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Human capital as a location factor: An empirical investigation of relocating firms and their labour force in the Netherlands

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Abstract. This paper examines the role of human capital as a location factor in the context of long-distance firm relocations. Using rich register data on single-plant firms in the Netherlands 2006–2011, the paper enquires into whether relocation is motivated by the wish to improve the access to employees and the quality of labour force. Not disrupting existing spatial relationships is a prominent consideration of relocating firms, yet in general, relocation does not result in a better spatial match. Some evidence is found for firm-specific human capital functioning as a keep factor. Relocating firms retain predominantly highly skilled employees, but general human capital itself functions neither as a keep factor nor as a pull factor.

JEL classification: J23, J24, R12, R30

Key words: Firm relocation, human capital, location factors, embeddedness

1 Introduction

The role of human capital in stimulating regional job creation is of great interest for scholars and policy-makers. New industries, such as services and especially knowledge services, are crucial for economic viability but they respond to different location factors than traditional industries; human capital is one of the main suspects for such new location factors. This paper focuses on the role of human capital in one of the mechanisms of regional job creation, namely, long-distance firm relocations (here defined as relocations over distance greater than 30 kilometres). The advantage of focusing on firm relocations of all the regional job creation mechanisms is that they entail an explicit comparison of two locations by a well-defined decision-maker. One or both of those aspects are absent when analysing regional differentials of firm entries/exits or employment growth in firms, which renders regional comparisons much cruder.

The focus on firm relocations allows comparing the composition of the workforce in the old and new locations as well as exploring the characteristics of employees that stay with the firm or leave around the time of disruptive relocation event. Therefore the findings enable us to sketch a nuanced picture of the role of various characteristics of the labour force, which we believe to pertain also to other types of firms' spatial behaviour that do not lend themselves so well to

in-depth analysis. In addition, understanding what motivates firm relocation and the employment dynamics that go with it is important in its own right considering the vast amounts of money spent by national and regional governments to either encourage firm relocation and so stimulate job creation or to retain firms put and prevent job loss (Geerdink and Stauvermann 2009).

The paper contributes to a better understanding of the role of human capital to firms and job creation in general and to firm relocation in particular. Such a contribution is important considering the extremely diverse discourse on the new role of human capital in different outlets, such as academic research, policy documents and consultancies reports. In order for human capital to be an important location factor, two conditions have to be met: first, human capital has to be important compared to other production factors; second, it has to be scarce, at least in some locations. The first condition has raised little controversy: there is a broad consensus that the importance of human capital has soared in comparison to that of other factors of production (see e.g., Drucker 1993; Florida 2002; Moretti 2012). The question that has been much more fervently debated is how scarce human capital is. It has been, for instance suggested, that the increased demand for human capital has been (more than) matched by the increased human capital levels that the employees possess and by easier access to the labour force globally, eliminating the need for the firms to go to great lengths to attract and retain human capital (Brown et al. 2008, 2011). Also the role of cyclical fluctuations has been subject to debate. Some argue that the demand for human capital has decreased in the time of the great recession, as indicated by rising unemployment, and the statements from prior to the great recession overestimate how universal the human capital scarcity is (Lazear and Spletzer 2012; Rothstein 2012; Levine 2013; Hotchkiss et al. 2014; Abraham 2015; Erken et al. 2015). Others, however, view unemployment as structural rather than cyclical and having to do with skill mismatch rather than low aggregate demand (Estevão and Tsounta 2011; Daly et al. 2012; Holzer 2015; Furlanetto and Groshenny 2016).

The role of human capital has been much less prominent in firm relocation research. Firm relocation research has acknowledged that considerations pertaining to both the internal labour force and labour market in general are potentially of influence in firms' relocation decisions (van Dijk and Pellenbarg 2000, forthcoming). Firm relocation policy evaluations and advice typically focus on relocating the employees together with the firm as the key determinant of the success of the relocation (Munton et al. 1993; Cooper 1996; Sagie et al. 2001). Regardless, human capital has received limited attention in empirical analyses in the firm relocation literature. It has been confined to including wage levels (Kronenberg 2013) or aspects of human capital as crude regional characteristics (e.g., Holl 2004; Weterings and Knoben 2013) as some of the explanatory variables. Little is known about how the relative spatial immobility of the employees enters the picture before the actual relocation in the relocation decision-making process, to what extent the risk of not successfully moving the employees can deter the relocation and to what extent the relocation itself improves the access to and the job relationships with the new and current employees.

The paper is organized in the following way. In Section 2 the aspects of human capital pertaining to firm relocation are elaborated on and the hypotheses are formulated. Empirical strategy and results are presented in Sections 3 and 4. Lastly, the conclusions are given.

2 The role of human capital in firm relocation

We suggest that firm relocation is motivated by seeking proximity to human capital. This entails both being able to hire employees closer by and being able to hire higher quality employees. In this section, we elaborate on both of those aspects pertaining to firm relocation.

First, firms can be expected to relocate to be closer to their (potential) labour force. Labour markets have traditionally been seen as geographically confined (as for instance, in labour pooling of Marshall 1890). Because of employees' aversion to spatial mobility, firms' ability to fill vacancies largely depends on the availability of labour force locally, especially if the vacancies need to be filled quickly or if the jobs are for short duration.

Access to human capital is likely to be considered when starting a firm; yet location preferences with regard to human capital can be adjusted later if the importance of access to human capital is re-evaluated or if the access to human capital in the old location worsens. A decline in area's ability to meet local labour demand is not uncommon as employees' and firms' location preferences are not necessarily aligned. Betz et al. (2016) show that highly educated preferred metropolitan areas with agglomeration and natural amenities in the US in the 2000s. No/weak evidence is found for the share of highly educated growing in metropolitan areas characterized by rapid growth of smart industries or presence of upskilling industries. Thus as in some areas labour demand cannot be met locally, at least with regard to the highly mobile group of highly educated, incentives arise for firms to relocate. This argument is summarized in the first hypothesis:

Hypothesis 1. *A good spatial match with employees functions a keep factor and as a pull factor with regard to firm relocation.*

Second, it can be expected that relocating firms are motivated by considerations of the quality of their labour force. Relocation affects characteristics of firms' labour force in two ways. First, a firm can tap into a different regional labour supply; second, relocation disrupts – possibly selectively – the relationships with internal labour force.

These considerations can be approached from the perspective of general and firm-specific human capital (Becker 1964). The changing roles of general and firm-specific human capital have also been extensively discussed individually, as well as contrasted to each other, in academic as well as non-academic outlets.

One popular view stresses the rising importance of talent that does not depend on firm-specific environment and can be easily transferred between jobs (Michaels et al. 2001; Goldin and Katz 2009; Moretti 2012). For instance, Michaels et al. (2001, pp. 6, 16) describe the shift from 'the old reality [where people need companies to] the new reality' where companies need people. In the new reality, the company, the jobs and the strategy are shaped to appeal to talented people.

Another view stresses the importance of hiring competent people (Pfeffer 1994), but organization, culture and synergies are argued to be more important than individual talent (Pfeffer 2001, for supporting empirical evidence see Groysberg et al. 2008). A modern firm achieves its competitive advantage through people (Pfeffer 1994), the competitive advantage can be sustained 'through facilitating the development of competencies that are firm specific, produce complex social relationships, are embedded in a firm's history and culture, and generate tacit organizational knowledge' (Lado and Wilson 1994, p. 699).

