, McGovern et al. 2004). Therefore, the graduates' wages were first predicted using a regression model with the four job-match variables (match between education and job, match between study field and job, contract and number of working hours) as independent variables. The predicted wage in fact equalled the average wage of all graduates controlled for the four education-job mismatches of the relevant graduate. Next, we determined whether graduates have jobs paid below or above this 'average' wage. A mismatch is indicated if the graduate's wage is below average.

To control for differences between graduates, we included their age, gender, ethnicity, education level and study field in the mismatch equations. Age is measured in years. Gender refers to the differences in labour market behaviour between men and women. Ethnicity is based on the distinction between native and immigrant graduates. An immigrant is either born abroad and has at least one parent born abroad, or has both parents born abroad. We distinguish between four education levels: pre-secondary (VMBO), lower secondary (BOL/BBL level 1/2), and upper secondary vocational education (BOL/BBL level 3/4), and vocational college (HBO). With respect to study field, we distinguish between eight categories: general, agriculture, education, engineering, economics, healthcare, behaviour/society and language/culture.

To incorporate regional differences in labour supply and demand, regional labour market characteristics are considered in the mismatch equations. To distinguish between regions in the Netherlands, we used the 18 RBA (*Regionaal Bestuur voor de Arbeidsvoorziening*; Regional Council for Labour Supply) areas, which refer to the location of the graduates' education. Regional unemployment rates and job density are also included in the analysis, with data derived from the 1996–2001 Labour Force Surveys (EBB) carried out annually by Statistics Netherlands (CBS). The yearly unemployment rate and job density is determined for each RBA area. Next, regional unemployment rates are divided into three categories: low (2–4%), middle (5–6%), and high (7–12%). Job density is determined by the regional labour force per square kilometre; we expect a better education-job match for graduates in regions with high job density given that more suitable jobs are available there (see also Van Ham et al. 2001). Table 1 shows the distribution of variables mentioned above.

4 Results

4.1 Empirical variable descriptives

Table 2 shows the average geographic mobility and five education-job mismatches for all variables used in the empirical analysis. On average, the distance between education and job is 28 kilometres for graduates in the Netherlands. This distance appears relatively large for graduates in the northern Netherlands (RBA areas Groningen and Friesland). This is to be expected, as in the north fewer suitable jobs are available within a certain distance than in other areas. Contrarily, for graduates in the western Netherlands (especially in the RBA areas Rijnmond, Zuidelijk Noord-Holland and Rijnstreek) the distance between education and job is minor. Table 2 also shows that the distance is greater for men and natives than for women and immigrants. As expected, for vocational college graduates the distance is relatively large (40 km), while for lower educated graduates, especially those from pre-secondary vocational education, it is just 13 km. Finally, for agriculture the distance between education and job location is larger than for graduates from other study fields.

Table 1. Distribution of variables used in the analysis

	%		%
Job matching the level of education	71	*Mobility*	
Job matching the study field	70	Between 0–10 km	36
Permanent job	83	Between 11–30 km	33
Full-time job	74	Between 31–70 km	20
Job paid above expected wage	57	More than 70 km	10
Age[a]	22.5 (2.8)	*RBA region*	
Gender		Groningen	3
Male	49	Friesland	4
Female	51	Drenthe	2
Ethnicity		IJssel-Vecht/Twente	11
Native	95	IJssel/Veluwe	1
Immigrant	5	Arnhem/Oost-Gelderland/Rivierenland	8
Level of education		Flevoland	1
Pre-secondary	10	Midden-Nederland	10
Lower secondary	15	Noord-Holland Noord	2
Upper secondary	37	Zuidelijk Noord-Holland	12
Higher vocational	39	Rijnstreek	2
Field of education		Haaglanden	3
General	1	Rijnmond	9
Agriculture	4	Zeeland	5
Education	6	Midden and West Brabant	10
Engineering	30	Noordoost Brabant	3
Economics	33	Zuidoost Brabant	6
Health care	15	Limburg	9
Behaviour/society	10	Job density (*100)[a]	260 (164)
Art/language/culture	2	Regional unemployment rate[a]	4.9 (1.9)
		N	83,355

Note: [a] Mean (standard deviation) instead of percentage.

4.2 Binary logit analysis results

We used logit analyses to determine the role of geographic mobility in reducing education-job mismatches. To this end, five education-job mismatches are analysed separately: jobs (i) at or below the acquired education level; (ii) within or outside the study field; (iii) with permanent or flexible contracts; (iv) with full- or part-time contracts; and (v) paid below or above the average wage controlled for the previous mismatches. Tables 3a and 3b show the results of these five logit analyses.

