

# Entry into working life: internal migration and the job match quality of higher-educated graduates

Citation for published version (APA):

Venhorst, V., & Cörvers, F. (2018). Entry into working life: internal migration and the job match quality of higher-educated graduates. *Journal of Regional Science*, 58(1), 116-140.  
<https://doi.org/10.1111/jors.12347>

## Document status and date:

Published: 01/01/2018

## DOI:

[10.1111/jors.12347](https://doi.org/10.1111/jors.12347)

## Document Version:

Publisher's PDF, also known as Version of record

## Document license:

Taverne

## Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

## General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

[www.umlib.nl/taverne-license](http://www.umlib.nl/taverne-license)

## Take down policy

If you believe that this document breaches copyright please contact us at:

[repository@maastrichtuniversity.nl](mailto:repository@maastrichtuniversity.nl)

providing details and we will investigate your claim.

Download date: 10 Apr. 2024

## ORIGINAL ARTICLE

# Entry into working life: Internal migration and the job match quality of higher-educated graduates

Viktor A. Venhorst<sup>1</sup>  | Frank Cörvers<sup>2</sup><sup>1</sup>URSI, Faculty of Spatial Sciences, University of Groningen, Groningen, the Netherlands<sup>2</sup>ROA, Maastricht University, Maastricht, the Netherlands and ReflecT, Tilburg University, Tilburg, the Netherlands**Correspondence**Viktor A. Venhorst, Faculty of Spatial Sciences, University of Groningen, the Netherlands.  
Email: v.a.venhorst@rug.nl**Abstract**

We estimate the impact of internal migration on job-match quality for recent Dutch university and college graduates. We find positive yet modest wage returns. After controlling for the self-selection of migrants with an IV approach, this effect is no longer significant for university graduates and all graduates from peripheral areas. We also find that, for our alternative job-match measures, where there is evidence of migrant self-selection, controlling for self-selection strongly reduces the effect of internal migration on job-match quality. In some cases, the returns on internal migration are found to be negative, which may signal forced migration.

**KEYWORDS**

job-match quality, recent graduates, regional labor markets, return on internal migration, wages

## 1 | INTRODUCTION

From the economic literature, it is not clear to what extent internal migration leads to a better job, and to what extent other factors, such as skill levels and other personal characteristics or economic circumstances in the departure and destination regions, drive the positive association between spatial mobility and financial return that is often found. The literature on the relation between internal migration and wage returns has considered aspects such as self-selection (Détang-Dessendre, Drapier, & Jayet, 2004), information gathering (Herzog, Hofler, & Schlottmann, 1985), and regional economic circumstances (Smits, 2001) to explain the return to spatial mobility. In our literature review, we show that, depending on the dominant mechanism, both a positive and a negative relationship between spatial mobility and wages can occur. Moreover, the diverse empirical approaches which are adopted (Herzog, Schlottmann, & Boehm, 1993), may in their own right lead to different results. Subtle differences in the specific econometric approach and the type of spatial mobility under study, as well as the nature of the counterfactual could therefore be at the root of these differences.

The paper's main question is whether finding a job at greater distance pays off: Does internal migration after graduating lead to a better job match or are both internal migration and job match determined by a third factor? This third factor could be an observable personal characteristic, such as age, gender, or field of study, or an unobservable characteristic, such as ambition or motivation, that influences spatial search effort. When using an ordinary least squares (OLS) model and controlling for ability and other observed personal and regional characteristics, we find modest positive wage effects of internal migration. Similarly, we find a positive effect of internal migration on a range of other

job-match characteristics. Next, we apply an instrumental variable (IV) approach to correct for self-selection. After instrumenting spatial postgraduate mobility by six different variables, including prestudy spatial mobility, we find that the general effect of internal migration on wages is no longer significant. With respect to the other job-match indicators, we are able to show that the effect of postgraduate internal migration on the other job-match characteristics disappears in many cases or becomes negative.

We acknowledge current insights in the regional economic literature in different ways. First, to prevent unknown migrant heterogeneity from being a crucial factor in the analysis of the return on migration, we analyze a very homogeneous group of migrants: recent Dutch college and university graduates. Studying this particular group ensures a degree of homogeneity regarding the relation between job change and spatial mobility. Our sample is homogeneous because almost all graduates who complete their education enter the labor market to seek a return on their educational investment. The degree of mobility is the key differential, while various individual demographic and study-related backgrounds also play a role. Similar approaches have been employed by Dahl (2002) for the United States and Abreu, Faggian, and McCann (2015) for the United Kingdom. Other studies by Gabriel & Schmitz (1995), Yankow (2003), and Détang-Dessendre et al. (2004) all focus specifically on younger migrants, albeit with various levels of education.

Second, from our literature overview, it appears that one needs to control for differences in abilities and skills between individual graduates, as well as differences in economic circumstances in departure or destination regions. Further, one cannot ignore the possibility that individual preferences that are difficult to observe, such as ambition and motivation, play a role as well. We therefore seek to control for self-selection in our analysis. Alongside entering observable characteristics, we attempt to control for unobserved characteristics by taking into account any correlation between the propensity to migrate and outcome in terms of the job match.

We contribute to the current literature in two respects. First, we analyze the impact of internal migration on the quality of the job match, which is a much broader concept than only the wage rate. Other elements of the contract, such as hours worked, whether the job is long term, and a good match with the level of education and academic discipline can be regarded as outcomes of the search process besides salary. We compare the outcomes in terms of wages with alternative job-match measures. It is possible that wage rates will not differ much between recent graduates across the country, particularly because of the impact of the system of central wage bargaining and collective labor agreements on wages in the Netherlands (Groot, Groot, & Smit, 2014). Therefore, spatial differences in terms of alternative job-match measures may be more profound. Moreover, the labor market entry phase is highly dynamic and graduates may weigh alternative job characteristics differently, as they move from one transient job to another in search of a good match. For example, temporary work may or may not be sought after as a stepping stone to more permanent employment (De Graaf-Zijl, Van den Berg, & Heyma, 2011). Second, we analyze different subgroups of recent graduates in the labor market. We distinguish between polytechnic or college and university graduates, between males and females and we single out graduates hailing from the peripheral areas of the Netherlands. Investing in spatial mobility may be more beneficial for some subgroups than for others.

This paper is organized as follows. In Section 2, we present an overview of the relevant literature. Next, in Section 3, we discuss our estimation strategy and present the data and sample statistics. In Section 4, we present our results regarding the payoff for internal migration in terms of the wage rate, followed by an elaboration on differences between subgroups in our sample. We also discuss the outcomes for a variety of other job-match measures. Section 5 discusses the findings and the main conclusions.

## 2 | LITERATURE REVIEW: THE RETURN ON SPATIAL MOBILITY

A well-known conclusion from economic analyses of geographic mobility is that migrants move toward regions with higher income levels (Borjas, Bronars, & Trejo, 1992; Sjaastad, 1962). This phenomenon can, in principle, be explained by the theory of compensating wage differentials. Workers desire jobs near their residence and dislike commuting or migrating for jobs. Therefore, in the latter situation, they seek compensation for their discomfort or, more positively formulated, for their investment in migration. Following this line of thinking, a substantial literature has emerged that

treats inter-regional migration as a form of spatial job searching. In these studies, a successful outcome is defined not only in terms of income (or improvements therein) but also, for example, as an escape from unemployment. Herzog et al. (1993) survey the literature and find that, generally, migrants tend to avoid regions with relatively high unemployment rates (Herzog et al., 1993; Pissarides & Wadsworth, 1989). Among others, Büchel and Van Ham (2003) and Iammarino and Marinelli (2015) demonstrate that spatial flexibility reduces the likelihood of being overeducated for one's job.

An alternative theory, which explains higher wages for the more mobile, is that certain personal characteristics that influence the likelihood of finding a good job match, such as ability, are correlated with mobility. Human capital theory predicts that returns on investments in job searching will be higher for the more able: Information processing skills, or the ability to learn, increase the likelihood of a successful outcome over and above the effect of a larger spatial search area and the associated increase in opportunities. Higher-skilled individuals show higher levels of spatial mobility. Herzog et al. (1985) distinguish between initial and acquired knowledge, the latter being operationalized as knowledge resulting from past mobility. Their findings suggest that first-time movers have to exert greater search effort to make up for their lack of knowledge. Individuals with high human capital do not necessarily possess higher levels of premove knowledge but are at an advantage when it comes to acquiring, evaluating, and processing premove information. This situation, combined with the higher returns in destination regions, leads to higher rates of spatial mobility for the highly skilled, since it reduces both the costs of migration, as well as the risks of an inferior outcome. However, the informational advantage from prior mobility does not always lead to higher returns. For example, Hunt (2004, p. 845) highlights a group of returning migrants who are identified as a "heterogeneous group of failures and successes" regarding their labor market outcomes.

Demand-oriented theories, however, predict that if employers in a region have an informational advantage above those outside the region, they will be able to attract the best local workers in the labor market (Thurow, 1975). Consequently, workers and graduates who are further down the "labor queue," because they are less able and therefore more expensive to train, are forced to leave the region. This unfavorable status could, in turn, lead to lower rather than higher wages in the destination region. In the literature (e.g., Smits, 2001), this latter group is sometimes referred to as "forced migrants," identified by their inferior labor market situation before the move took place or by the inferior outcome of the move itself. In addition, unobserved constraints on mobility—for example, related to one's household situation, a lack of financial means or the opportunity to move, or a preference for staying that outweighs a potentially inferior labor market outcome—could play a role. For these "constrained migrants" inferior outcomes in terms of job-match quality could also be observed due to the limited search area.