With regard to general human capital, it can be expected that firms do not only want to be closer to employees they hire but that they also want to hire higher quality employees. Selective migration of labour force can influence what employees a firm has access to. Also, how well a location fits firm's hiring needs can change if the hiring needs themselves change. Such changes were prominent in the recent decades: Scott (2010) documents a shift in the US from employment involving manual skills towards employment requiring cognitive and cultural skills, the latter being also associated with higher education levels. Similarly, Hardy et al. (2016) observe in Central and Eastern European countries an increase of non-routine cognitive tasks, associated with higher education levels, and decrease in manual tasks, associated with lower education

levels. Moreover, as Hansen et al. (2014) show, the change of role of human capital is not only due to more knowledge intensive activities replacing less knowledge intensive activities, but also the traditional industries become more human capital oriented. So a firm might be willing to move to a location with large supply of labour force with high levels of human capital, if in the present location the firm does not employ highly skilled people nor can hire them easily. This leads to the second and third hypothesis:

Hypothesis 2. *Being able to hire people with high levels of general human capital functions as a keep factor and as a pull factor with regard to firm relocation.*

Hypothesis 3. *Firms retain employees that possess higher levels of general human capital than other employees.*

At the same time, with regard to internal labour force, firms might find it important to preserve the continuity and tacit knowledge that has been accumulated. For instance, Stam (2007) shows that a firm's reluctance to relocate is attributable to firm-specific capital possessed by the employees and to perceived difficulty to replicate complex job relationships in another location with other employees. Stam (2007, p. 40) cites an entrepreneur stating 'You must take account of the fact that about half your team will say: I'm not coming with you, and ... so, what does that mean? Is your continuity put at risk? Yes, perhaps a little. And then you must think about it. For some of it you wouldn't want to move at all'. These considerations are summarized in the fourth and fifth hypotheses:

Hypothesis 4. *Having high levels of firm-specific human capital acts as a keep factor with regard to firm relocation.*

Hypothesis 5. *Firms retain employees who possess higher levels of firm-specific human capital than other employees.*

To conclude, given the increased importance of human capital we can expect that considerations of geographical proximity to labour force and of quality of labour force are important to firms reconsidering their location. Those considerations pertain to both internal and external labour force. The quality of labour force here is defined by two aspects of human capital, which loosely correspond with Becker's general and firm-specific human capital as conceptualized by Becker (1964), Mincer and Jovanovic (1979) and Topel (1991). Firms are driven by desire to find better general human capital but they are kept by the firm-specific human capital. Firms that do relocate, are willing to retain the employees with high levels of general and firm-specific human capital.

The retention of employees depends not only on firms' relocation policies but also on employees' spatial mobility, career prospects outside the firm and personal situation. As we are merely interested in the outcome – which employees are retained by relocating firms – rather than in fully understanding the mechanisms behind employee retention, only descriptive evidence is presented with regard to Hypotheses 3 and 5.

3 Empirical strategy

3.1 Data and approach

As we do not directly observe firm's decision-making, we infer the role of human capital as a keep factor or pull factor from firms' hiring in different locations. For that purpose, rich register

data provided by Statistics Netherlands is used. The datasets contain micro-level information, linking firms, jobs and people. The data allow us to trace the changes in firm's location, firms' employee composition and employees' residential locations. The datasets cover Dutch labour market from 2006 to 2011 with the location of the firms recorded at municipality level once a year at the end of the year. The final dataset consists of firm-year observations. We determine whether a firm has relocated between municipalities by comparing the location in two subsequent years.

The decision-making with regard to relocation is different depending on the relocation distance (Weterings and Knoben 2013). Aiming to identify the moves that considerably modify the distance to old and potential new employees, we select only the relocations over distances greater than 30 km, measured between the centres of municipalities. Such a relocation has a considerable impact on the spatial firm-employee relationships as commuting distances are fairly short in the Netherlands: in the selected firms median commuting distance measured between the centres of municipalities at personal level is 0 km, 80th percentile is 19.8 km. This is reasonably in line with the observations for the general Dutch population. For instance, people who found a new job of at least 12 hours per week in 2012 in the Netherlands and did not relocate for the job, commuted on average 12 km to the new job. Those who did relocate moved over 17 km distance on average (Bierings and de Vries 2014).

Since we are only interested in moves that present certain trade-offs between locations, the focus lies solely on one-plant firms and complete relocations. Additionally, our considerations of the role of human capital mainly apply to independent business entities rather than state-owned establishments or households. That is why we exclude industries in which these entities are prevalent. Also excluded are the industries with activities that strongly rely on location-specific natural resources as their location behaviour depends predominantly on the characteristics pertaining to those resources. The analyses also do not cover temporary employment agencies; due to their mediating role we expect the job relationships between them and the temporary labour force to be somewhat atypical; unfortunately the data does not allow linking temporary labour force to the firms where the actual work is performed (see Table A1 in the Appendix for a list of excluded industries). Firms with one or two employees only are not selected for the analyses since in those firms we cannot distinguish between personal and business-related relocation motives. Koster and Venhorst (2014) show, for instance, that for the self-employed, living and working locations often overlap and residential motives take the lead in location adjustments.

In order to obtain consistent results, we have also taken the following measures. Where firm-level variables are aggregated from employee-level data, they are only calculated if the values are non-missing for at least half of the employees, otherwise the firm-level variable is also set to missing. As mentioned before, if there are missing values in any of the years, the firm is removed completely. Also, to be able to calculate organizational tenures unambiguously, firms are only included if all the jobs that start in a firm also end in the same firm and vice versa. One remaining inconsistency, the influence of which we believe to be negligible, is that firms are sometimes assigned to different industries in different years, blurring the inferences of differences between industries. However, this affects relatively few observations: 3.65 per cent of all observations are in firms that are assigned to different industries in different years.

Thus, the initial selection (also additional adjustments are made dictated by the design of individual analyses) constitutes of firm-year observations of firms located in the Netherlands for which the location and the industry are known and which are assigned to NACE rev.2 industries other than those listed in Table A1. The selected firms also are in the dataset for at least four consecutive years, remain single-plant throughout the time span analysed and can be linked to at least three employees on 31 December of all the years when they are in the dataset. For consistency over time, if there are missing values in some years, the firm is excluded completely. As firms are followed before and after the relocation, only firms with one relocation recorded in the

time span analysed are included in order to be able to assign observations to time categories unambiguously (they also form the majority of relocated firms: 97.3% of all relocated firms relocate only once in the time span analysed). This leaves us with a selection of 134,470 firm-year observations, out of which 365 indicate long-distance relocation.

Synthetic relocation cohorts are constructed to follow the firms in time before and after the relocation. Firms can be followed from the fourth year before the relocation at earliest to the fourth year after the relocation at latest. We are interested in genuine long-term changes in (the access to) human capital in a firm, yet as we will show in descriptive statistics in subsection 4.1, the relocation also has short-term disruptive effects in job relationships until the firms and the employees adjust. To eliminate those short-term effects, we mostly focus on firm-year observations that do not directly precede/succeed relocation.