As we expected, more mobile graduates appear to have higher probability of permanent or full-time jobs at the acquired education level. In addition, Table 3b demonstrates that more mobile graduates have higher probability of jobs paid above the average wage. This means that – given the job's education level, study field, contract type and number of working hours – more mobile graduates earn more than those who are less mobile. However, geographic mobility negatively impacts the probability of finding a job within one's study field. As mentioned above, the interpretation of mismatches between study field and current job is less clear than those between education and job level.

Furthermore, mobility's effect on the probability of permanent or full-time jobs appears much greater than its effect on the probability of jobs at the acquired education level. This suggests that graduates specifically incorporate job security and the number of working hours into their mobility decisions; a result which highlights the importance of characteristics other than job level in explaining job-search behaviour.

Table 2. Average geographic mobility and five education-job mismatches by personal and labour market characteristics

	Mobility km	Job matching the level of education %	Job matching the field of study %	Permanent job %	Full-time job %	Job paid above 'average'[a] %
Total	28	71	70	83	74	57
RBA area						
Groningen	45	72	70	73	65	57
Friesland	48	68	64	72	70	55
Drenthe	32	64	57	81	69	44
IJssel-Vecht/Twente	39	71	74	85	74	59
IJssel/Veluwe	42	71	56	81	79	72
Arnhem/Oost-Gelderland/ Rivierenland	30	74	76	80	69	67
Flevoland	29	67	61	71	51	36
Midden-Nederland	22	74	69	83	73	55
Noord-Holland Noord	19	73	63	85	67	39
Rijnmond	18	74	69	84	77	65
Zuidelijk Noord-Holland	17	69	67	83	80	25
Rijnstreek	13	70	58	86	52	88
Haaglanden	29	79	72	87	86	54
Zeeland	36	64	72	86	72	49
Midden and West Brabant	25	67	73	85	78	55
Noordoost Brabant	24	75	71	86	80	59
Zuidoost Brabant	29	78	79	86	82	73
Limburg	29	69	69	81	75	45
Gender						
Male	29	72	71	86	84	61
Female	26	70	70	80	65	54
Ethnicity						
Native	28	71	71	83	75	57
Immigrant	19	70	59	76	72	55
Level of education						
Pre-secondary vocational	13	75	52	83	47	7
Lower secondary vocational	19	49	57	81	71	33
Upper secondary vocational	22	70	72	82	76	43
Higher vocational	40	79	78	84	81	89
Field of education						
General	12	77	–	81	29	16
Agriculture	41	65	65	80	79	58
Education	33	87	86	81	70	88
Engineering	28	72	76	87	86	57
Economics	27	69	60	81	83	53
Health care	23	71	76	83	52	44
Behaviour/society	26	69	75	76	48	69
Art/language/culture	32	72	73	80	65	86
Unemployment level						
Low	27	69	70	87	73	62
Middle	29	73	70	82	76	57
High	29	71	71	74	77	46
Job density						
Low	38	66	68	79	69	48
Middle	31	72	72	84	75	57
High	21	72	69	83	75	60

Notes: [a] Average wage controlled for the other four education-job mismatches. – = not applicable.

Table 3a. Relationship between mobility and education-job mismatches: results of five separate binary logistic regressions[a]

	Probability of a job at one's level of education		Probability of a job inside one's study field	
	Coefficient	S.E.	Coefficient	S.E.
Constant	−0.436**	0.148	0.883**	0.148
Age	0.053**	0.005	−0.008	0.005
Gender				
Male	ref	ref	ref	ref
Female	−0.106**	0.020	−0.057**	0.020
Ethnicity				
Native	ref	ref	ref	ref
Immigrant	0.104**	0.037	−0.238**	0.035
Level of education				
Pre-secondary vocational	0.230**	0.049	−1.493**	0.048
Lower secondary vocational	−1.113**	0.033	−0.979**	0.037
Upper secondary vocational	−0.259**	0.026	−0.309**	0.026
Higher vocational	ref	ref	ref	ref
Field of education				
General	0.139	0.130	–	–
Agriculture	−0.350**	0.041	0.212**	0.041
Education	0.657**	0.048	1.038**	0.047
Engineering	0.071**	0.023	0.923**	0.023
Economics	ref	ref	ref	ref
Health care	0.115**	0.026	0.899**	0.027
Behaviour/society	−0.261**	0.029	0.488**	0.030
Art/language/culture	−0.383**	0.055	0.367**	0.055
Regional unemployment rate				
Low	ref	ref	ref	ref
Middle	0.176**	0.023	0.037	0.023
High	0.199**	0.036	0.027	0.037
Job density	0.003**	0.000	0.000	0.001
Mobility				
Between 0–10 km	ref	ref	ref	ref
Between 11–30 km	−0.007	0.019	0.007	0.019
Between 31–70 km	0.020	0.023	−0.043	0.023
More than 70 km	0.067*	0.029	−0.141**	0.030
Pseudo R-square	0.079		0.106	
N	83,355		83,239	