One potential source of variation in empirical studies is the extent to which they control for self-selection among potential migrants. Borjas et al. (1992) elaborate on the work of Roy (1951) and develop a model of migration that serves to explain selection on the basis of the migrants' skill levels. The authors point out that skilled migrants are likely to move into regions where the skills premium is high relative to the local mean wage level. Conversely, low-skilled migrants typically select destination regions where this skills premium is low. The empirical findings suggest that migrants select destinations that feature a reward structure that matches their skills (or lack thereof). Looking at international migration, Borjas (1987) shows that self-selection processes are influenced by factors relating to both the destination area as well as the home region. Hunt and Mueller (2004) study cross-border migration with a sample of United States and Canadian workers and find border effects in addition to a relationship between skill migration and returns on those skills in some provinces.

Search effort and skills are difficult to capture in survey data, as are other individual-level effects that are likely to influence both the tendency to be spatially mobile and the return on this behavior. Given this situation, retrospective information on, for example, an individual's income prior to migration has been used in previous studies as a proxy for these unobservables. Gabriel and Schmitz (1995) find support for the idea of favorable self-selection, in the sense that prospective migrants exhibit higher income levels prior to migration than comparable nonmigrants do.

In estimating the effect of spatial mobility on wages, researchers can rely on Heckman (1979) selection models or the somewhat more general treatment effects regression models in controlling for selectivity (Maddala, 1983). Nakosteen, Westerlund, and Zimmer (2008) apply this latter approach when attempting to isolate unobserved migrant characteristics. They separately consider observable as well as unobservable characteristics for a sample of Swedish

men and women. They find evidence of self-selection based on unobservables, as well as self-selection on the basis of premigration income for women, with higher-income women found to be less mobile. Nakosteen and Westerlund (2004) investigate the return on inter-regional migration for previously employed and unemployed groups in a treatment effects framework and find that migration has positive effects on earnings and that there is a negative correlation between the selection and outcome equations. That is, even though the payoff from migration is positive, those with a higher propensity to migrate tend to achieve less favorable wage gains. Smits (2001) initially finds positive returns on migration for a sample of Dutch married men and married women but, after controlling for self-selection, the effect is negative for both groups. The author highlights a less favorable labor market situation for the migrants before they moved. In other words, forced migration and the ensuing less favorable negotiating position could play a role. Similarly, Axelsson and Westerlund (1998) study household migration in Sweden and find no postmigration income gains after correcting for self-selection. The findings of Dostie and Léger (2009), on the other hand, are more in line with Borjas's (1987) selection approach, with Canadian physicians with higher earnings potential found to be more likely to move to regions where the returns to the underlying unobservables are higher.

A related strand of literature discusses the accumulation of skilled employees in regions and finds that skilled regions tend to draw in yet more individuals with high human capital. Agglomeration effects and the resulting increases in productivity and wages are put forward as an explanation (Berry & Glaeser, 2005; Faggian & McCann, 2006). Scott (2010) discusses how human capital accumulates differently in different areas, according to the nature of the skills involved. Analyzing a sample of young French migrants, Détang-Dessendre et al. (2004) find that skilled migrants from regions with relatively small labor markets positively self-select for migration toward areas with more sizeable labor markets.

Other contributions point to two methodological issues that could be behind this diversity in results: the time horizon considered and the selection of appropriate reference groups. Krieg (1997) studies the return on migration for up to three years after migration, specifically taking into account whether migrants changed occupations, employers, or both. Migrants who do not change employers can be thought of as taking a "low-cost migration avenue" (Hunt, 2004, p. 832). Krieg (1997) notes that not taking these different types of migration properly into account biases the relationship found between migration and payoff. The author finds virtually no evidence for remaining selection effects once these aspects are included. Yankow (2003) investigates the return on migration over time in a study on migrant versus nonmigrant job changers. The author finds that, relative to the pay of nonmigratory job changers, the returns for skilled migratory job changers only became positive after almost two years. Conversely, the author finds immediate returns for low-skilled workers changing jobs and locations. Lehmer and Ludsteck (2011) also highlight the importance of selecting proper reference groups for job changers that only change employer, relative to those who also change regions. The authors find the highest returns for rural-to-urban migrants and for young migrants. Returns on migration only accrue after a time lag for more highly educated workers.

From this overview, we draw three conclusions. First, there can be great heterogeneity between and within groups of migrants and nonmigrants. Second, returns on spatial mobility can be either positive or negative, depending on the self-selection of migrants. Third, to obtain unbiased estimates on returns to spatial mobility, it is important to correct for self-selection. Taking into account these points in our empirical analyses, we focus on the relatively homogeneous group of recent Dutch graduates and correct for both observable and unobservable individual characteristics to estimate unbiased returns on spatial mobility. Furthermore, the returns are differentiated by level of study to account for differences in migratory behavior between these groups and are expressed in improvements in job-match indicators, including higher wages. The inflow of highly able graduates has positive effects on regional development, making this group highly relevant from a policy perspective (Faggian & McCann, 2006). Regional and individual productivity is maximized if graduates are able to fully exploit their talents by achieving a good match on the labor market. At the individual level, spatial mobility is sometimes necessary to escape from a lack of suitable job opportunities, as an inferior match early in the career may have negative longer-term consequences (Brunner & Kuhn, 2014; Waldorf & Yun, 2016). Recent graduates have been found to be particularly spatially mobile, since, following graduation, they seek to achieve a good match on the labor market to obtain a high return on their educational investment (Hensen, De Vries, & Cörvers, 2009; Iammarino & Marinelli, 2015; Venhorst, Van Dijk, & Van Wissen, 2011).

### 3 | DATA AND METHOD

#### 3.1 | Sample, job-match and internal migration measures

*Sample.* In our analysis, we use data drawn from the Research Centre for Education and the Labor Market (ROA) School-leaver Information System (ROA-SIS) on young graduates from colleges and universities located in the Netherlands. Each year, a representative cross-section of a new cohort of graduates is surveyed, approximately 18 months after they have graduated. Extensive information is collected on both the graduates' educational backgrounds, as well as their current jobs, including self-employment. The information on the current job includes income, hours worked, contract type, and a variety of other indicators of job-match quality. Data from the 2006 to 2008 cohorts of this annual survey are used. All universities and most colleges participated in the survey these years, resulting in near-complete coverage of the Netherlands. The dataset provides a rich set of location variables, which includes the graduates' pre-higher education home regions, residential location during their time in higher education and at the time of survey, next to job locations, and the location of the higher education institution. All locations are measured at the municipal level, with distances computed between their centroids. Further, we select only graduates aged between 20 and 30 who participated in full-time education. These constraints are imposed to obtain a more homogeneous sample. This yields a sample of approximately 17,600 college graduates and 8,500 university graduates.

Our sample excludes those graduates who were unemployed at the time of the survey. We do not expect this to affect our results. Administrative data of Statistics Netherlands demonstrates that unemployment was low for these cohorts, with about 3 percent of the recent graduates receiving social and unemployment benefits (Venhorst, Koster, & Van Dijk, 2013; Venhorst, 2017), which is similar to the figure we derive from our survey. Furthermore, unemployment depends strongly on the field of study, for which we control. We also control for time spent in unemployment before the current job. In addition, our analysis does not include graduates who, at the time of the survey, were still active in follow-up education, such as an additional master's program. Participating in follow-up education could be seen as an additional investment in human capital, for which a return from the labor market can be expected, although it may take some time before these benefits materialize. Those who are still enrolled in full-time follow-up programs often work in low-skilled part-time jobs that do not reflect any attempt at a proper job match. In our analysis, we control for previous participation in follow-up education by graduates who successfully completed such a program by the time of survey.

From earlier research (Venhorst, Van Dijk, & Van Wissen, 2010), it is apparent that the propensity to migrate differs considerably between university and college graduates and, therefore, we analyze college and university graduates separately. Table 1 consequently presents sample statistics on endogenous and exogenous variables separately for college (first set of columns) and university graduates (second set of columns).

*Job-Match Quality.* First, we follow the literature by using the natural log of the hourly wage rate as a dependent variable. However, especially for the group of new labor market entrants studied in this paper, income differences could be limited. This is not only because these individuals are still at the beginning of their careers, which might lead to a higher prevalence of nonpermanent and mismatched positions, but also a result of central wage bargaining arrangements, which are common in the Netherlands.