3.2 *Models specification*

In the first place, binary logistic regression is conducted to predict firm's propensity to relocate depending on the spatial match with the employees and the human capital levels in the firm.

The main independent variables identified in Section 2 are: geographical proximity to employees, general human capital of the employees, firm-specific human capital of the employees.

- The geographical proximity to employees indicates that a spatial match has been achieved and that a long-distance relocation is likely to affect it negatively. We intend to capture other factors of influence to the hiring distance, such as the specialization and scarcity of the skill required by the vacancy, by education and firm employment growth variables. We distinguish between the proximity to new hires (HIRINGDIST) and the proximity to all employees in the firm (ALLDIST).
- We use education level in a firm as a proxy for general human capital (EDUC). Measures based on educational attainment are the most popular proxies for human capital (OECD 1998). Firms that have been able to accumulate high levels of valuable human capital are expected to be reluctant to leave it behind and exit the region.
- We use mean organizational tenure (TENURE) as a proxy for the level of firm-specific human capital. In literature on firm-specific capital on a personal level, it is argued that firm-specific capital naturally increases with the time spent in a firm (Topel 1991). In some instances, we also use employment churning (CHURN, the employment dynamics that does not result in employment growth) as a measure for job stability in the short term. This measure is convenient when analysing the time trend from before and after the relocation or when comparing firms after the relocation with non-relocated firms.

In addition, we control for several firm-level and region-level variables that have been shown to play a role in firms' relocation decisions:

- Firm size (SIZE). Small firms are known to be more mobile as found by van Dijk and Pellenbarg (2000), Brouwer et al. (2004), Kronenberg (2013), Weterings and Knoben (2013), see Brouwer et al. (2004) for a more extensive explanation.
- Employment growth dummies (POSGROWTH and NEGGROWTH). Positive growth presents firms with different location requirements: new premises might be sought, but also new production outlets, labour markets and suppliers. The previous findings on the effects of negative growth on relocation are conflicting: cf. Brouwer et al. (2004) and Kronenberg (2013).
- Firm age (TENUREMAX). Old firms are more embedded in the local environment and thus less willing to relocate (Brouwer et al. 2004). Since we do not have reliable data on the age of firms, the longest organizational tenure is used as a proxy for the firm age.

- Average workload per job, in full time equivalents (FTEs) (WORKLOAD). How complicated a long-distance relocation is, relates not only to the magnitude of work performed in the old location, as measured in FTEs, but also to the number of job relationships in the old location. This variable addresses the relationship between the FTEs and jobs.
- Industry dummies. Six broad industries are distinguished: manufacturing (MANUF), utilities and construction (UTILCON), wholesale (WHOLESALE), retail (RETAIL), knowledge-intensive services (KNOWLSERV), other services (OTHERSERV).
- Dummy variable to indicate whether a firm had inflows in a certain year (NOINFLOWS). While for some firms the mean hiring distance cannot be computed as the firm has not done any hiring meeting the requirements in that specific year (that is, the missing values occur not because the values are unknown but because they genuinely do not exist), the missing values are replaced with series mean and a dummy is created to capture this effect.
- Home region (NUTS 3 area) variables: industry variety (HH), location quotient of the industry that the firm is in (LQ), working age population density (POPDENS). These variables are intended to capture the nature of job transitions and business environment in a broad sense in the local labour market. Working age population density and location quotient also reflect the density of the labour market, providing more opportunities for both labour pooling and labour poaching.
- Education level in region-industry combination (weighted, EDUCREGIND). Despite the recent emphasis on the importance of highly-skilled employees, there is still a variety of jobs at different skill levels. As the reasonable and desirable levels of human capital are likely to vary across regions and industries, education level in region-industry combination to establish a baseline.

The operationalization of the variables is described in Table 1.

Second, OLS regressions are conducted with dimensions of human capital in the firm as the dependent variables to analyse the effect of relocation. Dummy variables are used to indicate whether the firm has relocated in the time span analysed and whether the firm-year observation comes from post-relocation period. In such a way, it is similar to difference-in-differences approach but is simplified due to not being able to define the post-treatment effect for the non-relocated firms. Again, to eliminate the short-term turbulence around the relocation, the firm-year observations from the first year before the relocation, year of relocation and the first year after the relocation are removed.

In the OLS analyses the dependent variables are education level, employment churning and hiring distance. Additionally the following variables are used:

- Dummy variable indicating an observation of a firm that has relocated in the time span analysed (RELFIRM).
- Dummy variable indicating an observation in the post-relocation period (AFTERREL).

4 Results

4.1 Descriptive statistics

In order to explore what role human capital plays in firms' long-distance relocations decisions, in this section we show how different dimensions of human capital compare in firms before and after relocation as well as in non-relocating firms (see also Table 6).

Table 1. Operationalization of variables used in analyses

Variable	Operationalization
HIRINGDIST	Average distance in kilometres to residential locations of new employees one month before the job commences. It is calculated for all new inflows throughout the year that stayed in a firm for at least thirty calendar days. Weighted.
ALLDIST	Average distance in kilometres to residential locations of all employees working at the firm at the end of the year. Weighted.
EDUC	Share of employees with higher education (associate degree and higher). Weighted.
CHURN	The calculation is based on Burgess et al. (2000). $\text{CHURN} = (\text{employee inflows} + \text{employee outflows} - \text{employment growth}) / \text{average employment size in the firm.}$ Weighted.
TENURE	Mean organizational tenure of all employees that work at the firm at the end of the year. Weighted.
SIZE	Firm employment size in FTEs at the end of the year.
POSGROWTH, NEGGROWTH	Dummies indicating whether employment growth in the firm is greater than 5% or smaller than -5% respectively.
TENUREMAX	The longest organizational tenure at the firm.
WORKLOAD	FTEs and jobs ratio in the firm.
MANUF, UTILCON, WHOLESALE, RETAIL, KNOWLSERV, OTHERSERV	Industry dummies: manufacturing (NACE rev.2 section C), utilities and construction (sections D, E, F), wholesale (groups 45 and 46 in section G), retail (group 47 in section G), knowledge-intensive services (sections J, K and M), other services (sections H, I, L, N, S).
NOINFLOWS	Dummy variable to indicate whether a firm had inflows in a certain year. It is used to account for missingness in HIRINGDIST that arises from firms not having inflows in some years. Where NOINFLOWS is used, the missing values in HIRINGDIST are replaced with series mean.
HHI	Herfindahl-Hirschman index at two-digit level of NACE rev.2 in NUTS 3 region.
LQ	Location quotient of the industry that the firm is in. Calculated using two-digit NACE rev.2 industries and NUTS 3 regions.
POPdens	Working age (15-65) population density in NUTS 3 region, in thousands of inhabitants per square kilometre.
EDUCREGIND	Share of population with higher education (associate degree and higher) in firm's original NUTS 3 region and industry.
RELFIRM	Dummy indicating whether the firm has relocated in the time span analysed.
AFTERREL	Dummy indicating whether the observation comes the post-relocation period of a relocated firm, an interaction between RELFIRM and time variables.

Notes: Where indicated, jobs are weighted by their workload (in full time equivalents) when calculating the firm-level aggregates from individual jobs. All the distances are measured between the centres of municipalities.