Notes: [a] Logit effects are statistically controlled for RBA area (region of education). * $p < 0.05$: ** $p < 0.01$; ref = reference group; – = not applicable.

    Moreover, Tables 3a and 3b show that the education-job match is better for men than women. Male graduates more often have jobs at the acquired education level, within their study field, with permanent and full-time contracts and higher than average wage. In addition, natives more often have jobs within their study field and permanent jobs than immigrants, but immigrants more often have jobs at the acquired education level. The education-job match is better for higher educated graduates, who more often have jobs within their study field, permanent and full-time jobs, and jobs paid above average. At the same time, the least qualified graduates more often have jobs at the acquired education level; this is because there are fewer jobs below their education level than there are for higher educated graduates.

    Labour market conditions also influence the education-job mismatch. High regional unemployment reduces the probability of finding a permanent job or one paid above average, but

Table 3b. Relationship between mobility and education-job mismatches: results of five separate binary logistic regressions[a]

	Probability of a permanent job		Probability of a full-time job		Probability of a job paid above 'average'[b]	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Constant	1.287**	0.175	1.139***	0.170	-6.167**	0.203
Age	0.009	0.006	0.028***	0.005	0.345**	0.007
Gender						
Male	ref	ref	ref	ref	ref	ref
Female	-0.267**	0.024	-0.469**	0.024	-0.546**	0.026
Ethnicity						
Native	ref	ref	ref	ref	ref	ref
Immigrant	-0.583**	0.040	0.011	0.041	0.030	0.047
Level of education						
Pre-secondary vocational	-0.398**	0.059	-2.258***	0.055	-3.124**	0.076
Lower secondary vocational	-0.448***	0.041	-1.215***	0.039	-2.015***	0.044
Upper secondary vocational	-0.217*	0.031	-0.298***	0.031	-1.692**	0.033
Higher vocational	ref		ref		ref	
Field of education						
General	-0.026	0.141	-0.780***	0.122	1.099**	0.172
Agriculture	-0.157***	0.049	-0.332***	0.051	-0.080	0.057
Education	-0.254***	0.045	-1.368***	0.042	0.292**	0.059
Engineering	0.287***	0.028	0.436**	0.031	0.202**	0.029
Economics	ref		ref		ref	
Health care	0.199***	0.031	-1.395***	0.028	0.119***	0.033
Behaviour/society	-0.374***	0.033	-2.069***	0.031	0.472**	0.038
Art/language/culture	-0.495***	0.063	-1.932***	0.057	-0.505**	0.077
Regional unemployment rate						
Low	ref		ref		ref	
Middle	-0.463**	0.027	0.102**	0.027	-0.936**	0.029
High	-0.858***	0.041	0.037	0.041	-1.617***	0.047
Job density	0.006***	0.001	0.001	0.001	0.013***	0.001
Mobility						
Between 0–10 km	ref		ref		ref	
Between 11–30 km	0.056*	0.023	0.175***	0.021	0.040	0.024
Between 31–70 km	0.114**	0.028	0.220***	0.026	0.186**	0.030
More than 70 km	0.211**	0.037	0.436***	0.037	0.264**	0.037
Pseudo R-square	0.064		0.280		0.537	
N	83,355		83,355		74,041	

Notes: [a] Logit effects are statistically controlled for RBA area (region of education). [b] Average wage controlled for the other four education-job mismatches. * $p < 0.05$: ** $p < 0.01$; ref = reference group.

increases that of finding full-time work or a job at one's own education level. Furthermore, in regions with high job density graduates more often have jobs at the acquired education level, permanent jobs or jobs paid above average.