Therefore, alongside the wage rate, we also study the effect of spatial mobility on a wider range of job-match measures that could also be relevant as elements of a job offer. We do not expect that all aspects of a job match are equally sought after or important for young starters. In fact, differences in the return on spatial mobility for these various job-match measures could be indicative of the willingness to move to acquire an improvement in a specific aspect of the job (Hensen et al., 2009). We investigate whether internal migration increases the likelihood of acquiring a job that comes with a permanent contract, a job that is full time, and at the corresponding level of education (a vertical match) and in the appropriate field (a horizontal match). To these measures, we add two somewhat subjective measures of job-match quality. First, we include the respondents' own assessment of the match between their education and the job requirements. Respondents were asked whether they felt that their job matched the skills they acquired at college or university. See Hartog (2000) for a discussion of advantages and drawbacks of respondents' self-assessments on job-match indicators. Second, we used the answer to the question "Are you currently looking for another job?" as a very

TABLE 1 Sample statistics: College and university graduates

	College			University		
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.
Job-match indicators						
LN(Hourly Wage)	2.56	0.26	0.62	5.12	2.71	0.21
Permanent Contract	0.58		0	1	0.53	
Full Time Job	0.75		0	1	0.82	
Vertical Match	0.83		0	1	0.58	
Horizontal Match	0.81		0	1	0.72	
Good Match (subj)	0.77		0	1	0.76	
Not Looking for Other Job (subj)	0.83		0	1	0.82	
Spatial mobility						
Dist (km) res loc study - time of quest/1,000	0.02	0.05	0.00	0.32	0.03	0.06
Dist (km) res loc study - time of quest/1,000 sq	0.00	0.01	0.00	0.10	0.00	0.02
Dist (km) commute/1,000	0.02	0.03	0.00	0.32	0.02	0.03
Dist (km) commute/1,000 sq	0.00	0.01	0.00	0.10	0.00	0.01
Dist (km) home - study/1,000 (instr)	0.04	0.05	0.00	0.32	0.06	0.06
Dist (km) home - study/1,000 sq (instr)	0.00	0.01	0.00	0.10	0.01	0.02
Dist (km) study commute/1,000 (instr)	0.03	0.05	0.00	0.32	0.02	0.05
Dist (km) study commute/1,000 sq (instr)	0.00	0.01	0.00	0.10	0.00	0.01

(Continues)

TABLE 1 (Continued)

	College				University			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
Demographics								
Male	0.43		0	1	0.46		0	1
Age at time of quest	24.50	1.82	20.00	30.00	26.31	1.72	21.00	30.00
Foreign born EU	0.01		0	1	0.01		0	1
Foreign born Non-EU	0.02		0	1	0.02		0	1
Parent(s) foreign born (instr)	0.08		0	1	0.09		0	1
Human Capital								
Low grade [6.7>	0.12		0	1	0.09		0	1
Medium grade [7.8> (ref.)	0.65		0	1	0.68		0	1
High grade [8.10]	0.23		0	1	0.23		0	1
Study duration in months/100	0.47	0.11	0.06	1.20	0.54	0.27	0.01	1.43
Internship					0.70		0	1
Relevant work exp	0.51		0	1	0.47		0	1
Management exp	0.20		0	1	0.39		0	1
Study abroad	0.07		0	1	0.16		0	1
Internship abroad	0.15		0	1	0.18		0	1
Follow-up education	0.11		0	1	0.10		0	1
Transition study – job								
Duration finals – questionnaire. months	0.18	0.03	0.12	0.31	0.19	0.04	0.12	0.30
Rel waiting time in unemployment	0.05	0.13	0.00	1.00	0.08	0.15	0.00	1.00

(Continues)

TABLE 1 (Continued)

	College			University		
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.
Regional economic characteristics						
# suitable jobs dest $t - 1$ (/1,000,000)	0.28	0.14	0.03	0.48	0.32	0.12
Mean housing value dest $t - 1$ (/100,000)	0.11	1.23	-300	1.60	0.47	1.03
Reg econ growth rate dest $t - 1$ (%)	0.18	1.21	-5.60	5.20	0.22	0.92
Reg unempl rate grads dest $t - 1$ (%)	4.13	1.31	0.00	7.13	3.57	1.12
Dummies: year of observation, field of study, home region, study region						
Year 2006 (ref.)	0.35		0	1	0.42	0
Year 2007	0.29		0	1	0.37	0
Year 2008	0.36		0	1	0.20	0
Agriculture	0.04		0	1	0.06	0
Teaching	0.13		0	1		
Engineering	0.21		0	1	0.17	0
Economics	0.34		0	1	0.19	0
Health care	0.10		0	1	0.10	0
Behavioral Sciences (ref.)	0.16		0	1	0.24	0
Humanities					0.10	0
Law					0.08	0
Natural Sciences					0.06	0
Home region is West (instr)	0.40		0	1	0.45	0
Studied in North	0.12		0	1	0.04	0
Studied in East	0.22		0	1	0.07	0
Studied in West (ref)	0.42		0	1	0.59	0
Studied in South	0.24		0	1	0.30	0
Valid N	17,698				8,550	

general indicator of job match. The first of these is a rather specific measure of the perceived quality of the job match, whereas the latter could be related to a host of other job- and nonjob-related factors; that is, graduates could be looking at other job options for reasons unrelated to their current job. It is nevertheless of interest to assess the impact of migration on such a more general indicator of job satisfaction.

Table 1 shows that even though, on average, college graduates earn slightly less than their university counterparts, they do marginally better in terms of the other objective job-match indicators, with the exception of *having a full-time job*. Differences between the groups were smallest for the subjective indicators *self-evaluation of job match* and *not looking for other work*.

*Internal Migration* is measured looking at the distance between the residential locations during a graduate's time in college or university and at the time of survey. The mean distance moved is about 21 km for college graduates and 32 km for university graduates, but both distributions are strongly skewed to the right as they include ample numbers of nonmovers (0 km moved, which is also the median for both groups). The number of nonmovers appears large because we do not include intra-municipal moves. Due to the set-up of our data, we cannot observe them, but moreover these arguably concern moves with a residential rather than a work-related motive, which is found to be an important distinction (Waldorf & Yun, 2016). We also include squared terms in our analysis.<sup>1</sup> Also, internal migration is measured as if it was a single move from study to the location at the time of survey.

### 3.2 | Econometric approach, instrumental variables and other control variables

*Econometric Approach.* In previous studies on the relationship between migration and the resulting payoff, a number of different econometric strategies have been applied to correct for endogeneity between the migration decision and the resulting labor market match. The key issue in these types of analyses is that individuals do not randomly enter into migration and nonmigration trajectories. Rather, those individuals that stand to gain the most from such a move are more likely to migrate. Critically, the characteristics that drive this mechanism may be invisible to the researcher. In this paper, we therefore apply an IV approach. A standard OLS outcome equation can be thought of as having the form

$$Y_i = X_i\beta + \delta M_i + \varepsilon_i,$$

where the parameter  $\delta$  measures the effect of migration (measured by the variable  $M_i$ ) on outcome variable  $Y_i$  (in the context of this paper, either the wage rate or an alternative job-match indicator), given a set of observed controls  $X_i$ . Crucially, if endogeneity is an issue, the parameter  $\delta$  will be biased, since it captures not only the effect of migration but also the unobserved characteristics of those who are mobile. For example, if migration is positively correlated with the propensity to realize a favorable job match for reasons that are unobserved or not included in the model (and hence, with  $\varepsilon_i$ ), parameter  $\delta$  is biased upward. We thus apply a set of instruments for  $M_i$ , denoted  $Z_i$ , which includes all of the variables in  $X_i$  as well as a number of additional variables excluded from the outcome equation, using IV with heteroscedasticity-robust standard errors (Baum, Schaffer, & Stillman, 2007). We aim to measure the effect of internal migration not only on wages, but also on a variety of other job-match indicators, measured as dichotomous variables. In these instances, we apply linear probability models (LPMs) rather than probit or logit models. There are clear disadvantages associated with LPMs. Most importantly, their range is not constrained to the [0,1] interval. However, this approach provides a uniform framework to assess the strength and relevance of our instruments.<sup>2</sup>

*Instrumental Variables (IV).* Previous research finds that those who have been spatially mobile in the past are more likely to move again (DaVanzo & Morisson, 1981). A past migrant has previously incurred the cost of moving and, additionally, in the case of a returning migrant, has existing knowledge of the destination region. In this spirit, we propose

<sup>1</sup> We also ran our models using the distance between college (or university) and the location of the job at time of survey as a measure of spatial mobility. Next to this, we ran our analyses using relative rather than absolute distance as the main explanatory variable, in order to take interactions between the region of departure and the propensity to move into account. The results, which are qualitatively similar, are available upon request.

<sup>2</sup> We also ran IV probit versions of our models for alternative job match measures. The results are qualitatively the same. Only in a marginal number of cases do our LPM models predict probabilities outside the [0,1] bracket, leaving us unconcerned about bias resulting from this choice. Due to space limitations, these results are available upon request.

the following six IVs: a dummy indicating whether a graduate lived in the central economic region of the Netherlands at age 16, the distance between the residential location at age 16 and the study location (and its square), a dummy indicating whether the graduate has at least one parent born outside the Netherlands, and the commuting distance during a graduate's time in college or university (and its square). These instruments, by measuring various dimensions of (exposure to) the degree of spatial mobility before and during graduate-level studies, capture unobservable characteristics that may influence spatial search effort, such as ambition or motivation. Theoretically, living in the opportunity-rich core region at age 16 could affect later search behavior both positively (greater awareness of possibilities) as well as negatively (these possibilities are available nearby). Having a foreign-born parent could lower the psychological costs of being spatially mobile. Spatial mobility before the onset of study is measured as the distance between a student's home region (residential area at age 16) and the study location. Defining the home region in this manner, rather than using the region of birth, for example, better reflects the theoretical decision making and spatial information gathering framework that underlies this variable (Newbold, 2001). Relations with the area of birth could have weakened over time, whereas the degree of spatial awareness is likely to be fairly high by the age of sixteen. The mean distance moved before the onset of studies is 40 km for college graduates and 63 km for university graduates. Not everyone moves towards their college or university town. We therefore also include commuting distance as an instrumental variable. This instrument is operationalized as the distance between the residential location at the time of study, and the college or university location.