Long-distance relocation is an infrequent event. While 1.38 per cent of firm-year observations indicate a municipality change, only 19.6 percent of those moves cover distance greater than 30 kilometres, measured between the centres of municipalities. No clear patterns of firm migration emerge comparing origin and destination regions (NUTS 3 areas): they are similar in terms of working age population density (681 versus 666 people per square kilometre in the old and new location respectively), industry diversity (Herfindahl-Hirschman index is 0.042 in both the old and the new location) and concentration of relocating firm's industry (location quotient of 1.23 in the old location versus 1.20 in the new location). Individual examination of NUTS 2 areas shows that in most of the cases net firm migration is close to zero. The greatest firm receivers in relative terms are the provinces (NUTS 2 areas) of Flevoland and Gelderland (received

1.8% and 12.4% of all relocating firms respectively, lost 1.3% and 10.2% of all relocating firms respectively) and the greatest firm donors are Zuid-Holland and Noord-Holland (received 24.5% and 20.2% of all relocating firms respectively, lost 25.2% and 21.7% of all relocating firms respectively). This is in line with the observation made by Pellenbarg et al. (2002): one of the main firm migration directions in the Netherlands is from the centre of population and economic activity towards an intermediate zone, surrounding the centre. Even so, the trend is not very pronounced given the relatively similar magnitude of firm emigration and immigration.

Next we look into changes in labour force composition around the time of relocation. As shown in Figure 1, the employment growth is high in firms before relocation (but with a very high variance) and slows down after the relocation, though the employment growth in non-relocating firms also follows a similar trend in time.¹ However, the modest employment growth after the relocation is achieved by having substantial inflows of employees hired in the new location, as the employees who did not relocate need to be replaced.

As far as the stability of job matches is concerned, employment churning peaks in the year of relocation and declines afterwards, but it still seems in general to remain above the level of non-relocated firms, with the exception of the dip in the first year before the relocation. (Figure 1). It must also be noted that the variation in all of the human capital variables is predominantly between-firm variation: the intraclass correlation coefficients for human capital variables used in regression analyses (spatial match variables, general and firm-specific human capital variables) vary between 0.42 and 0.91.

Another way to compare job stability is to look into the mean organizational tenure data. As it reflects long-term past trend, the tenures after the relocation are affected by the disruptive relocation event and comparisons in time are not meaningful. However, the advantage is that looking into tenures data allows comparison of job stability at an individual level. So for instance, employees who stay with the firm have shorter tenures (on average 2.70 years in the first year before relocation) than all employees in the firm (on average 3.00 years). This is in contrast to Hypothesis 5 predicting that employees with long tenures are more inclined to stay. However, the findings could probably be explained by positive correlation between organizational tenure and age (correlation coefficient equals 0.50). Older age is associated with greater embeddedness in the home area and a shorter time to reap the benefits of a good match, resulting from spatial mobility.

Changes in spatial relationships with the employees are relatively small but in the expected direction. Relocation has substantial short-term effects: the distance to new inflows as well as the distance to all employees peak in the first year before the relocation and gradually decrease afterwards. However, Figure 2 is suggestive of the distance to new inflows and the distance to all employees being lower after the relocation than before the relocation, also when the short-term turbulence wears off. It must be noted that the distance to new inflows and the distance to all employees always remain higher than that of non-relocated firms by a very large margin. This can indicate that relocating firms are very inefficient hirers or they are much less sensitive to distance to employees than an average firm. Possibly, the jobs in these firms require employees to routinely be in locations other than the location of the employer or perhaps teleworking is widespread. Indeed, Table 2 shows that relocating firms are overrepresented in wholesale and knowledge services, where the location of work is often more loosely connected to the location of the firm.

In addition, long-distance relocations are less disruptive to the spatial relationships with the employees than it could be expected due to mutual adjustments by the firm and the employees. The employees that stay in the firm do not experience increase in commuting distances (Figure 2) due to several factors. First, large initial distances to the employees enable relocating firms to make relatively long moves with only moderate modifications in the distance to the

¹ As the lower limit for employment growth is -1 but there is no upper limit, there are many positive outliers that influence the results. If cube root transformation is used to give the outliers less weight, the trend remains the same.

Fig. 1. Comparison of job dynamics in relocating and non-relocating firms

Fig. 2. Comparison of distance to employees in relocating and non-relocating firms

Table 2. Comparison of relocating and non-relocating firms

	Relocating firms in the year of relocation	Non-relocating firms in 2007
SIZE, mean	8.73	8.76
MANUF = 1 (%)	3.6	6.7
UTILCON = 1 (%)	3.3	4.6
WHOLESALE = 1 (%)	14.5	10.3
RETAIL = 1 (%)	10.7	19.9
OTHERSERV = 1 (%)	20.6	37.2
KNOWLSERV = 1 (%)	47.4	21.3
N	365	24797

employees. The weighted mean distance between a relocating firm and its employees is 44.8 km before the relocation, the weighted mean distance between the pre-relocation residential locations of the same employees and the post-relocation location of the firm is 42.5 km, introducing a slight decrease. In addition, this distance is 37.7 km for the employees that stay in the firm in the year after relocation and 37.4 km for the employees that stay in the firm in the second year after the relocation. This suggests that there is also a selection of employees staying in the firm depending on their new commuting distances. Alternatively, it could be that the firms primarily adjust their location to the locations of the most important core employees that the firm is willing to retain in the long term. Lastly, the employees of relocating firms also adjust their residential location to the new location of the firm: they change the municipality more often than the employees of non-relocating firms, predominantly in the year of the relocation.

Relocating firms employ highly educated workers, but the educational levels are not upgraded by means of relocation. The higher education levels in relocating firms are partially explained by them being in high education level region-industry combinations. As Hypothesis 3 predicts, core employees with high levels of education are retained and employees with lower levels of education are replaced with local employees, yet in general the after-relocation education levels remain at the same level as before the relocation (Figure 3).

The figures show considerable dynamics around the time of relocation. This could be explained by anticipation effects and other short-term turbulence associated with the move. As we are primarily interested in the longer-term effects of the move, in logistic regression the outcomes will be calibrated against the situation two to four years before the move. Firms that do not relocate are also benchmarked against their situation two to four years before the observation year. In OLS regressions, the observations from the first year before the relocation to the first year after the relocation are excluded from the analyses.

4.2 Human capital as a keep factor in firm relocation

4.2.1 Results

Descriptive analysis suggests that long-distance firm relocation is motivated by suboptimal spatial match with employees. No evidence or only very weak evidence is found that the firms are

Fig. 3. Comparison of education level in relocating and non-relocating firms

kept put by general or firm-specific human capital. However, due to synthetic relocation cohort approach used, the estimates calculated at different points in time are based on different samples of firms and affected by different macroeconomic conditions of the time. In this section we assess the findings of subsection 4.1 by means of logistic regression, also controlling for a number of firm, region and industry characteristics.

First, we check whether looking into dimensions of human capital forms a meaningful addition to understanding firm relocation. In Table 3 regression (1) we include all variables described in subsection 4.2, except the human capital variables. They correspond to a great extent to variables typically used in firm relocation research. In regression (2) also the human capital variables are included. Human capital variables considerably improve the model, especially the spatial match variables (McFadden's pseudo R squared increases from 0.0849 to 0.1560).