It is possible however, that regional unemployment and job density implicitly influence graduates' mobility decisions. For example, higher unemployment could force graduates to become more mobile.[8] A two-step OLS procedure was thus undertaken, incorporating the regional unemployment rate and labour force size as instrumental variables for mobility. The results' patterns and significance, however, were similar to the previous results, and are therefore not shown here.

4.3 Binary logit analysis results by education level

What could cause the strong relationship between geographic mobility and full-time or permanent jobs? Selection of individuals could be one reason. As noted previously, we expect job search behaviour to vary between graduates with different education levels. To find suitable jobs, higher educated graduates have to be more geographically mobile than the lower educated. Therefore, we examine the role of geographic mobility in reducing education-job mismatches for graduates with different education levels. We performed the same five logit analyses as in section 4.2 separately for graduates from pre-secondary, lower secondary, upper secondary and higher vocational education. The effects of mobility are shown in Table 4, along with mobility per education level.

The results demonstrate that the role of geographic mobility in reducing education-job mismatches differs for graduates with varying education levels. The mobility behaviour of pre-secondary, lower secondary and upper secondary vocational education graduates appears to result in higher probability of full-time jobs. Very mobile graduates (>70 km) from lower and upper secondary vocational education are more likely to have permanent contracts, but their mobility does not increase the probability of jobs at the acquired education or within their own study field. Conversely, for graduates from higher vocational education, greater geographical mobility results not only in higher probability of permanent or full-time jobs, but also of jobs at the acquired education level. For these graduates the effect of mobility on the probability of jobs at the acquired education level, and permanent or full-time jobs is more or less equal; this does not hold, however, for the lower education levels.

Finally, Table 4 shows that higher mobility for graduates from lower and upper secondary education and higher vocational education is related to higher probability of jobs paid above the average wage. Only for graduates from pre-secondary vocational education is mobility related to higher probability of below-average pay.

4.4 Multinomial logit analysis results

In the previous analysis we investigated the role of geographic mobility in reducing education-job mismatches by addressing five equations separately. It appeared that higher mobility mainly results in higher probability of permanent or full-time jobs. However, jobseekers may prioritize different jobs with varying job characteristics. The decision to accept a job is based on the combination of these characteristics. Therefore, we also analyse the five job characteristics together. This leads to 32 possible combinations, ranging from total match to total mismatch.

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[8] See Coniglio and Prota (2008) for the main factors influencing migration among young and highly-educated graduates.

Table 4. Results of five separate binary logistic regressions for graduates with different levels of education[a]

	Distribution of mobility	Probability of a job matching the level of education	Probability of a job matching the study field	Probability of a permanent job	Probability of a full-time job	Probability of a job paid above 'average'[b]
Pre-secondary vocational education						
Mobility: 0–10 km	53	ref	ref	ref	ref	ref
11–30 km	36	0.236**	0.023	−0.212**	0.343**	−0.180
31–70 km	10	0.311**	−0.289**	0.260*	0.585***	−0.433*
>70 km	2	−0.636**	0.155	0.267	0.983**	−0.876
	100					
Lower secondary vocational education						
Mobility: 0–10 km	41	ref	ref	ref	ref	ref
11–30 km	39	0.006	−0.045	0.135*	0.284**	0.121*
31–70 km	16	−0.108	−0.110	0.030	0.334**	0.458***
>70 km	4	−0.146	−0.084	0.829**	0.712**	0.360**
	100					
Upper secondary vocational education						
Mobility: 0–10 km	41	ref	ref	ref	ref	ref
11–30 km	35	−0.077*	−0.074*	0.006	0.169*	0.061
31–70 km	17	−0.009	−0.056	0.080	0.259*	0.171**
>70 km	7	−0.007	−0.102	0.180**	0.543*	0.374**
	100					
Higher vocational education						
Mobility: 0–10 km	25	ref	ref	ref	ref	ref
11–30 km	29	0.009	0.182**	0.156*	0.079	0.020
31–70 km	27	0.083*	0.049	0.182*	0.066	0.106*
>70 km	18	0.158**	−0.099*	0.189*	0.165**	0.197**
	100					

Notes: [a] Logit effects are statistically controlled for age, gender, ethnicity, study field, RBA area (region of education), unemployment rate and job density. [b] Average wage controlled for the other four education-job mismatches. * $p < 0.05$: ** $p < 0.01$; ref = reference group.

Total match consists of a job at the acquired education level, inside one's own study field, permanent, full-time and paid above the average wage.