As we exclude them from the outcome equations, these IVs are required to be unrelated to the job-match element being studied in the outcome equations. We formally test whether this requirement is satisfied for the six instruments, using the Hansen J statistics. In some cases, one of the variables does not meet this requirement and is consequently also added to the outcome equation. Table A1 in Appendix A includes the results for the Hansen tests on the exclusion restrictions, along with the weak and underidentification tests (Kleibergen-Paap). Table A1 shows that the resulting specifications satisfy these tests; that is, the selected variables are rightly excluded from the outcome equation while, at the same time, strongly identifying a propensity for mobility.

*Other Control Variables.* Our earlier review of the literature suggested a number of potentially relevant explanatory and control variables. These include measures of human capital, controls for regional economic circumstances and the transition between education and the labor market, and demographic characteristics. Some of these controls could be considered as endogenous to labor market outcomes. Commuting behavior and selection of a field of study serve as prime examples. However, in the context of this study, we are not concerned with identification of causal effects for these variables, as they enter as mere controls. Below, we briefly discuss the exogenous variables that, on this basis, are included in our analysis.

First, we are interested in the effect of ability in a broad sense, since, from the literature, it is clear that human capital factors could be the driving force behind spatial mobility and job-match quality. We therefore include dummies for graduation grades to control for academic ability. Venhorst et al. (2010) demonstrate that graduates with higher final grades are not necessarily more mobile. For some fields of study, a labor queue model appears to reflect the observed patterns, with the better graduates achieving good local matches while others have to move elsewhere. This phenomenon also relates to the apparent instances of "forced spatial mobility" found in some of the studies discussed earlier.

Furthermore, given that our sample is made up of new entrants to the labor market it may be useful to control for other factors that enhance human capital, such as managerial experience (within student societies), internships (included only for university graduates, since virtually all college graduates serve in internships), and relevant work experience or experience abroad, since these could be valued by employers when selecting young employees. We also control for time spent completing the college or university program, as a more general measure of skill.

Second, it is essential to control for the opportunities and constraints present in the working region, since these alter the negotiation balance between employers and job seekers. From Cörvers, Hensen, and Bongaerts (2009), we conclude that these labor market indicators could be sensibly entered at the level of the NUTS 2 working regions. These regional variables are entered with a one-year lag and are assumed as a given for individual graduates. They are entered for the NUTS 2 region (i.e., province) of the current job and are intended to capture the effects of

amenities and general economic and labor market circumstances on spatial mobility and job-match quality. Our regression analyses include four different exogenous regional variables. First, we enter (in millions) the *number of suitable jobs* measured as workers in higher and scientific jobs in a region's active labor force. Second, we enter the *mean housing value* as a measure of the region's relative cost of living, operationalized by taking the average value, at the NUTS 2 level, of family homes as a percentage of the national average. The result is a variable with values generally close to zero, with positive values indicating that house prices in that region are relatively high. Third, the *regional economic growth rate* (REGG) is included, again relative to the national growth rate. This results in a variable with a zero mean and positive values for regions with above-average development. Fourth, the *regional unemployment rate among graduates*,  $U_{it}$ , calculated specifically for recent college and university graduates, is entered in the model as a measure of prevailing labor market conditions, based upon the work of Van der Klaauw and Van Vuuren (2010). Using the ROA-SIS dataset, we compute  $U_{it}$  as the percentage of college or university graduates within the labor force but looking for work.

We control for commuting distance (and its square) between the place of residence at the time of survey and the location of the job. The mean commuting distance is about 18 km for college graduates and 23 km for university graduates, respectively.

We also control for the length of the period between the time of graduation and the time of the survey (in months). Although graduates are surveyed approximately 18 months after graduation, there is some variation. Within a graduation cohort, which spans a year, some receive their diploma relatively early and some later. As a result, some graduates start the job-matching process earlier than others do, with the possible consequence of finding a better match, possibly through greater mobility. Further, we control for the time spent in unemployment during this period. Graduates in our sample spent about 5 (college graduates) to 8 percent (university graduates) of the time between graduation and survey in unemployment. We would expect relatively longer waiting times to lead to both a lower reservation wage as well as an increase in the likelihood of moving. Finally, we introduce dummy variables for the year of observation, the study field and the region in which the degree was obtained.

## 4 | RESULTS

### 4.1 | Wage equation

In this section, we discuss the estimation results for the impact of geographic mobility on the hourly wage rate, controlling for various characteristics and the endogeneity of migration. Table 2 shows an OLS model (first set of columns) that does not take into account endogeneity and the IV outcome equation (second set of columns), for the total sample of college graduates. Similarly, in Table 3, we report the results for university graduates, which are discussed further down. In Table 4, we provide an overview of all estimates, including the results for the relevant exogeneity tests. The full IV specifications also feature two first-stage equations, one for distance moved and one for distance moved squared. For reasons of conciseness these first-stage equations are reported and discussed in Appendix B.

The top row in Table 2 shows the results for the main variables of interest: *distance moved from study to current residence*, and its square. The coefficients show strikingly different results between the OLS model and the IV regression. In the OLS model, we find significant effects, suggesting a second-degree polynomial with a peak at a distance of around 154 km. At this peak, the wage return to migration amounts to 1.4 percent. Recalling that the mean distance moved is around 21 km for college graduates, the effect could thus be regarded as modest but positive. However, in our IV setup, we find that the effect of postgraduate internal migration on wages is insignificant; that is, after both selection and the effect of the other covariates are controlled for, migration has no effect on the wage rate of college graduates. We cannot reject the exogeneity of internal migration, however (Table 4).

The other estimated coefficients in the college wage equation are very similar in both outcome models. Wage rates are found to be higher for commuters (up to a distance of 177 km), males, those with above-average grades, those with experience as a member of a student board, and those with relevant work experience. In addition, wages are higher for

**TABLE 2** Estimation results (college graduates): OLS and IV models of ln(Hourly Wage)

	OLS			IV		
	ln(Hourly Wage)			ln(Hourly Wage)		
	College total			College total		
	<i>b</i>	SE	Sig	<i>b</i>	SE	Sig
Spatial mobility						
Dist (km) res loc study – time of quest/1,000	0.181	0.089	**	–0.018	0.230	
Dist (km) res loc study – time of quest/1,000 sq	–0.586	0.335	*	0.020	0.719	
Dist (km) commute/1,000	1.003	0.126	***	1.005	0.126	***
Dist (km) commute/1,000 sq	–2.833	0.653	***	–2.919	0.663	***
Demographics						
Gender: female (0), male (1)	0.062	0.005	***	0.062	0.005	***
Age at time of quest	0.043	0.024	*	0.043	0.024	*
Age at time of quest sq/100	–0.055	0.049		–0.054	0.049	
Foreign born EU	0.005	0.019		0.001	0.019	
Foreign born non-EU	0.019	0.016		0.016	0.016	
Human capital						
Low grade [6.7>]	–0.031	0.006	***	–0.031	0.006	***
High grade [8.10]	0.017	0.005	***	0.018	0.005	***
Study duration in months/100	0.024	0.018		0.024	0.018	
Relevant work exp	0.007	0.004	*	0.007	0.004	*
Management exp	0.009	0.005	*	0.010	0.005	**
Study abroad	0.002	0.008		0.003	0.008	
Internship abroad	–0.011	0.005	**	–0.009	0.006	*
Follow-up education	0.003	0.007		0.004	0.007	
Transition study – job						
Duration time grad – quest in months/100	0.393	0.064	***	0.404	0.065	***
Rel waiting time in unemployment	–0.170	0.019	***	–0.168	0.019	***
Regional economic characteristics						
# suitable jobs dest $t - 1$ (/1,000,000)	0.112	0.017	***	0.113	0.018	***
Mean housing value dest $t - 1$ (/100,000)	0.005	0.002	**	0.005	0.002	**
Reg econ growth rate dest $t - 1$ (%)	0.001	0.002		0.001	0.002	
Reg unempl rate grads dest $t - 1$ (%)	–0.002	0.002		–0.003	0.002	
Dummies: year of observation, field of study, home region, study region						
Year 2007	0.024	0.005	***	0.024	0.005	***
Year 2008	0.036	0.007	***	0.036	0.007	***
Agriculture	–0.054	0.012	***	–0.053	0.012	***
Teaching	–0.015	0.007	**	–0.015	0.007	*
Engineering	–0.011	0.007		–0.010	0.007	
Economics	–0.022	0.006	***	–0.023	0.006	***

(Continues)

TABLE 2 (Continued)

	OLS			IV		
	ln(Hourly Wage)			ln(Hourly Wage)		
	College total			College total		
	<i>b</i>	SE	Sig	<i>b</i>	SE	Sig
Health care	0.073	0.007	***	0.074	0.008	***
Study region North	−0.023	0.008	***	−0.020	0.009	**
Study region East	−0.026	0.006	***	−0.025	0.006	***
Study region South	−0.029	0.006	***	−0.028	0.006	***
constant	1.684	0.307	***	1.685	0.306	***
<i>N</i>	17,698			17,698		
<i>R</i> <sup>2</sup>	0.073			0.073		
Adj. <i>R</i> <sup>2</sup>	0.072			0.071		
<i>F</i>	39.045			39.599		

\* $P < 0.1$ , \*\* $P < 0.05$ , \*\*\* $P < 0.01$ .

those working in larger labor markets and more expensive regions. This latter result is interesting as Venhorst et al. (2011) demonstrate that housing cost is relevant in destination choice, in particular for college graduates. However, wage rates are negatively affected by an internship abroad, perhaps because graduates find it more difficult to reacquaint themselves with the Dutch labor market. An alternative possibility is that foreign experience is not valued by employers to the extent that this group of graduates anticipated. Completing a follow-up education program does not have a significant effect on wages. This could be because, given the source of the data used, these additional programs were generally only completed shortly before the survey and it takes more time to reap the benefits of this investment. Wages are also found to be lower for those with a longer time spent in unemployment before finding a job and for graduates in the fields of agriculture, economics, and teaching (relative to the reference category of graduates in the behavioral sciences).