Lower mean employees' commuting distance is related to a lower propensity to relocate and spatial match variables are jointly statistically significant at 0.01 level. Due to correlation

Table 3. The effects of different aspects of human capital on firm's propensity for long-distance relocation, log odds

	Dep. var. = relocation in the second to the fourth year after the independent variables are observed	
	(1)	(2)
Human capital variables		
EDUC		0.611 (0.385)
TENURE		-0.210 (0.088)**
HIRINGDIST		0.002 (0.003)
ALLDIST		0.030 (0.004)***
Firm level control variables		
NOINFLOWS		-0.453 (0.368)
SIZE	0.004 (0.002)**	0.000 (0.003)
POSGROWTH	0.187 (0.175)	0.005 (0.087)
NEGGROWTH	0.359 (0.211)*	0.328 (0.225)
TENUREMAX	-0.054 (0.023)**	0.016 (0.028)
WORKLOAD	1.871 (0.597)**	1.300 (0.620)**
Industry and region control variables		
Industry: UTILCON (MANUF being the reference category)	-0.923 (0.765)	-0.911 (0.777)
Industry: WHOLESALE	-0.704 (0.582)	-1.051 (0.597)*
Industry: RETAIL	0.515 (0.597)	0.374 (0.618)
Industry: OTHERSERV	0.308 (0.523)	0.029 (0.541)
Industry: KNOWLSERV	-0.496 (0.517)	-0.705 (0.523)
HHI	-6.725 (16.568)	-15.534 (17.858)
LQ	-0.721 (0.290)**	-0.756 (0.280)**
POPDENS	0.075 (0.230)	0.164 (0.238)
EDUCREGIND	3.459 (0.693)***	2.421 (0.849)**
Dummies: maximum number of years that the observation precedes the relocation fact	+	+
Year dummies	+	+
N	76171	76171
Mc Fadden's pseudo R squared	0.0849	0.1560
Prob > chi2	0.0000	0.0000
Log likelihood	-1345.994	-1241.373
BIC	2905.562	2752.524

Notes: Standard errors clustered by firm in parentheses (In logistic regression not only the standard errors but also the point estimates can be affected by the clustered structure of the data. However, due to large number of small clusters we expect the effect of clustering on point estimates to be negligible). *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

between distance to new employees and distance to all employees, distance to new employees is only statistically significant if distance to all employees is excluded. Thus as Hypothesis 1 predicts, good spatial matches deter firms from long-distance relocation, controlling for education level and firm employment growth. Low mean organizational tenure is associated with higher firm's propensity for long-term relocation, thus, as Hypothesis 4 predicts, high levels of firm-specific capital make a firm less willing to relocate.

However, in contradiction to Hypothesis 2, firms with highly educated employees are not less likely to exit the region. The coefficient for share of highly educated is not statistically significant after controlling for the share of highly educated in the region-industry, however, the share of highly educated in the region industry is positively statistically significantly associated with propensity to relocate. Also, if spatial match variables which are correlated with education levels are excluded, firms with higher education levels are even shown to have a higher propensity for long-distance relocation ($p=0.054$). Thus in general, firms with many educated employees are more likely to relocate, to some extent this remains true also after having accounted for the education level that is common in similar firms. Possibly, such firms have highly career-oriented labour force and can count more on them relocating together with the firm. In any case, this finding suggests that the firms' rootedness is driven primarily by firm-specific rather than by general human capital.

To facilitate a straightforward interpretation of the effect size, next to log odds we also calculate the marginal effects for the main independent variables. The marginal effects are calculated at mean response values of other variables (see Hoetker 2007). The results indicate that ten additional years in mean organizational tenure is associated with 0.57 per cent lower probability to relocate. Ten additional kilometres in distance to all employees and new inflows is related with 0.08 per cent and 0.01 per cent increase in relocation probability respectively (but only distance to all employees is statistically significant when both are included together). 10 per cent increase in share of highly educated employees is associated with 0.17 per cent higher probability to relocate, though this result is not statistically significant. While the changes in probability look small, it must be kept in mind that they apply to a small baseline probability: in the sample used in this regression only 0.28 per cent of the firms experience the relocation event.

In addition, we find that localization economies in home region deter firms from long-distance relocation. Firms with more full-time employees have a higher propensity to relocate.

4.2.2 Robustness checks

In this subsection we perform robustness checks: first, in different specifications we measure the variables at different times relative to the relocation; second, we check whether the results are sensitive to different distance thresholds in defining long-distance relocation. Earlier in the paper we suggest that the propensity to relocate is determined by between-firm variation and that the short-term turbulence caused by relocation can be eliminated by excluding the observations from the year of relocation and the first year before relocation. If this is so, we can expect that the effects of human capital variables are consistent regardless of whether they are measured in the second, third or fourth year before the relocation. The results of regressions testing this are presented in Table A5 in the Appendix. Mean organizational tenure is statistically significant when measured in the second and in the third year before the relocation but not in the fourth year before the relocation. However, the lack of statistical significance is likely to arise from a small number of firms with positive event (there are 129 positive events when the independent variables are measured in the second year before relocation, the number of positive events is 67 and 18 for the third and fourth year before the relocation, respectively). The spatial match variables are jointly statistically significant in all the years.

Next we check whether the results are sensitive to the relocation distance. Relocation over 30 km distance seems disruptive in the Dutch context given fairly tight spatial match between the employers and the employees; yet outside of this specific context, even the modified distances can still be seen as within reasonable commuting range. In this robustness check, we focus on a more disruptive relocation over distance greater than 60 km, measured between the centres of the municipalities, as opposed to 30 km used in the main specification. Because of the rarity of the newly defined relocation event (only 71 firms in the sample relocate over distance greater than 60 kilometres), we conduct both logistic regression and penalized maximum likelihood estimation. However, as the outcomes are similar, only logistic regression results are reported.

The results, compared to the main specification, are similar with one exception: the effect of mean organizational tenure becomes statistically not significant. This is somewhat surprising: relocations over longer distances could be expected to be more disruptive in terms of quantity of employees that the firm is able to retain and the stress that the retained employees experience. Therefore the importance of quality of labour force can be expected become greater with greater relocation distances. A possible explanation is offered by an examination of distances to employees. While they are greater in firms relocating over more than 30 kilometres distance than in firms that do not relocate, in firms relocating over more than 60 kilometres distance they are greater yet (mean distances to all employees and new employees are 10.6 km and 13.2 km in non-relocating firms respectively, 29.3 km and 28.2 km in firms that relocate over distance between 30 and 60 km, 41.2 km and 44.7 km in firms that relocate over distance greater than 60 km). Thus relocation is rarely a disruptive event in terms of radical change of spatial relationships with the employees; rather firms only opt for the relocation if it is not very disruptive.

To conclude, tight spatial match with the employees deters firms from exiting the region, mixed evidence of the same effect is found for high levels of firm-specific human capital. General human capital of the employees, however, motivates rather than deters firm long-distance relocation.

4.3 *Human capital as a pull factor in firm relocation*

4.3.1 Results

The previous subsection shows that lower levels of firm-specific human capital and suboptimal spatial matches with internal and external labour force are associated with higher propensity to relocate (though some results are sensitive to the definition of long distance relocation). In this subsection we examine to what extent the relocation results in improvements in general human capital levels and spatial matches with the employees.