To examine this, we used multinomial logit analyses. As the estimates from the multinomial logit model are difficult to interpret, we report only the most important estimated coefficients. Table 5 displays the effects of geographic mobility on the 32 specific combinations of (mis)matches; it shows mobility's effects on the probability of particular combinations of job-match characteristics relative to the probability of total mismatch. This provides an indication of graduates' preferences about combinations of job characteristics, given that the risk of mismatched combinations reduces as spatial flexibility increases. The top of Table 5 presents the

Table 5. The relationship between mobility and 32 combinations of education-job (mis)matches: results of the multinomial logit regression[a]

Education-job (mis)matches					Mobility[c]			N = 70,910
Job matching the level of education	Job matching the study field	Job with a permanent contract	Full-time job	Job paid above 'average'[b]	11–30 km	31–70 km	>70 km	
					Coefficient	Coefficient	Coefficient	N
Yes	No	No	Yes	Yes	0.617**	0.814**	1.065**	3,005
Yes	Yes	No	Yes	Yes	0.392**	0.672**	1.031**	4,720
No	No	Yes	Yes	Yes	0.561**	0.666**	0.897**	2,576
Yes	Yes	No	No	Yes	0.234	0.404**	0.893**	852
No	No	No	Yes	Yes	0.333**	0.455**	0.865**	2,612
Yes	Yes	No	Yes	No	0.368**	0.449**	0.812**	607
Yes	Yes	Yes	Yes	Yes	0.414**	0.548**	0.764**	15,294
Yes	Yes	Yes	No	Yes	0.496**	0.538**	0.658**	2,121
No	Yes	No	Yes	Yes	0.602**	0.740**	0.613**	2,365
No	Yes	No	No	Yes	0.680**	0.281	0.579*	581
No	Yes	Yes	Yes	Yes	0.399**	0.379**	0.578**	11,586
Yes	Yes	No	No	No	0.042	0.251	0.576*	214
Yes	No	Yes	Yes	Yes	0.487**	0.434**	0.567**	3,600
Yes	No	No	No	Yes	0.421**	0.642**	0.555**	1,209
Yes	Yes	Yes	No	No	0.323**	0.469**	0.547**	1,066
No	Yes	No	Yes	No	0.439**	0.362**	0.528**	840
No	Yes	Yes	Yes	No	0.455**	0.451**	0.517**	3,471
Yes	No	Yes	No	Yes	0.439**	0.488**	0.508*	580
Yes	Yes	Yes	Yes	No	0.360**	0.485**	0.448**	4,588
No	No	Yes	No	Yes	0.483**	0.590**	0.453	291
Yes	No	Yes	No	No	0.575**	0.667**	0.419	315
Yes	No	No	Yes	No	0.232*	0.086	0.402*	1,027
No	Yes	Yes	No	Yes	0.336**	0.336**	0.357*	1,706
Yes	No	Yes	Yes	No	0.356**	0.415**	0.215	1,206
No	No	Yes	No	No	0.620**	0.340	0.171	162
No	No	No	No	Yes	0.223*	0.306*	0.158	743
Yes	No	No	No	No	−0.090	−0.395*	0.086	472
No	Yes	Yes	No	No	0.176	0.171	0.017	899
No	Yes	No	No	No	−0.360**	0.077	0.001	273
No	No	Yes	Yes	No	0.023	0.074	−0.027	799
No	No	No	Yes	No	–	–	–	0
No	No	No	No	No	ref	ref	ref	1,130

Notes: [a] Statistically controlled for age, gender, ethnicity, field of study, RBA area (region of education), level of education, unemployment rate and job density. [b] Average wages controlled for the other four education-job mismatches. [c] Reference = 0–10 km. * $p < 0.05$: ** $p < 0.01$; ref = reference group; – = not applicable.

combinations of job-match characteristics in descending order to the estimated effect for the most mobile graduates (>70 km). The smallest effects for the most mobile graduates appear at the bottom.

Table 5 shows total match for 15,294 graduates (22%). It appears that the probability of total match increases, the more mobile the graduate. For the most mobile graduates (>70 km), the odds of total match as opposed to total mismatch are 2.14 (= $e^{0.764}$) times larger than the corresponding odds for barely mobile (0–11 km). Moreover, we find the strongest relationship between mobility and the combination of full-time job, job at the acquired education level, and job paid above 'average' (respectively 11–30 km and 0.617; 31–70 km and 0.814; >70 km and 1.065). We also find a relatively strong relationship between mobility and the probability of a full-time job, combined with a job at the acquired education level, within the study field and paid above average, or with a permanent job paid above average. Therefore, we conclude that graduates specifically incorporate number of working hours into their mobility decisions.