Table 3 shows the corresponding results for university graduates. In the OLS model, we find again evidence for a second-order polynomial with a peak at around 162 km. At this peak, the coefficients translate to a wage return to migration of about 4 percent. Again, considering that the mean migration distance is around 32 km for university graduates, many graduates will not attain this level of return. Migration is not significant in the IV setup of our model, which is the preferred specification, since the exogeneity of spatial mobility is rejected (Table 4). That is, the positive effect of spatial mobility on wage rates found in the OLS specification is driven by issues of selection rather than being a direct effect of spatial mobility as such.

The effects of our control variables on wages are partly similar to those found for college graduates. One notable difference is that, next to stronger effects of relevant work experience and experience in student boards, internships abroad now have a positive effect, as do internships in general (an aspect not considered with college students, who virtually all undergo an internship). Another difference with college graduates is that we now find a negative effect of study duration on income. We also find a 4.4 percent positive premium for non-EU foreigners. We find no effect of the relative housing cost, but, in line with the results for college graduates, university graduate wages are higher in regions with many job opportunities.

## 4.2 | Differentiation by gender, location of institution and alternative job-match indicators

In this section, we take a closer look at the differences in wage premium for geographic mobility between men and women by running our analysis separately for these groups. We then explore the returns on mobility in terms of other job-match aspects rather than wages.

**TABLE 3** Estimation results (university graduates): OLS and IV models of ln(Hourly Wage)

	OLS			IV		
	ln(Hourly Wage)			ln(Hourly Wage)		
	University total			University total		
	<i>b</i>	SE	Sig	<i>b</i>	SE	Sig
Spatial mobility						
Dist (km) res loc study – time of quest/1,000	0.480	0.085	***	0.261	0.270	
Dist (km) res loc study – time of quest/1,000 sq	–1.477	0.319	***	–0.578	0.811	
Dist (km) commute/1,000	0.900	0.116	***	0.911	0.116	***
Dist (km) commute/1,000 sq	–2.713	0.525	***	–2.915	0.543	***
Demographics						
Gender: female (0), male (1)	0.035	0.005	***	0.035	0.005	***
Age at time of quest	0.087	0.036	**	0.088	0.036	**
Age at time of quest sq/100	–0.133	0.067	**	–0.135	0.067	**
Foreign born EU	–0.006	0.017		–0.007	0.017	
Foreign born non-EU	0.044	0.021	**	0.044	0.021	**
Human capital						
Low grade [6.7>]	–0.024	0.008	***	–0.024	0.008	***
High grade [8.10]	0.024	0.005	***	0.024	0.005	***
Study duration in months/100	–0.026	0.010	***	–0.026	0.010	***
Internship	0.027	0.005	***	0.027	0.005	***
Relevant work exp	0.038	0.004	***	0.038	0.004	***
Management exp	0.019	0.004	***	0.020	0.005	***
Study abroad	–0.005	0.006		–0.005	0.006	
Internship abroad	0.014	0.006	**	0.013	0.006	**
Follow-up education	–0.007	0.008		–0.007	0.008	
Transition study – job						
Duration time grad – quest in months/100	0.330	0.058	***	0.337	0.059	***
Rel waiting time in unemployment	–0.203	0.017	***	–0.204	0.017	***
Regional economic characteristics						
# suitable jobs dest <i>t</i> – 1 (/1,000,000)	0.196	0.023	***	0.199	0.023	***
Mean housing value dest <i>t</i> – 1 (/100,000)	0.003	0.003		0.003	0.003	
Reg econ growth rate dest <i>t</i> – 1 (%)	–0.005	0.004		–0.005	0.004	
Reg unempl rate grads dest <i>t</i> – 1 (%)	–0.001	0.002		–0.001	0.002	
Dummies: year of observation, field of study, home region, study region						
Year 2007	0.021	0.005	***	0.021	0.005	***
Year 2008	0.027	0.007	***	0.027	0.007	***
Agriculture	–0.050	0.024	**	–0.049	0.024	**
Engineering	–0.014	0.007	*	–0.012	0.007	*

(Continues)

TABLE 3 (Continued)

	OLS			IV		
	ln(Hourly Wage)			ln(Hourly Wage)		
	University total			University total		
	<i>b</i>	SE	Sig	<i>b</i>	SE	Sig
Economics	0.059	0.007	***	0.060	0.007	***
Health care	0.070	0.009	***	0.073	0.010	***
Arts, language & culture	−0.083	0.009	***	−0.083	0.009	***
Law	0.019	0.009	**	0.018	0.009	**
Natural Sciences	−0.003	0.010		−0.002	0.010	
Study region North	−0.006	0.014		−0.001	0.017	
Study region East	0.005	0.023		0.008	0.024	
Study region South	0.001	0.006		0.003	0.007	
Constant	1.132	0.470	*	1.120	0.469	*
<i>N</i>	8,550			8,550		
<i>R</i> <sup>2</sup>	0.161			0.160		
Adj. <i>R</i> <sup>2</sup>	0.157			0.156		
<i>F</i>	39.707			39.470		

\**P* < 0.1, \*\**P* < 0.05, \*\*\**P* < 0.01.

We analyze the relationship between spatial mobility and wage rate separately for men and women, since the broader literature on labor market participation suggests that labor supply decisions differ between men and women. Earlier work on the spatial mobility of Dutch graduates (Venhorst et al., 2010, 2011) shows that women have a higher propensity to be mobile than male graduates, especially in considering a move from peripheral areas toward the core region of the Netherlands. Faggian, McCann, and Sheppard (2007) suggest that women have to accept higher levels of spatial mobility to compensate for adverse circumstances in local labor markets. In this light, we would expect to see higher returns on spatial mobility for women than for men. Similarly, we look specifically at graduates who completed their degree programs in the less dense north, east and southern parts of the Netherlands. These graduates will need to be more migratory if they wish to reach the denser agglomerated areas. We also ran a robustness check to estimate the impact of foreign graduates in our sample. The results did not change when excluding these graduates from our sample.

We furthermore analyze alternative job-match measures using the full college and university graduate samples. These are measured using dummy variables indicating whether the described quality pertains to the current job (variable equals one) or not (variable equals zero). Table 4 presents a summary of the results, restricting our discussion to the main coefficients of interest.<sup>3</sup> In the last columns, we also report exogeneity tests ( $\chi^2$ , with *df* = 2) for migration where the zero hypothesis is that migration is indeed exogenous to the job quality indicator under study.

We start our discussion with the college graduates, as reported in the upper portion of Table 4. The first row repeats the result from Table 2 and shows the effect of mobility on wages for the complete sample of college graduates. Below this, the results of individual estimations for college graduates by gender are shown. We find no effects of spatial mobility on wages in the OLS specifications for women and only a marginally significant and modest positive effect for men. We find no statistically significant effects for either group in the IV specifications. We could not reject the exogeneity of migration for female and male college graduates, however.

We find significant effects gained from migration for both female and male university graduates in the OLS specifications, suggesting modest returns given the second-order polynomials with peaks at about 183 and 149 km,

<sup>3</sup> The models discussed in this section include the same controls as the models for wage rates in section 4.1. The full estimates are available upon request.