The effects of relocation on the firm's relations with its human capital are further explored using OLS regression. Mean hiring distance and education levels are used as the dependent variables. Dummy variables are included to indicate whether the firm has relocated in the time span analysed and whether the firm-year observation comes from post-relocation period of relocated firms. This allows us to compare both non-relocating firms (reference category) with relocating firms and relocating firms before and after relocation. Firm observations from the first year before the relocation to the first year after the relocation are excluded in order to eliminate the effects of short-term turbulence around the relocation.

As Table 4 shows, relocating firms hire their employees further away, yet the hiring distance does not decrease after the relocation, contrary to what Hypothesis 1 predicts. Also, relocated firms have more highly educated employees but there is no evidence that the education level is affected by the relocation itself; this does not conform to Hypothesis 2 predicting that relocation is instrumental in upgrading the skill base.

Table 4. Effects of firm relocation on education level of employees and mean hiring distance

	Dep. var. = EDUC	Dep. var. = HIRINGDIST
Relocation variables		
RELFIRM	0.060 (0.016)***	14.935 (1.704)***
AFTERREL	0.001 (0.012)	-0.065 (1.145)
(2nd year after rel.	-0.010 (0.015)	-2.365 (1.730)
3rd year after rel.	0.009 (0.014)	0.925 (1.472)
4th year after rel.)	0.000 (0.013)	0.457 (1.451)
Firm level variables		
SIZE	0.001 (0.000)***	0.076 (0.012)***
TENUREMAX	0.002 (0.000)***	-0.144 (0.015)***
EDUC		12.274 (0.472)***
Industry and region variables		
Industry: UCON (MANUF being the reference category)	0.030 (0.007)***	1.171 (0.436)**
Industry: WHOLESALE	0.056 (0.006)***	3.920 (0.381)***
Industry: RETAIL	0.060 (0.005)***	0.362 (0.320)
Industry: OTHERSERV	0.068 (0.005)***	1.113 (0.313)***
Industry: KNOWLSERV	0.069 (0.007)***	0.125 (0.440)
LQ	-0.002 (0.001)**	0.921 (0.286)***
POPDENS	0.011 (0.003)***	-1.880 (0.210)**
EDUCREGIND	0.942 (0.013)***	15.578 (0.980)***
Year dummies	+	+
N	133497	114233
Prob > F	0.0000	0.0000
R squared	0.5061	0.1341

Notes: Standard errors clustered by firm in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

In conclusion, while relocating firms are different from non-relocating firms along several dimensions of human capital, we do not find evidence that the spatial match with the employees or the quality of labour force are improved by the relocation.

4.3.2 Robustness checks

Several robustness checks are performed (see Tables A6 and A7 in the Appendix for detailed results). First, in the analysis in subsection 4.3.1 we have excluded the observations from the first year before the relocation to the first year after the relocation in order to eliminate the influence of short-term turbulence around the relocation. Since the relocation-related peak in hiring distance is earlier than the peak for other variables (Figure 2), here we check whether the results change if the observations from the second year before the relocation are also excluded.

In addition, the regression on mean hiring distance is only performed on those firms that have hired in a certain year. If the firms that cannot find good matches in the proximity do not hire and if the relocation provides the firms with better hiring opportunities, it is possible that OLS underestimates the effects of relocation. To check this, Heckman correction has been conducted with the following selection variables: firm size, working age population density, industry, year and relocation variables. Heckman estimation is conducted on the dataset with observations removed from the second year before the relocation to the first year after the relocation.

We also conduct the same analysis with a different definition of long-distance relocation: 60 instead of 30 kilometres between the new and the old locations, measured between the centres of municipalities. The results remain very similar.

Additionally, while the education level in a region-industry combination is calculated for fairly large combinations of broadly defined region (NUTS 3 area) and industry (2-digit level

of NACE rev.2), it is still possible that some big firms dominate region-industry combinations, thus making the education level in a region-industry a very good predictor for the education level in the firm. However, the findings are robust to the exclusion of education level in region-industry.

Thus also after the robustness checks we find no evidence that good access to employees or labour force with high levels of general human capital serve as pull-factors for relocating firms.

5 Conclusions

This paper examines to what extent human capital influences firms' long-distance relocation decisions. It tests whether firm relocation is driven by the considerations of geographical proximity to labour force and also whether relocation is instrumental in changing the composition of employment in the firm.

We demonstrate that not disrupting the spatial relationships with the labour force is an important consideration of relocating firms. Long-distance relocations are infrequent and they happen predominantly among firms that have very long commuting and hiring distances already before the relocation, indicating low dependence on the local labour markets, local knowledge and networks. In addition, great initial commuting distances enable the firms to have long moves without increase in the employees' commuting distances. However, relocation fails to statistically significantly shorten the hiring distances. This suggests that different hiring practices are to a great extent determined by different firms' needs rather than different labour markets. Possibly, the hiring distances depend also on the knowledge of the local market and participation in local networks, which explains why the newcomers are less efficient.

We also show that general human capital functions neither as a keep factor nor as a pull factor. While based on, for instance, Florida (2002) it could be expected that the spatial differentials in skill level inflict response in firms' spatial behaviour, having highly skilled employees does not deter firms from exiting the region and relocation does not result in skill upgrading. There can be several explanations for this. It is possible that the exceptional position in the labour market of the highly skilled is overrated. While there is little doubt about the growing demand for skills, the scarcity of skills is still very much debated. Furthermore, even if the war for talent is real, it is not clear how prevalent its manifestations are. Talent in the traditional sense of the word defines a rare, exceptional ability, possessed only by a minority, and this becomes even clearer if the discussion is framed in terms of firm's competitive advantage in the global world.

We find mixed evidence depending on the relocation distance that firm-specific human capital functions as a keep factor. The positive results are in line with Stam's (2007) observations that firms value continuity and are unwilling to disrupt employment relationships.

The findings discussed have several implications with regard to the dynamics of people and jobs. If the importance of human capital has grown in comparison to the importance of other production factors and if firms face an unmet demand for human capital, we could expect to see that firms relocate to regions where they can hire a higher quality labour force. However, we find no evidence that relocation influences general human capital levels. Also, relocating firms tend to retain highly educated employees and hire lower educated employees in the new location, showing little reliance on the labour supply in the new location for their core employees. The lack of evidence for general human capital attracting jobs calls into question the efficiency of policies aimed at improving local amenities in order to attract highly skilled labour force and to consequently simulate job creation (see Peck 2005). It is also doubtful whether the oft-prescribed promoting of educational attainment of the labour force (e.g., Goldin and Katz 2009) can lead to considerably more jobs or to better jobs.

What we do find is the keep effect of the labour force. Relocating firms tend to be the firms where relocation is less of a threat to the spatial match with the employees and subsequently also

to employment continuity. It is however more difficult to pinpoint what exactly the firms value in the employees so they want to retain them: we find no evidence for general human capital for the employees keeping firms put and mixed evidence for firm-specific human capital. Curiously, while we find some evidence for the role of firm-specific human capital as a location factor, trends such as labour market flexibilization and decline in employer-provided training (Cappelli 2014), point towards employees accumulating less firm-specific capital and firms subsequently becoming more footloose in the future. The findings on human capital as a keep factor are more difficult to extend to understand other mechanisms of regional job creation, yet they call for more attention to the matching of people’s skills and the needs and capacities of firms rather than human capital as an isolated concept.