5 Conclusion

In this paper we investigated the relationship between geographic mobility and education-job mismatch. We focused on graduates' mobility decisions combined with decisions on the following mismatches: (i) jobs below the acquired education level; (ii) jobs outside the study field; (iii) flexible jobs; (iv) part-time jobs; and (v) jobs paid below the average wage given the previous mismatches. We also analysed the impact of mobility on education-job mismatches for different groups of graduates. This paper thus attempts to supplement existing overeducation literature with an empirical evaluation of overeducation in relation to other education-job mismatches. Extending the graduates' choice set increases information about mobility decisions combined with education-job mismatches. We evaluated whether geographic mobility is likely to result in lower probability of such mismatches in view of individual background and regional labour market characteristics.

Our results show that geographically more mobile graduates have higher probability of finding jobs at the acquired education level, and permanent or full-time jobs (though the impact of mobility on the probability of a permanent or full-time job is much larger than that on the probability of a job at the acquired education level). In addition, given the job's education level, study field, contract type, and number of working hours, more mobile graduates have higher probability of jobs paid above average than those who are less mobile. However, geographic mobility is related to lower probability of finding a job within one's study field.

The relationship between geographic mobility and education-job mismatch differs for higher and lower educated graduates. For graduates from pre-, lower and upper secondary vocational education, mobility mainly results in higher probability of full-time jobs; yet it does not affect the likelihood of finding a job at the acquired education or within one's own study field. Only for higher vocational education graduates does greater mobility result in higher probability of jobs at the acquired education level. These results suggest that graduates not only try to avoid jobs below the acquired education level, but also prevent other education-job mismatches by incorporating them into their mobility decisions.

Finally, we analysed the five job characteristics together, and found a relatively strong relationship between mobility and the probability of a full-time job (combined with other education-job matches). We therefore conclude that graduates are spatially flexible particularly to ensure full-time jobs.

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El papel de la movilidad geográfica en la reducción del desequilibrio entre educación y puestos de trabajo en los Países Bajos

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Resumen. En este artículo investigamos la relación entre movilidad geográfica y desequilibrio entre educación y puesto de trabajo en los Países Bajos. Nos centramos en el papel de la movilidad geográfica en reducir la probabilidad de graduados trabajando en (i) trabajos por debajo de su nivel educativo; (ii) trabajos fuera de su campo de estudio; (iii) trabajos a tiempo parcial; (iv) trabajo flexible; o (v) trabajos pagados por debajo del salario esperado al principio de la carrera profesional. Con este propósito utilizamos datos de graduados de educación secundaria y superior vocacional durante el periodo 1996–2001. Mostramos que los graduados que tienen movilidad tienen una probabilidad más alta de encontrar trabajo del nivel educativo adquirido que aquellos que no la tienen. Además, los graduados con movilidad tienen mayor probabilidad de encontrar trabajo a tiempo completo o permanente. Esto sugiere que la movilidad se busca para prevenir no solo el tener que aceptar un trabajo por debajo del nivel educativo adquirido, sino también otros desequilibrios entre educación y puesto de trabajo; los graduados son flexibles espacialmente en particular para asegurarse trabajos a tiempo completo.

JEL classification: J61, J24

Palabras clave: Movilidad laboral geográfica, elección ocupacional, desequilibrios laborales

要旨： 本論文において我々は、オランダにおける地理的移動性と教育と職業のミスマッチとの関係を検証する。我々は、（i）教育レベルを下回る職業、（ii）研究分野と異なる職業、（iii）パートタイム・ジョブ、（iv）フレキシブル・ジョブ（有期雇用、派遣労働、契約労働等）、（v）就業開始時点で期待を下回る賃金の職業、これらに就業する卒業者の可能性を低下させる地理的移動性の役割に焦点を当てる。この目的のため、我々は、1996年から2001年の期間における中等及び高等職業教育を修了した卒業者のデータを用いる。我々は、移動性の高い卒業者はそうでない卒業者に比べ、習得した教育レベルに応じた職を見つける可能性が高いことを示す。さらに、移動性の高い卒業生はフルタイムまたは正社員職を見つける可能性がより高い。これは、習得教育レベルを下回る職業への就業を余儀なくされることのみならず、その他の教育と職業のミスマッチを回避するために、移動性が求められることを示唆している。卒業者は、とりわけ常勤職を確保するため、空間的に柔軟性がある。