TABLE 4 Summary of estimation results (various samples and job-match measures): OLS and IV models

	Dist (km) Res Loc Study – Time of Quest/1,000						Dist (km) Res Loc Study – Time of Quest/1,000 Sq						Exogeneity Test	
	Naïve OLS/LPM			IV/IV LPM			Naïve OLS/LPM			IV/IV LPM			H0: All Exogenous	
	b	SE	Sig	b	SE	Sig	b	SE	Sig	b	SE	Sig	$\chi^2$	Sig
College														
LN Hourly Wage rate (LnWage)	0.181	0.089	**	–0.018	0.230		–0.586	0.335	*	0.020	0.719		0.871	
LnWage Women	0.139	0.117		0.128	0.308		–0.432	0.404		–0.468	0.940		0.614	
LnWage Men	0.231	0.137	*	–0.116	0.352		–0.780	0.584		0.375	1.137		1.741	
LnWage Studied in Periphery	0.256	0.100	**	–0.224	0.228		–1.079	0.381	***	0.374	0.713		5.468	*
p(Perman Contr)	–0.298	0.175	*	–0.633	0.465		0.922	0.653		2.014	1.448		1.073	
p(Fulltime)	0.458	0.130	***	–0.115	0.355		–1.373	0.466	***	0.176	1.096		5.759	*
p(VertMatch)	0.217	0.131	*	0.477	0.349		–0.480	0.486		–1.258	1.079		0.672	
p(HorMatch)	–0.206	0.138		–1.714	0.378	***	0.775	0.530		5.214	1.182	***	19.096	***
p(SubjGoodMatch)	–0.225	0.153		–0.675	0.410	*	1.098	0.562	*	2.723	1.271	**	6.701	**
p(NotLookingOthJob)	–0.068	0.137		–0.938	0.372	*	–0.041	0.521		2.460	1.165	**	7.246	**
University														
LN Hourly Wage rate (LnWage)	0.480	0.085	***	0.261	0.270		–1.477	0.319	***	–0.578	0.811		6.405	**
LnWage Women	0.521	0.120	***	0.021	0.387		–1.424	0.468	**	0.423	1.173		7.223	**
LnWage Men	0.430	0.119	***	0.373	0.370		–1.444	0.431	***	–1.136	1.101		1.255	
LnWage Studied in Periphery	0.520	0.109	***	0.362	0.225		–1.655	0.407	***	–0.736	0.717		5.800	*
p(Perman Contr)	0.845	0.211	***	–0.970	0.656		–2.765	0.807	***	2.603	1.980		8.721	**
p(Fulltime)	0.643	0.146	***	0.728	0.478		–2.246	0.566	***	–2.694	1.433		1.127	
p(VertMatch)	0.834	0.213	***	5.736	1.273	***	–2.646	0.800	***	–16.306	3.667	***	18.350	***
p(HorMatch)	–0.140	0.194		–1.258	0.614	**	0.194	0.745		3.346	1.856	*	3.811	
p(SubjGoodMatch)	0.478	0.178	***	0.758	0.566		–2.214	0.700	***	–2.990	1.718	*	0.292	
p(NotLookingOthJob)	0.358	0.164	**	–0.215	0.522		–1.376	0.632	**	0.391	1.577		1.564	

\* $P < 0.1$ , \*\* $P < 0.05$ , \*\*\* $P < 0.01$ .

respectively. We find no significant effect of migration on wages for both female and male graduates in the IV specifications. For female university graduates, we reject exogeneity, and therefore the IV is the preferred specification ( $\chi^2 = 7.223$ ;  $df = 2$ ;  $P = 0.027$ ). For male university graduates, exogeneity could not be rejected, however ( $\chi^2 = 1.255$ ;  $df = 2$ ;  $P = 0.534$ ). We therefore find very little support for our earlier conjecture that returns to migration ought to be higher for female graduates. We find no effect for female college graduates, and the effect we find for female university graduates appears to be driven by self-selection issues.

Graduating from institutions located in the more peripheral areas of the Netherlands leads to a greater necessity of spatial mobility. This is reflected in the OLS results, where we find modest positive wage returns to migration for both college and university graduates. Exogeneity of migration is rejected however. In our IV setup, we find no significant effect of migration, suggesting that the wage returns on migration for graduates from the peripheral areas is driven by self-selection.

We now turn to the alternative job-match measures for college graduates. We find very mixed patterns for this group, although the overarching conclusion appears to be that, for most measures considered, we find either no effect of spatial mobility, or evidence for a negative relationship. The exception to this rule is the likelihood of finding a job commensurate with one's education level (vertical match), where we find a marginally significant linear positive effect. The impact of spatial mobility on obtaining a full-time job is positive over a distance up to around 167 km. However, this result is rejected in favor of the insignificant outcome in the IV setup. We find a marginally significant negative effect of spatial mobility on the probability of a college graduate reporting having a permanent contract. In the naïve LPM's, we find no significant effect of spatial mobility on horizontal match and both subjective evaluations. However, all latter three naïve LPM specifications are rejected in favor of the IV versions, where we find negative effects of spatial mobility on these job-match measures with lows around 124–191 km.

At first sight, the picture that emerges for these other job-match aspects appears clearer for university graduates. With the exception of *horizontal match*, in the naïve LPMs, the estimated coefficients for the relationships between spatial mobility and the proposed alternative outcomes are generally significant and indicate the existence of second-order polynomials with peaks between 108 and 158 km. In the IV setup, most of these positive effects are reduced to insignificance, but three out of five of these IV specifications are rejected, since the exogeneity of spatial mobility cannot be rejected. Overall, university graduates seem to improve their chances of finding full time employment as well as jobs leading to favorable subjective evaluations by being spatially mobile (up to a point). As with the college graduates, we find a positive effect of spatial mobility on the likelihood of finding work that matches the field of study (vertical match), although the evidence is much stronger for university graduates. There is no effect on finding a permanent position (IV setup is preferred), nor is there an effect on the likelihood of obtaining a horizontal match.

## 5 | DISCUSSION AND CONCLUSIONS

We have studied the relationship between internal migration and job-match quality for a sample of recent graduates in the Netherlands. The inflow of graduates is often considered an important asset in achieving regional growth. Such benefits are more likely to materialize when these graduates are able to achieve a successful match on the regional labor market such that they can fully exploit the investment in their human capital. Examining this specific group allows us to abstract from the confounding issues that have been noted in the literature, such as the relation between job-to-job mobility and internal migration, and their effects on job-match quality. At the same time, we aim to add to the literature by examining a number of additional job-match indicators alongside the more commonplace hourly wage rate. In our analysis, we include a rich variety of observed human capital indicators and control for unobserved personal characteristics that may introduce endogeneity into the relationship between internal migration and job-match quality.

Our primary OLS analysis of mobility and wages showed that migration of recent graduates within the Netherlands has the anticipated significant positive effect on wages, a finding in line with many other studies. The

effects are however modest in economic sense. In addition, a number of observable human capital indicators plus regional circumstances such as prevailing labor market conditions have strong and consistent effects on wage rates.

However, after controlling for self-selection, using an IV approach, we find that the positive effects of engaging in greater internal migration on hourly wage rates are no longer significant for college and university graduates. Whereas economic theory predicts positive returns on migration, our results seem to indicate that in particular for university graduates a variety of personal traits is key to achieving this benefit—and not the move as such.

We further analyze this relationship for men and women separately. Here we find (modest) positive returns to internal migration for male college and university graduates but no effect of migration for female graduates. These results are not in line with our expectations, since for female graduates, migration is often regarded as a means to deal with adverse circumstances in local labor markets. Likewise, we also find no causal effect of migration on the hourly wage rate for graduates from peripheral institutions. This group could be considered as being relatively disadvantaged as well, in terms of access to larger agglomerations, but our IV results indicate that the wage returns to migration observed in simple OLS regressions are not due to the move itself but rather to selection on (un-)observables.

We also analyzed the relationship between internal migration and a number of alternative job-match indicators that relate to objective characteristics of the job. These include the length of the contract, the number of hours worked, and horizontal and vertical matching. Furthermore, we studied the outcomes on two more subjective evaluations of the match between education and the job.

The evidence on these alternative job-match indicators is slightly more mixed than for wages. We again find that, when endogeneity plays a role, controlling for selectivity through IVs generally reduces the observed returns on spatial mobility: initial positive effects become insignificant and initially insignificant effects become negative and significant. We find evidence that, for college graduates, some aspects of job matches (i.e., the subjective job-match measures and *having a permanent contract* and a good *horizontal match*) are affected negatively by migration: those that do not move far do better. This could indicate evidence of a role of local matching, forced mobility or mobility for reasons considered superior to these particular match outcomes. The exception to this rule is the likelihood of finding a job at college degree level (*vertical match*). For university graduates, we do find positive effects of migration on the likelihood of *working full-time*, *achieving a vertical match* and giving positive subjective evaluations of the quality of the job-match. Conversely, there is no effect of spatial mobility on the likelihood of finding a *horizontal match* and a job on a *permanent contract* for university graduates.

In terms of policy, this study concludes that generic labor market measures, especially in less opportunity-rich labor markets, are likely to be of limited efficacy. Specific groups of graduates might fail to find a local match and are therefore forced to move to other regions with, at least initially, a poor match as a consequence. This appears to most notably affect college graduates, especially in terms of permanent contracts, jobs in the right field, and general job satisfaction. Targeting labor market information for this group could prove fruitful. However, the more able and perhaps more intrinsically motivated tend to find their way, regardless of circumstances. Second, policy makers in peripheral regions who offer limited opportunities for graduates from local institutions of higher education may be worried that the high returns achievable through migration are indicative of wide structural problems in their own labor markets. However, as this study demonstrates, these returns on migration are either modest, or do not generally result from the move as such. Higher education institutions and regional policy makers could try to prevent these moves by retaining the most able recent graduates by offering them attractive jobs in the region. However, this approach may not, *per se*, lead to higher general national or international income, since those policies can come at the cost of other regions (Bertrand-Cloodt, Cörvers, & Heijke, 2016).

A fruitful avenue for further research could be to include household and partner characteristics, as well as characteristics that are not directly related to labor market entry. These could serve to explain some of the unobserved constraints on spatial mobility or provide rationales other than improving labor market or career perspective for internal migration.