The findings, however, should be qualified by the time period, which is the years of and around the great recession. In the recession years, firms’ location preferences might be less pronounced: firms are less willing to commit to a costly relocation to pursue long-term benefits. The recession might also blur the differences between locations in terms of human capital as the labour force is more abundant and more willing to spatially adjust. For those reasons, our results are likely to be an underestimation. It would therefore be interesting for future research to also utilize longer time series to be able to better separate the structural and cyclical effects.

In the light of those findings, policy measures seem to have little effect on firms that are embedded in the local labour market. Other firms’ mobility behaviour can be influenced, yet the relocated firm effect on local job creation could be lower than expected as the relocating firms tend to retain fairly many employees with them, especially the highly educated employees. Context should be kept in mind when generalizing those findings: the results are derived from a sample of single-plant firms that are not a typical target for relocation subsidies and might be more geographically embedded than the multiplant firms. Also, we looked into firm migration in the Netherlands, a fairly small and densely populated country. The sheer size of the country limits the firm’s ability to move to locations truly inaccessible to the old employees. Fairly equal population distribution leaves much room for manoeuvring both for the firms and for the employees. The same might not apply to bigger countries with unequal population distribution. Even then, long-distance relocation is an infrequent event in many countries in spite of regional competition for firms and attachment to internal labour force might be a good starting point to explain firm immobility in various contexts.

Appendix

Table A1. Industries excluded from the analyses

NACE rev 2. industry code	NACE rev 2. industry title
A	Agriculture, forestry and fishing
B	Mining and quarrying
78 in N	Employment activities
O	Public administration and defence, compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
T	Activities of households as employers; undifferentiated goods-and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies

Table A2. Summary of relocating firms' characteristics in time

	2 years before relocation		1 year before relocation		Year of relocation		1 year after relocation		2 years after relocation		Non- relocated, 2007		Non- relocated, 2011	
	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.	Mean	Std. dev.
Employment dynamics														
Employment growth (in FTEs)	0.48	2.02	0.49	1.42	0.45	1.90	0.14	0.44	0.10	0.35	0.35	16.42	0.05	0.33
CHURN	0.80	0.84	0.67	0.83	0.82	1.24	0.71	0.90	0.70	0.94	0.71	0.84	0.63	0.89
Share of retained FTEs that were in the firm in the year before relocation							0.58	0.27	0.51	0.27				
TENURE	3.05	1.86	3.00	1.98	2.91	1.90	3.25	1.74	3.57	1.63	3.67	2.35	5.05	2.23
Tenure of retained employees, weighting by FTE			2.70	1.73										
Access to employees														
ALLDIST	37.6	26.0	44.8	31.1	33.5	24.3	31.7	24.8	31.1	25.3	12.8	18.3	13.3	19.2
HIRINGDIST	39.6	29.7	48.0	36.5	31.7	28.5	31.0	29.4	30.9	32.3	10.3	12.4	10.8	13.2
Mean distance to retained employees, weighting by FTE			49.1	33.6	36.2	27.6	35.3	27.7						
Employees' skill level														
EDUC	0.41	0.33	0.43	0.35	0.41	0.35	0.41	0.34	0.42	0.35	0.20	0.30	0.22	0.31
EDUC of retained employees			0.48	0.39										
EDUCREGIND			0.39	0.23			0.40	0.24			0.23	0.22	0.25	0.22
N	130		239		365		329		266		24797		26017	

Notes: For some variables N is lower than shown. Timeframe shown for relocated firms is selected to have a sufficiently large and consistent firm sample. For non-relocated firms the statistics are shown for years 2007 and 2011 to illustrate the time trend. Where a time trend is observed, it is fairly linear.

Table A3. Descriptive statistics of variables

Variable	N	Mean	Standard deviation
CHURN	134470	0.65	0.88
TENURE	134470	4.24	2.36
HIRINGDIST	115097	13.40	19.37
EDUC	134470	0.21	0.30
SIZE	134470	8.75	18.33
ALLDIST	134470	10.92	13.53
TENUREMAX	134470	10.67	6.60
WORKLOAD	134470	0.65	0.25
HHI	134470	0.04	0.01
LQ	134470	1.12	1.16
POPDENS	134470	0.56	0.45
EDUREGIND	134470	0.24	0.22
POSGROWTH	134470	0.43	0.49
NEGGROWTH	134470	0.32	0.47
NOINFLOWS	134470	0.14	0.35

Table A4. Correlation table of continuous variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
TENURE (1)	1.00											
CHURN (2)	-0.37	1.00										
HIRINGDIST (3)	-0.03	0.01	1.00									
ALLDIST (4)	-0.06	-0.01	0.68	1.00								
EDUC (5)	0.07	-0.12	0.32	0.33	1.00							
SIZE (6)	0.06	-0.03	0.13	0.14	0.17	1.00						
TENUREMAX (7)	0.74	-0.20	0.00	-0.04	0.07	0.30	1.00					
WORKLOAD (8)	0.17	-0.22	0.26	0.27	0.39	0.20	0.15	1.00				
HHI (9)	0.02	0.00	-0.00	-0.02	-0.02	-0.01	0.02	-0.01	1.00			
LQ (10)	0.00	-0.01	0.10	0.12	0.09	0.12	0.04	0.08	-0.02	1.00		
POPDENS (11)	-0.05	0.03	0.05	0.05	0.20	0.06	-0.02	0.12	0.38	0.08	1.00	
EDUCREGIND (12)	0.05	-0.12	0.32	0.34	0.71	0.17	0.05	0.47	-0.04	0.14	0.26	1.00

Table A5. Robustness checks: the effects of different aspects of human capital on firm's propensity for long-distance relocation, log odds

	Dep. var. = long distance relocation			
	Independent variables measured in the second year before relocation fact	Independent variables measured in the third year before relocation fact	Independent variables measured in the fourth year before relocation fact	Long distance relocation defined as relocation over distance greater than 60 km
Human capital variables				
EDUC	0.483 (0.342)	0.689 (0.491)	0.954 (1.036)	0.856 (0.608)
TENURE	-0.211 (0.089)**	-0.240 (0.118)**	-0.143 (0.178)	-0.096 (0.156)
HIRINGDIST	0.001 (0.004)	-0.001 (0.005)	0.019 (0.006)**	0.001 (0.005)
ALLDIST	0.030 (0.004)***	0.029 (0.005)***	0.013 (0.006)***	0.038 (0.007)***
Firm level control variables				
INFLOWS	-0.728 (0.432)*	-0.066 (0.505)	-0.043 (1.024)	-0.690 (0.714)
SIZE	-0.003 (0.004)	0.002 (0.002)	0.005 (0.002)**	0.003 (0.004)
POSGROWTH	-0.141 (0.253)	0.075 (0.344)	0.865 (0.756)	0.333 (0.395)
NEGGROWTH	0.254 (0.274)	0.370 (0.389)	1.082 (0.878)	0.672 (0.445)
TENUREMAX	0.020 (0.027)	-0.006 (0.039)	0.043 (0.054)	-0.009 (0.047)
WORKLOAD	1.687 (0.595)**	0.953 (0.741)	-0.261 (1.444)	1.051 (1.103)
Industry and region control variables				
Industry: UTILCON (MANUF being the reference category)	-0.082 (0.756)	- ¹		- ²
Industry: WHOLESALE	-0.300 (0.563)	-1.821 (1.127)	- ³	12.700 (0.664)***
Industry: RETAIL	0.696 (0.571)	0.689 (0.682)	-0.606 (0.913)	13.751 (0.823)***
Industry: OTHERSERV	0.360 (0.508)	0.402 (0.583)	-0.586 (0.878)	13.686 (0.639)***
Industry: KNOWLSERV	-0.366 (0.497)	-0.303 (0.592)	-1.254 (1.087)	12.488 (0.467)***
HHI	-10.773 (15.578)	-9.257 (22.168)	-234.383 (71.089)***	-39.629 (40.905)
LQ	-0.643 (0.234)**	-0.818 (0.409)**	-1.913 (0.795) **	-1.839 (0.535)***
POPDENS	0.0180 (0.0219)	0.201 (0.299)	-0.929 (0.812)	0.124 (0.499)
EDUCREGIND	2.544 (0.771)***	2.720 (1.133)**	0.847 (2.497)***	2.755 (1.463)*
Dummies: maximum number of years that the observation precedes the relocation fact				+
Year dummies				
N	76086 +	47718 +	22587	76171 +
Mc Fadden's pseudo R squared	0.1367	0.1283	0.1511	0.2394

Notes: ¹UTILCON predicts failure perfectly, therefore it has been recoded into one industry together with MANUF (reference category). ²UTILCON predicts failure perfectly, therefore it has been recoded into one industry together with MANUF (reference category). ³WHOLESALE predicts failure perfectly, therefore it has been recoded into one industry together with RETAIL. Standard errors clustered by firm in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A6. Robustness checks: adjustments after the relocation, as described in section 4.3.2

Changes made with regard to regressions in Table 3	Dep. var. = EDUC	Dep. var. = HIRINGDIST	
	With EDUCREGIND excluded	With records in the second year before the relocation excluded	Heckman estimation (with records in the second year before the relocation excluded)
Relocation variables			
REL FIRM	0.103 (0.018)***	12.401 (1.950)***	12.327 (1.951)***
AFTERREL	0.011 (0.014)	−1.091 (1.149)	−0.961 (1.148)
(2nd year after rel.	−0.002 (0.017)	−0.401 (1.742)	−0.517 (1.739)
3rd year after rel.	0.021 (0.016)	2.114 (1.449)	1.999 (1.451)
4th year after rel.)	0.010 (0.014)	1.016 (1.459)	0.868 (1.458)
Firm level variables			
SIZE	0.001 (0.000)***	0.075 (0.012)***	0.071 (0.011)***
TENUREMAX	0.002 (0.000)***	−0.143 (0.015)***	−0.154 (0.015)***
EDUC		12.251 (0.472)**	12.127 (0.472)***
Sector and region variables			
Industry: UCON (MANUF being the reference category)	−0.039 (0.008)***	1.156 (0.436)**	1.327 (0.437)**
Industry: WHOLESALE	0.061 (0.007)***	3.922 (0.381)***	3.986 (0.38)***
Industry: RETAIL	−0.058 (0.006)***	0.356 (0.320)	0.332 (0.321)
Industry: OTHERSERV	−0.015 (0.006)**	1.104 (0.313)***	0.846 (0.313)**
Industry: KNOWLSERV	0.387 (0.006)***	0.111 (0.440)	−0.062 (0.440)
LQ	0.006 (0.002)***	0.923 (0.286)***	0.927 (0.285)***
POPDENS	0.078 (0.003)***	−1.869 (0.210)**	−1.919 (0.210)***
EDUCREGIND		15.626 (0.981)***	16.064 (0.983)***
Year dummies	+	+	+
			Heckman selection
Size: 2 to 4.99 FTEs (reference category being less than 2 FTEs)			0.147 (0.017)***
Size: 5 to 9.99 FTEs			0.819 (0.021)***
Size: more than 10 FTEs			1.645 (0.028)***
Industry: UCON (MANUF being the reference category)			−0.365 (0.036)***
Industry: WHOLESALE			−0.066 (0.030)**
Industry: RETAIL			0.210 (0.029)***
Industry: OTHERSERV			0.604 (0.028)***
Industry: KNOWLSERV			0.367 (0.035)***
POPDENS			0.068 (0.015)***
EDUCREGIND			−1.008 (0.060)***
Year dummies			+
REL FIRM			0.023 (0.108)
AFTERREL			0.210 (0.083)**
rho			−0.105 (0.007)***
sigma			17.836 (0.184)***
N	133497	114110	133367 (114110 uncensored)
Prob > F	0.0000	0.0000	0.0000
R squared	0.3807	0.1328	

Notes: Standard errors clustered by firm in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table A7. Robustness checks: sensitivity to relocation distance, as described in section 4.3.2. Only the effects of relocation dummies are shown.

	Dep. var. = EDUC	Dep. var. = HIRINGDIST
Relocation variables		
RELFIRM	0.077 (0.028)**	26.982 (3.484) ***
AFTERREL	0.011 (0.018)	−1.334 (1.976)
(2nd year after rel.	−0.007 (0.023)	−7.517 (3.243)**
3rd year after rel.	0.017 (0.012)	2.338 (2.573)
4th year after rel.)	0.017 (0.020)	−0.922 (1.785)
Other variables as in regressions in Table 3	+	+

Notes: Standard errors clustered by firm in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

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Resumen. Este artículo examina el papel del capital humano como un factor de localización en el contexto de las deslocalizaciones de larga distancia de las empresas. A partir de datos de calidad de registro de empresas de una sola planta en los Países Bajos entre 2006-2011, el artículo se pregunta si la reubicación está motivada por el deseo de mejorar el acceso para los empleados y la calidad de la mano de obra. La no interrupción de las relaciones espaciales existentes es una consideración importante a la hora de deslocalizar empresas pero, en general, la reubicación no se traduce en una mejor adecuación espacial. Se encontraron algunas pruebas del funcionamiento del capital humano específico de las empresas como factor de permanencia. Las empresas que se trasladan retienen predominantemente los empleados altamente cualificados, pero el capital humano en general no funciona ni como factor de permanencia ni como factor de atracción.

抄録: 本稿では、企業の長距離移転における立地の決定要因としての人的資本の役割を検討する。2006年から2011年のオランダにおける単一の生産拠点をもつ企業に関する豊富な登録データを用いて、従業員の通勤と労働力の質を改善・向上することを目指して移転が行われるかどうかを検討する。空間的な関係性を壊さないことが移転企業にとっての重要な検討事項であるが、概して、移転によっては空間的マッチングが改善されることはない。キープ要因(keep factor)として機能する企業特異的な人的資本に関するいくつかのエビデンスが認められる。移転を行う企業は、主に技能の優れた従業員を保持するが、一般的な人的資本そのものは、キープ要因としてもプル要因としても、いずれにも機能していないのである。