## REFERENCES

- Abreu, M., Faggian, A., & McCann, P. (2015). Migration and inter-industry mobility of UK graduates. *Journal of Economic Geography*, 15(2), 353–385.
- Axelsson, R., & Westerlund, O. (1998). A panel study of migration, self-selection and household real income. *Journal of Population Economics*, 11(1), 113–126.
- Baum, C. F., Schaffer, M. E., & Stillman, S. (2007). *ivreg2: Stata Module for Extended Instrumental Variables/2SLS, GMM and AC/HAC, LIML, and k-Class Regression*. Boston College Department of Economics, Statistical Software Components S425401. Retrieved from: <http://ideas.repec.org/c/boc/bocode/s425401.html>.
- Bertrand-Cloodt, D., Cörvers, F., & Heijke, H. (2016). Ability, academic climate, and going abroad for work or pursuing a PhD. *CESifo Economic Studies*, ifw015.
- Berry, C.R., & Glaeser, E.L. (2005). The divergence of human capital levels across cities. *Papers in Regional Science*, 83(3), 407–444.
- Borjas, G.J. (1987). Self-selection and the earnings of immigrants. *American Economic Review*, 77(4), 531–553.
- Borjas, G.J., Bronars, S.G., & Trejo, S.J. (1992) Self-selection and internal migration in the United States. *Journal of Urban Economics*, 32(2), 159–185.
- Brunner, B., & Kuhn, A. (2014). The impact of labor market entry conditions on initial job assignment and wages. *Journal of Population Economics*, 27(3), 705–738.
- Büchel, F., & Van Ham, M. (2003). Overeducation, regional labor markets, and spatial flexibility. *Journal of Urban Economics*, 53(3), 482–493.
- Cörvers, F., Hensen, M.M., & Bongaerts, D. (2009). Delimitation and coherence of functional and administrative regions. *Regional Studies*, 43(1), 19–31.
- Dahl, G.B. (2002). Mobility and the return to education: Testing a royl model with multiple markets. *Econometrica*, 70(6), 2367–2420.
- DaVanzo, J., & Morrison, P.A. (1981). Return and other sequences of migration in the United States. *Demography*, 18(1), 85–101.
- de Graaf-Zijl, M., Van den Berg, G. J., & Heyma, A. (2011). Stepping stones for the unemployed: The effect of temporary jobs on the duration until (regular) work. *Journal of Population Economics*, 24(1), 107–139.
- Détang-Dessendre, C., Drapier, C., & Jayet, H. (2004) The impact of migration on wages: Empirical evidence from french youth. *Journal of Regional Science*, 44(4), 661–691.
- Dostie, B., & Léger, P.T. (2009). Self-selection in migration and returns to unobservables. *Journal of Population Economics*, 22(4), 1005–1024.
- Faggian, A., & McCann, P. (2006) Human capital flows and regional knowledge assets: A simultaneous equation approach. *Oxford Economic Papers*, 58(3), 475–500.
- Faggian, A., McCann, P. & Sheppard, S. (2007). Some evidence that women are more mobile than men: Gender differences in u.k. graduate migration behavior. *Journal of Regional Science*, 47(3), 517–539.
- Gabriel, P.E., & Schmitz, S. (1995). Favorable self-selection and the internal migration of young white males in the United States. *Journal of Human Resources*, 30(3), 460–471.
- Groot, S., Groot, H. L., & Smit, M. J. (2014). Regional wage differences in the Netherlands: Micro evidence on agglomeration externalities. *Journal of Regional Science*, 54(3), 503–523.
- Hartog, J. (2000) Over-education and earnings: Where are we, where should we go? *Economics of Education Review*, 19(2), 131–147.
- Heckman, J. J. (1979) Sample selection bias as a specification error. *Econometrica*, 47(1), 153–161.
- Hensen, M. M., De Vries, M. R., & Cörvers, F. (2009). The role of geographic mobility in reducing education-job mismatches in the Netherlands. *Papers in Regional Science*, 88(3), 667–682.
- Herzog Jr, H. W., Hofler, R. A., & Schlottmann, A. M. (1985). Life on the frontier: Migrant information, earnings and past mobility. *The Review of Economics and Statistics*, 373–382.
- Herzog Jr, H. W., Schlottmann, A. M., & Boehm, T. P. (1993). Migration as spatial job-search: A survey of empirical findings. *Regional Studies*, 27(4), 327–340.
- Hunt, G. L., & Mueller, R. E. (2004). North american migration: Returns to skill, border effects, and mobility costs. *The Review of Economics and Statistics*, 86(4), 988–1007.

- Hunt, J. (2004). Are migrants more skilled than non-migrants? repeat, return, and same-employer migrants. *Canadian Journal of Economics*, 37(4), 830–849.
- Iammarino, S., & Marinelli, E. (2015) Education-job (mis)match and interregional migration: Italian university graduates' transition to work. *Regional Studies*, 49(5), 866–882.
- Krieg, R.G. (1997) Occupational change, employer change, internal migration, and earnings. *Regional Science and Urban Economics*, 27 (1), 1–15.
- Lehmer, F., & Ludsteck J. (2011) The returns to job mobility and inter-regional migration: Evidence from germany. *Papers in Regional Science*, 90(3), 549–571.
- Maddala, G. S. (1983). *Limited-Dependent and Qualitative Variables in Econometrics*, Cambridge: Cambridge University Press.
- Nakosteen, R. A., & Westerlund, O. (2004). The effects of regional migration on gross income of labor in Sweden. *Papers in Regional Science*, 83(3), 581–595.
- Nakosteen, R. A., Westerlund, O., & Zimmer, M. A. (2008). Migration and self-selection: Measured earnings and latent characteristics. *Journal of Regional Science*, 48(4), 769–788.
- Newbold, K. B. (2001). counting migrants and migrations: Comparing lifetime and fixed-interval return and onward migration. *Economic Geography*, 77(1), 23–40.
- Pissarides, C. A., & Wadsworth, J. (1989). Unemployment and the inter-regional mobility of labor. *Economic Journal*, 99(397), 739–755.
- Roy, A. D. (1951) Some thoughts on the distribution of earnings. *Oxford Economic Papers, New Series*, 3(2), 135–146.
- Scott, A. J. (2010). Space–time variations of human capital assets across U.S. metropolitan areas, 1980 to 2000. *Economic Geography*, 86(3), 233–250.
- Sjaastad, L. A. (1962). The Costs and Returns of Human Migration. *Journal of Political Economy*, 70(5), 80–93.
- Smits, J. (2001). Career migration, self-selection and the earnings of married men and women in the Netherlands, 1981–93. *Urban Studies*, 38(3), 541–562.
- Thurow, L. C. (1975). *Generating Inequality*, New York, Basic Books.
- Van der Klaauw, B., & Van Vuuren, A. (2010). Job Search and Academic Achievement. *European Economic Review*, 54 (2), 294–316.
- Venhorst, V. A. (2017). Constrained choice? Graduate early career job-to-job mobility in core and non-core regions in the Netherlands. In J. Corcoran & A. Faggian (eds), *Graduate Migration and Regional Development: An International Perspective* (pp. 82–113). Cheltenham, U.K. and Northampton, MA, U.S.A.: New Horizons in Regional Science Series, Edward Elgar Publishing.
- Venhorst, V., Van Dijk, J., & Van Wissen, L. J. G. (2010). Do the best graduates leave the peripheral areas of the Netherlands? *Tijdschrift Voor Economische en Sociale Geografie*, 101(5), 521–537.
- Venhorst, V., Van Dijk, J., & Van Wissen, L. J. G. (2011). An analysis of trends in spatial mobility of dutch graduates. *Spatial Economic Analysis*, 6(1), 57–82.
- Venhorst, V.A., Koster, S. & Van Dijk, J. (2013) *Geslaagd in de Stad*. URSI Research Report no 344. University of Groningen. Retrieved from: <http://irs.ub.rug.nl/ppn/37257274X>
- Waldorf, B., & Do Yun, S. (2016). Labor migration and overeducation among young college graduates. *Review of Regional Research*, 36(2), 99–119.
- Yankow, J. J. (2003). Migration, job change, and wage growth: A new perspective on the pecuniary return to geographic mobility. *Journal of Regional Science*, 43(3), 483–516.

**How to cite this article:** Venhorst VA, Cörvers F. Entry into working life: Internal migration and the job match quality of higher-educated graduates. *J Regional Sci.* 2018;58:116–140. <https://doi.org/10.1111/jors.12347>

APPENDIX A: IV IDENTIFICATION TESTS

TABLE A1 Results for identification tests

	Instruments Excluded from 2nd Stage?					Excl		Under ID		Weak ID	
	Home region is West	Dist (km) home – study/1,000	Dist (km) home – study/1,000 sq	Parent(s) foreign born	Dist (km) study commute/1,000	Restrictions Hansen J stat		Kleibergen-Paap rk LM statistic		Kleibergen-Paap rk Wald F statistic	
						Stat	P	Stat	P	Stat	Stat
College											
LN Hourly Wage rate (LnWage)	YES	YES	YES	YES	YES	6.846	0.144	899.612	0.000	204.424	
LnWage Women	NO	YES	YES	YES	YES	2.067	0.559	506.471	0.000	135.530	
LnWage Men	YES	YES	YES	YES	YES	1.034	0.905	393.688	0.000	91.044	
LnWage Studied in Periphery	YES	YES	YES	YES	YES	1.097	0.895	692.840	0.000	163.108	
p(Perman Contr)	NO	YES	YES	YES	YES	5.208	0.157	899.319	0.000	245.106	
p(Fulltime)	YES	YES	YES	YES	YES	5.252	0.262	899.612	0.000	204.424	
p(VertMatch)	NO	YES	YES	YES	YES	4.135	0.247	899.319	0.000	245.106	
p(HorMatch)	NO	YES	YES	NO	YES	3.524	0.172	888.575	0.000	301.724	
p(Subj(GoodMatch)	YES	YES	YES	NO	YES	5.809	0.121	888.921	0.000	241.575	
p(NotLookingOthJob)	YES	YES	YES	YES	YES	2.739	0.602	899.612	0.000	204.424	
University											
LN Hourly Wage rate (LnWage)	YES	YES	YES	YES	YES	1.899	0.754	551.767	0.000	108.898	
LnWage Women	YES	YES	YES	YES	YES	7.555	0.109	293.192	0.000	56.544	
LnWage Men	YES	YES	YES	YES	YES	7.548	0.110	263.463	0.000	53.004	
LnWage Studied in Periphery	YES	YES	YES	YES	YES	4.528	0.339	461.418	0.000	115.976	
p(Perman Contr)	YES	YES	YES	YES	YES	3.821	0.431	551.767	0.000	108.898	
p(Fulltime)	NO	YES	YES	YES	YES	5.089	0.165	491.459	0.000	122.659	
p(VertMatch)	YES	NO	NO	YES	YES	2.121	0.346	164.579	0.000	41.670	
p(HorMatch)	YES	YES	YES	YES	YES	6.853	0.144	551.767	0.000	108.898	
p(Subj(GoodMatch)	YES	YES	YES	YES	YES	4.652	0.325	551.767	0.000	108.898	
p(NotLookingOthJob)	YES	YES	YES	YES	YES	6.406	0.171	551.767	0.000	108.898	

## APPENDIX B: FIRST-STAGE ESTIMATION RESULTS

The IV first stage provides some insight into what drives spatial mobility among college and university graduates. In Table B1, we report the first-stage estimations for the full college and university samples, IV models for  $\ln(\text{Hourly Wages})$ . Each IV specification has two first-stage equations: one for the endogenous variable *distance moved (km) res loc study – time of quest/1,000*, and one for *distance moved (km) res loc study – time of quest/1,000 squared*. In this appendix, we briefly discuss these first stages, even though some of the coefficients should be, broadly speaking, viewed as partial correlates and not as causal factors.

Distance moved appears U shaped in commuting distance for university graduates: as commuting distance increases, distance moved first decreases up to a commute of about 64 km and then increases. We find very little differences according to demographic factors. Also, the results according to graduation grade are mixed; the best university graduates appear to be more mobile, but the reverse holds for the college graduates. Across the board, distance moved is positively related to having studied abroad, having completed an internship abroad and a follow up education program (college only). It is also positively related to the time between graduation and survey as well the relative time spent as unemployed before finding work. College and university graduates move further in order to reach destination regions with many job opportunities and relatively higher growth rates (only college graduates). In particular college graduates who move far do so in the direction of more expensive regions, with lower unemployment rates. We find some differences in distance moved for graduates from different disciplines, relative to the graduates in behavioral sciences. Likewise, graduates having completed their programs in the peripheral areas in the Netherlands move further than those in the central region West.

The final group of variables is our proposed instruments. They have been excluded from the outcome equations. We find positive effects on distance moved from having grown up in the central region West. Strongly significant effects are found for prestudy mobility: for college and university graduates this amounts to an inverse U shape with a peak at around 177 and 181 km moved, respectively. Having parents who were not born in the Netherlands is not related to distance moved. Having commuted to the location of one's degree program is however: the relation is U shaped, with a low at around 72 km for college graduates and 78 km for university graduates.

TABLE B1 First-stage results

	IV				IV				IV			
	In(Hourly Wage)				In(Hourly Wage)				In(Hourly Wage)			
	College total				College total				University total			
	1st stage: distance				1st stage: distance sq				1st stage: distance			
	b	SE	Sig		b	SE	Sig		b	SE	Sig	
Spatial mobility												
Dist (km) commute/1,000	−0.051	0.045			−0.018	0.014			−0.122	0.044	**	
Dist (km) commute/1,000 sq	0.560	0.534			0.192	0.176			0.956	0.482	**	
Demographics												
Gender: female (0), male (1)	0.000	0.001			0.000	0.000		**	0.000	0.001		
Age at time of quest	0.002	0.003			0.000	0.001			0.002	0.007		
Age at time of quest sq/100	−0.006	0.007			0.000	0.001			−0.007	0.013		
Foreign born EU	−0.007	0.005			−0.003	0.001		**	−0.009	0.008		
Foreign born non-EU	−0.004	0.002			0.000	0.001			0.004	0.004		
Human capital												
Low grade [6,7>	−0.001	0.001			0.000	0.000		**	−0.003	0.002	*	
High grade [8,10]	−0.001	0.001		*	0.000	0.000			0.002	0.001	*	
Study duration in months/100	0.001	0.003			0.000	0.000			−0.003	0.002		*
Internship									−0.001	0.001		**
Relevant work exp	−0.001	0.001			0.000	0.000			0.001	0.001		
Management exp	0.001	0.001			0.000	0.000			−0.001	0.001		*

(Continues)

TABLE B1 (Continued)

	IV				IV				IV			
	In(Hourly Wage)				In(Hourly Wage)				In(Hourly Wage)			
	College total				College total				University total			
	1st stage: distance				1st stage: distance sq				1st stage: distance			
	b	SE	Sig		b	SE	Sig		b	SE	Sig	
Study abroad	0.003	0.001	**		0.001	0.000	**		0.010	0.002	***	
Internship abroad	0.005	0.001	***		0.001	0.000	***		0.007	0.002	***	
Follow-up education	0.002	0.001	*		0.000	0.000			-0.003	0.002		*
Transition study - job												
Duration time grad - quest in months/100	0.026	0.009	***		0.003	0.002	*		0.050	0.013	***	
Rel waiting time in unemployment	0.004	0.002	*		0.001	0.000	**		0.009	0.003	***	
Regional economic characteristics												
# suitable jobs dest t - 1 (1,000,000)	0.026	0.003	***		0.004	0.001	***		0.030	0.007	***	
Mean housing value dest t - 1 (1/100,000)	0.002	0.000	***		0.000	0.000	***		-0.001	0.001		
Reg econ growth rate dest t - 1 (%)	0.001	0.000	***		0.000	0.000	***		0.001	0.001		
Reg unempl rate grads dest t - 1 (%)	-0.001	0.000	***		0.000	0.000	**		0.001	0.001		
Dummies: year of observation, field of study, home region, study region												
Year 2007	-0.001	0.001			0.000	0.000			0.000	0.001		
Year 2008	-0.002	0.001	**		0.000	0.000	**		-0.002	0.002		
Agriculture	0.005	0.002	**		0.000	0.000			-0.023	0.008	***	
Teaching	0.001	0.001			0.000	0.000						
Engineering	0.005	0.001	***		0.001	0.000	***		0.003	0.002		
Economics	0.002	0.001	***		0.000	0.000			0.008	0.002	***	

(Continues)

TABLE B1 (Continued)

	IV				IV				IV			
	In(Hourly Wage)				In(Hourly Wage)				In(Hourly Wage)			
	College total				College total				University total			
	b	SE	Sig		b	SE	Sig		b	SE	Sig	
Health care	0.005	0.001	***		0.001	0.000	**		0.011	0.002	***	
Arts, language & culture									0.001	0.002		
Law									0.006	0.002	***	
Natural Sciences									0.005	0.002	**	
Study region North	0.030	0.002	***		0.004	0.000	***		0.052	0.005	***	
Study region East	0.011	0.001	***		0.001	0.000	***		0.046	0.008	***	
Study region South	0.006	0.001	***		0.001	0.000	***		0.027	0.002	***	
Excluded from outcome equation												
Home region is West Yes (1)/No (0)	0.002	0.001	**		0.000	0.000			0.005	0.001	***	
Dist (km) home – study/1,000	0.584	0.021	***		0.067	0.004	***		0.473	0.029	***	
Dist (km) home – study/1,000 sq	–1.649	0.085	***		–0.192	0.021	***		–1.304	0.125	***	
Parent(s) foreign born	–0.001	0.001			0.000	0.000			–0.002	0.002		
Dist (km) study commute/1,000	–0.670	0.022	***		–0.150	0.004	***		–0.663	0.031	***	
Dist (km) study commute/1,000 sq	4.631	0.078	***		1.345	0.018	***		4.255	0.133	***	
Constant	–0.025	0.040			0.004	0.008			–0.037	0.094		
N	17,698				17,698				8,550			
R <sup>2</sup>	0.592				0.791				0.485			
Adj. R <sup>2</sup>	0.591				0.790				0.482			

\* $P < 0.1$ , \*\* $P < 0.05$ , \*\*\* $P < 0.01$ .